

NATIONAL ENERGY BOARD

IN THE MATTER OF the *National Energy Board Act*, R.S.C. 1985, c. N-7, as amended, (“NEB Act”) and the Regulations made thereunder;

AND IN THE MATTER OF THE *Canadian Environmental Assessment Act, 2012*, S.C., 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 Pipeline L.P. (collectively “Trans Mountain”) for a Certificate of Public Convenience and Necessity and other related approvals pursuant to Part III of the NEB Act.

**FINAL ARGUMENT OF
LIVING OCEANS SOCIETY AND
RAINCOAST CONSERVATION FOUNDATION**

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Date submitted

Dyna Tuytel, Karen Campbell and Margot Venton
Barristers and Solicitors
Representatives for Living Oceans Society and Raincoast Conservation Foundation
900 – 1000 5th Ave. SW
Calgary, AB T2P 4V1
dtuytel@ecojustice.ca, kcampbell@ecojustice.ca, mventon@ecojustice.ca

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PART I - Introduction

A) Living Oceans Society and Raincoast Conservation Foundation's position

1. Living Oceans Society ("Living Oceans") and Raincoast Conservation Foundation ("Raincoast") submit that Board cannot and should not recommend the approval of the proposed Trans Mountain Expansion Project (the "Project") at the conclusion of its review of the Project (the "Project Review").
2. Trans Mountain ULC ("Trans Mountain") has not provided a complete environmental assessment. Trans Mountain's environmental assessment does not adequately identify the Project's environmental effects, the significance of its effects, and mitigation measures. As a result, the Board cannot complete its environmental assessment as required by s. 19(1)(a), (b) and (d) of the *Canadian Environmental Assessment Act, 2012* ("CEAA 2012")¹ and s. 52(3) of the *National Energy Board Act* ("NEB Act")².
3. The Project would have significant adverse environmental effects, including effects that will jeopardize the survival and recovery of the endangered southern resident killer whale population, and they are not justified in the circumstances. The Board should recommend as such in its report, pursuant to CEAA 2012 ss. 29(1)(a) and 31(1)(a).
4. Further, the assessment has not met the additional requirements imposed by the *Species at Risk Act* ("SARA")³, including, but not limited to, failing to consider all adverse impacts and failing to mitigate all adverse impacts regardless of significance.
5. If weighed against each other, the Project's adverse effects outweigh its benefits. The Board should therefore recommend *against* approval.

¹ *Canadian Environmental Assessment Act, 2012*, SC 2012, c 19, s 52, s 19 [CEAA 2012].

² *National Energy Board Act*, RSC 1985, c N-7, s 52(3) [NEB Act].

³ *Species at Risk Act*, SC 2002, c 29 [SARA].

6. In the event that the Board does recommend in favour of the Project, Living Oceans and Raincoast request that the Board recommend additional and amended conditions that Trans Mountain must meet.

B) About Living Oceans and Raincoast

7. Living Oceans and Raincoast are not-for-profit organizations which are intervenors in this proceeding.

8. Living Oceans' organizational mission is to advance science-based policy recommendations to achieve conservation of oceans and the human communities that depend on them. This includes commissioning research concerning aspects of oil and gas development and transportation that affect the marine environment. Living Oceans filed expert evidence concerning the fate and effects of oil spills in the marine environment, the Project's air quality and human health impacts, and the economic and other costs and benefits of the Project.

9. Raincoast is a team of conservationists and scientists dedicated to using conservation science to protect the land, waters and wildlife of coastal British Columbia, including wild salmon, marine mammals and seabirds. Much of Raincoast's research concerns species and geographical areas that would be affected by the Project. Raincoast's evidence focused on the Project's impacts on marine forage fish, Fraser River salmon and other Fraser River fish species, and on the endangered southern resident killer whales (the "Southern Residents").

PART II - The legal requirements governing this Project Review

10. Pursuant to s. 52(1) of the NEB Act, the Board must submit a report to the Minister setting out its recommendation as to whether the Governor in Council should direct the Board to issue a certificate for the Project.⁴

⁴ NEB Act, s 52(1).

11. The Board's review of the Project, which includes the environmental assessment, must meet several specific legal requirements under the NEB Act, CEAA 2012, and SARA. These are mandatory pre-requisites to the Board making a recommendation to the Governor in Council.

12. CEAA 2012 requires that the Board must: (a) ensure that an environmental assessment of the Project is conducted (s. 22(a)); (b) ensure that a report is prepared with respect to that environmental assessment (s. 22(b)); (c) ensure that any interested party is provided with an opportunity to participate in the environmental assessment (s. 28); (d) set out its recommendations as to whether or not the Project is likely to cause significant adverse environmental effects, and if so, if those effects can be justified in the circumstances (s. 29(1)(a); s. 31(1)(a)); (e) set out its recommendation with respect to a follow-up program (s. 29(1)(b)); and (f) submit its report to the Minister (s. 29(2)).

13. As the Project is likely to affect listed wildlife species and their critical habitat, the Project Review must also meet additional obligations prescribed by SARA.⁵

14. Environmental legislation, including CEAA 2012 and SARA, should be interpreted and applied consistently with the precautionary principle, which stipulates that “[w]here there are threats of irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.”⁶ The precautionary principle is codified in CEAA 2012, which specifically states that projects should be assessed in a “careful and precautionary manner” and requires the Board to “exercise [its] powers [under CEAA 2012] in a way manner that protects the environment and human health and applies the precautionary principle.”⁷

15. Trans Mountain states that “[t]he objective of an EA is not to prevent development from occurring” and that “the purpose of an EA is to ensure that environmental effects of a project are identified and considered along with its benefits

⁵ SARA, s 79.

⁶ *114957 Canada Ltée (Spraytech, Société d'arrosage) v Hudson (Town)*, 2001 SCC 40 at para 31.

⁷ CEAA 2012, s 4(1) and (2).

before a project is allowed to proceed.”⁸ Similarly, an environmental assessment is not a formality, or a guarantee of an approval with conditions. Environmental assessment is a “planning tool that is now generally regarded as an integral component of sound decision-making”, that has an information-gathering and a decision-making component.⁹

16. At the conclusion of its Project Review, including the environmental assessment, the Board may recommend for or against the Project. Living Oceans and Raincoast submit that the deficiencies of the environmental assessment and the adverse effects of the Project are such that the Board should recommend against approval.

A) The NEB Act requires the Board to evaluate whether the Project is in the public interest

17. Section 52(1)(a) of the NEB Act specifies that the Board’s recommendation must take into account “whether the pipeline is and will be required by the present and future public convenience and necessity”.

18. Subsection 52(2) of the NEB Act states that the Board “shall have regard to all considerations that appear to it to be directly related to the pipeline and to be relevant, and may have regard to [...] (e) any public interest that in the Board’s opinion may be affected by the issuance of the certificate”.

19. The Board has previously interpreted the “public interest” as “inclusive of all Canadians” and referring to “a balance of economic, environmental and social interests that changes as society’s values and preferences evolve over time.” When making a public interest determination pursuant to s. 52 of the NEB Act, the Board must balance the total benefits and burdens of the Project.¹⁰

⁸ Exhibit B444-2, Trans Mountain Revised Final Argument (clean) [Trans Mountain Revised Final Argument], Filing ID A4W6L8, at pages 220, 221.

⁹ *Friends of the Oldman River Society v Canada (Minister of Transport)*, [1992] 1 SCR 3 at pages 46-47.

¹⁰ *Emera Brunswick Pipeline Company Ltd* (2007), NEB Decision GH-1-2006 at para 307. See also National Energy Board, *Pipeline Regulation in Canada: A Guide for Landowners and the Public* (Calgary: National Energy Board, 2010) at page 1.

20. Raincoast and Living Oceans submit that, when viewed in its entirety, the Project's many burdens outweigh its benefits such that it is not in the public interest.

B) CEAA 2012 requires the Board to consider certain factors in this environmental assessment

21. The NEB Act requires, pursuant to s. 52(3), that the Board's report to Cabinet must include the Board's environmental assessment of the Project prepared in accordance with CEAA 2012.

22. Pursuant to s. 19(1)(a), (b) and (d) of CEAA 2012, the Board must take into account the following factors, among others, in the environmental assessment:

(a) the environmental effects of the designated project, including the environmental effects of malfunctions or accidents that may occur in connection with the designated project and any cumulative effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out;

(b) the significance of the effects referred to in paragraph (a); [...] and

(d) mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project. (emphasis added)

23. Trans Mountain's environmental assessment consists of the Environmental and Socio-Economic Assessment provided as part of its Application, the Technical Data Reports filed as part of its Application, and further information filed in responses to Information Requests or filed by Trans Mountain in support of the Application.

24. Living Oceans and Raincoast submit that Trans Mountain's environmental assessment has not adequately considered the environmental effects or the cumulative effects of the Project, and that it therefore also cannot adequately evaluate the significance of those effects. Furthermore, it does not consider mitigation measures that are technically and economically feasible.

25. Given these deficiencies, the Board cannot recommend in favour of the Project, as it would not be fulfilling its statutory obligations under the NEB Act and CEAA 2012.

C) CEAA 2012 requires the Board to recommend whether significant adverse environmental effects are justified

26. Section 31(1)(a) of CEAA 2012 requires the Governor in Council, taking into account any mitigation measures identified in the Board's report, to decide whether the Project is likely to cause significant adverse environmental effects, and if so whether those effects are justified in the circumstances.

27. Section 29(1)(a) of CEAA 2012 requires the Board to include in its report to the Governor in Council a recommendation about whether the project, taking into account mitigation measures, is likely to cause significant adverse environmental effects and if so whether those effects are justified in the circumstances.

28. As discussed in Part III below, the Project will cause significant adverse environmental effects. These effects cannot be justified in the circumstances. Therefore, Board should recommend as such to the Governor in Council, and should not recommend approval of the Project.

D) SARA imposes additional legal requirements on the Board

29. Because the Project will affect SARA-listed wildlife species, including the Southern Residents, section 79(2) of SARA imports additional requirements into the environmental assessment and imposes additional, heightened legal obligations on the Board. The Board must meet these obligations to lawfully complete the environmental assessment.

30. These obligations are in addition to the requirements for the assessment of the environmental effects of the Project. Meeting the requirements of the NEB Act and CEAA 2012 does not mean that SARA obligations are met.¹¹

31. Section 79(2) of SARA applies when a project is likely to affect a listed species or its critical habitat.¹² Section 79(2):

- a) Establishes a requirement for the Board to ensure that the environmental assessment identifies all adverse effects of the Project on a listed wildlife species and its critical habitat, and, if the Project is carried out, to ensure that those effects are mitigated and monitored;
- b) Establishes a requirement for the Board to ensure that measures are taken to avoid or lessen all adverse effects of the Project on listed wildlife species and critical habitat, regardless of the significance of those effects; and
- c) Establishes a requirement that, if a recovery strategy or action plan exists for the species, the measures must be taken in a way that is consistent with that recovery strategy or action plan.¹³

32. The Board's Filing Manual reflects these additional SARA-specific requirements, stating that SARA listed species, "are at risk in large part as a result of past cumulative

¹¹ Environment Canada and Parks Canada, *Addressing Species at Risk Act Considerations under the Canadian Environmental Assessment Act for Species under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada* (Ottawa: Government of Canada, 2010) [*Addressing Species at Risk Act Considerations*] at pages 5, 13-16, 34, 36-37, 42; Environment Canada and Parks Canada, *The Species at Risk Act Environmental Checklists for Species under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada: Support Tool for the Required Elements under the Species at Risk Act for Environmental Assessments conducted under the Canadian Environmental Assessment Act*, (Ottawa: Government of Canada, 2010) [*The SARA Environmental Checklists*] at pages 7, 10-11.

¹² SARA, s 79(1).

¹³ Environment Canada and Parks Canada, *Addressing Species at Risk Act Considerations* at pages 5, 13-16, 34, 36-37, 42; Environment Canada and Parks Canada, *The SARA Environmental Checklists* at pages 7, 10-11.

effects on their habitat” and have “crossed a threshold requiring special actions for their protection and recovery”, such that “any additional residual effects have the potential to further contribute to this existing situation”, and “[c]onsequently, proposed projects must preferably avoid, or fully mitigate or compensate for any residual project contribution to cumulative effects” (emphasis added).¹⁴

33. Trans Mountain’s environmental assessment fails to consider or fully address potentially adverse Project-related effects on the Southern Residents and their critical habitat, including acoustic impacts on whales and degradation of the acoustic quality of critical habitat; contamination of critical habitat; and effects of reduced availability of Chinook salmon on Southern Residents and their critical habitat.

34. Trans Mountain fails to propose mitigation measures to “avoid or lessen” adverse Project-related effects it deems “not significant”, such as the impacts of an oil spill. There is a lack of mitigation measures proposed to deal with effects of an oil spill in critical habitat, and therefore a failure to include “measures specific to killer whales” which are recommended in the *Recovery Strategy for the Northern and Southern Resident Killer Whales (Orcinus orca) in Canada* (the “Southern Resident Recovery Strategy”).¹⁵ Trans Mountain fails to propose measures to “avoid or lessen”, or “fully mitigate”, all of the adverse environmental effects of increased tanker traffic on Southern Residents.

35. If the Project is approved, the evidence before the Board indicates that it will have significant adverse effects on Southern Residents and their critical habitat, for which no specific mitigation is proposed, which will jeopardize the Southern Residents’ survival and recovery.

¹⁴ National Energy Board, *Filing Manual*, (Calgary: National Energy Board, 2004), Release 2015-01 at page 4A-52.

¹⁵ Exhibit C291-1-4, Attachment C to written evidence of Raincoast – Recovery Strategy for the Northern and Southern Resident Killer Whales – Fisheries and Oceans Canada [Recovery Strategy], Filing ID A4L9F9, at page 45.

PART III - Evidence of adverse environmental impacts

36. Living Oceans and Raincoast submit that the evidence before the Board shows that the Project will cause significant adverse environmental effects which are not justifiable, and that the Project is not in the public interest. Living Oceans and Raincoast also have identified instances where the Application is so flawed or deficient as to render the environmental assessment incomplete; in these instances, there may be likely additional significant adverse environmental effects that cannot be adequately evaluated due to these shortcomings.

37. The Project is a proposed expansion of the existing Trans Mountain pipeline from Edmonton, Alberta to Burnaby, British Columbia. It would carry diluted bitumen from the oil sands to be loaded onto tankers at the Westridge Marine Terminal in Burnaby, for shipment overseas. The pipeline would parallel the Fraser River for approximately 140 km and cross the main stem of the Fraser. From Westridge, Aframax and Panamax tankers would travel through the Salish Sea, and their numbers would increase from approximately five to approximately 34 arriving at Westridge each month, which is equivalent to an increase from 120 to 816 tanker transits annually, and a 13.5% increase in vessel traffic in the shipping lanes.

38. This section presents evidence regarding the Project-related effects on fish in the Fraser River, including salmon and SARA-listed species; effects on marine forage fish; effects on endangered Southern Residents and their critical habitat; marine oil spills; effects on air quality and human health; and economic considerations. There are other Project-related impacts beyond these, which are addressed by other intervenors. However, based on the evidence of the impacts described below alone, Living Oceans and Raincoast submit that the Project is not in the public interest.

A) The Project's adverse effects on Fraser River fish and marine forage fish

39. The Project's pipeline and tanker route will have adverse effects on fish, including the Fraser River's salmon runs, SARA-listed and provincially-listed at risk species, and forage fish such as Pacific Herring. Given the commercial, cultural and

ecological importance and the conservation status of many of these species, the adverse effects of a spill from the pipeline where it runs adjacent to or crosses the lower Fraser River and its tributaries or a spill from a tanker would be significant.

1) The Fraser River is globally significant fish habitat and vulnerable to oil spills

40. The Fraser River is a river of national and global significance that supports many fish species of cultural, commercial and ecological importance, and at-risk fish species. The Fraser River has been under stress due to human activities for years; due to this ecological context many fish stocks are greatly reduced. As the evidence below shows, due to the myriad species that rely on the river and the year-round presence of fish at various life stages, there is no safe time for an oil spill in the Fraser River. At any time of year, important fish species will be present and vulnerable to the effects of a spill.

41. The Lower Fraser River (also “Lower Fraser” or “Fraser”)¹⁶ and its tributaries are home to 42 species of fish, including nine species of salmonids, two species of sturgeon, and forage fish species.¹⁷

42. The Lower Fraser and its tributaries are home to numerous at-risk fish species, including SARA-listed white sturgeon (Upper Fraser River population), green sturgeon, salish sucker, and nooksack dace, as well as provincially red-listed (endangered or threatened) and blue listed (of special concern due to sensitivity to human activities or natural events) species, and at-risk populations which are recognized by the Committee on the Status of Endangered Wildlife in Canada (“COSEWIC”).¹⁸ It is also home to Chinook salmon which, as discussed in Part III-B below, are the main prey of the SARA-listed Southern Residents.

43. The Fraser River and estuary supports several species of forage fish, including Pacific herring, which are the dominant forage fish in B.C.’s coastal waters and are the

¹⁶ The Lower Fraser River is the 180km section from Hope to the Fraser River Estuary.

¹⁷ Exhibit C291-1-3, Attachment B to written evidence of Raincoast – Potential effects on salmon of an oil spill into the Fraser River – Logan [Logan], Filing ID A4L9F4, at pages 8-9.

¹⁸ *Ibid* at pages 8-9, 47-48.

crucial foundation of the marine food web.¹⁹ Pacific herring are a major prey species that support marine birds, mammals, and other fish species such as salmon, and, indirectly, those species' predators, including Southern Residents.²⁰

44. The Fraser River is one of the most productive salmon rivers in the world. It supports 56 Conservation Units (evolutionarily distinct and therefore irreplaceable populations) of five salmon species: Chinook, chum, coho, pink and sockeye. These salmon migrate in and out of the Lower Fraser through the estuary and rely on it to varying degrees as juveniles and adults, and are harvested in commercial, recreational and First Nations fisheries.²¹ Pink and chum salmon rely heavily on the Lower Fraser for spawning grounds, Chinook and coho spend a significant amount of time in the Lower Fraser River and estuary as juveniles, and all salmon species must pass through the Lower Fraser twice during their lifecycle.²²

45. The value of commercial salmon fisheries in recent years is approximately \$23-74 million, depending on sockeye returns, and recreational fishing contributes approximately \$604-705 million in expenditures and investments in BC, 63% of which is associated with salmon fishing.²³

46. Annual salmon returns fluctuate, but the overall trend across species over the last two decades is a decline.²⁴ Salmon face adverse effects of pollution from agricultural, industrial, and urban activities, as well as land use changes such as forestry and urbanization that alter stream hydrology, riparian cover and temperature.²⁵ Salmon returns are negatively impacted by increases in river temperature, and this effect interacts with a shift in the last two decades to earlier upriver migrations, causing increasing

¹⁹ Exhibit C291-1-2, Attachment A to written evidence of Raincoast – Evaluation of impacts on Pacific herring and other forage Fish, Dr. Fox [Fox], Filing ID A4L9F3, at page 3.

²⁰ *Ibid.*

²¹ Exhibit C291-1-3, Logan, Filing ID A4L9F4, at pages 8, 15, 16, 46-47.

²² *Ibid* at pages 47, 51-52, 59-60, 122-129.

²³ *Ibid* at page 47.

²⁴ *Ibid* at page 90.

²⁵ *Ibid* at pages 90-91.

mortality during upriver migration.²⁶ Invasive species and manmade structures pose additional challenges.²⁷ The cumulative effect is negative.

47. Juvenile Chinook, chum, pink and coho salmon are widespread over Sturgeon and Roberts Banks at the mouth of the Fraser and are found at low, middle and high intertidal habitats.²⁸ Most returning adult salmon migrate upstream through the main (south) arm of the River, but they also use other channels leading onto Sturgeon and Roberts Banks.²⁹

48. The Lower Fraser River provides critical nursery habitat for juvenile salmon.³⁰ The delta's intertidal mudflats are not only the entry and exit point for all migrating Fraser River salmon populations, they are also the substrate for invertebrates that support juvenile salmon that move into the lower estuary to feed and undergo osmoregulation changes.³¹ These invertebrates are also eaten by forage fish (including herring, sand lance, eulachon, longfin smelt, and surf smelt), which, along with juvenile salmon, are prey for larger predators such as waterfowl, shorebirds and raptors, marine mammals, and other fish including adult salmonids.³²

49. Salmon and other fish species are present year-round, either as residents in the Fraser River or at various life stages including incubating eggs and embryos, rearing and overwintering of juveniles, and migration and spawning by adults, such that no time of year is a safe time for a spill.³³

50. Chinook, for example, are vulnerable to exposure for much of the year.³⁴ Mature Chinook return in three broad groups from February to November. The most vulnerable are stream-type Chinook populations in tributaries intersected by the pipeline route, which are present there as juveniles throughout the year, and ocean-type Chinook

²⁶ *Ibid* at page 92.

²⁷ *Ibid* at pages 90, 93

²⁸ *Ibid* at page 49.

²⁹ *Ibid* at page 49.

³⁰ *Ibid* at pages 9, 19.

³¹ *Ibid* at page 19.

³² *Ibid* at page 21.

³³ *Ibid* at pages 10, 51-52, 122-136. For detailed species-specific explanations see pages 53-56.

³⁴ *Ibid* at page 54.

(including the largest Fraser Chinook population), which use the Lower Fraser and estuary extensively as juveniles in the spring.

51. A spill during peak migration of economically important, culturally significant or at-risk species, such as the spring outmigration of hundreds of thousands of juvenile Fraser salmon, could be devastating for those species, and for people who rely upon them as a source of sustenance, culture or livelihood.³⁵

52. In addition to the Fraser River, 380 salmon-bearing streams and rivers drain from Vancouver Island, the Gulf Islands, and the mainland into the Canadian portion of the Salish Sea, supporting another 48 Conservation Units of the five salmon species, which use estuaries and nearshore waters in Georgia Strait, Haro Strait and the Juan de Fuca Strait in the Salish Sea.³⁶ In total, 104 Conservation Units of these salmon species rely on the Salish Sea and its streams and rivers for spawning, rearing, staging and migration.³⁷

53. Fraser River salmon are also vulnerable to a spill from a tanker as they may use all waters in the Marine RSA for migration and foraging, and the marine shipping route overlaps important salmon areas and salmon migration routes.³⁸ Oil spills affecting Georgia Strait and the Salish Sea also have the potential to contaminate nearshore rearing habitat for juvenile salmon from the Fraser River and to affect dozens of salmon populations that rear and migrate in Georgia Strait and the Salish Sea.³⁹

2) Potential spills from the Project in the Fraser River

54. The pipeline would parallel the Fraser River for approximately 140 km through the Fraser Valley, crossing the Chilliwack/Vedder River and 24 other Lower Fraser River tributaries, until, west of the Salmon River, it would parallel close to the Lower Fraser

³⁵ *Ibid* at page 10.

³⁶ *Ibid* at pages 8, 21, 23. This does not include U.S.-based salmon populations.

³⁷ *Ibid* at pages 22-23.

³⁸ Exhibit B18-25, Vol 8A 4.2.6.5.2 to 4.2.26 Mar Trans Assess, Filing ID A3S4X9, at page 8A-144.

³⁹ Exhibit C291-1-3, Logan, Filing ID A4L9F4, at page 10.

River itself for 17km, before crossing the main stem of the Fraser just west of the Port Mann Bridge.⁴⁰

55. The route between the Salmon River and the point where the pipeline would cross the main stem of the Fraser is part of the 11 per cent of the pipeline which would use a new route, as opposed to using the existing route or any other existing rights of way.

56. A spill from the pipeline could reach the Fraser directly at a point where it crosses a stream or the river, or indirectly by spilling over land and travelling overland to the Fraser. Habitats most at risk are tributaries crossed by the pipeline, main stem reaches downstream of at-risk tributaries, and main stem reaches in close proximity to the pipeline; this includes much of the Lower Fraser River.⁴¹

57. The Application models the fate of diluted bitumen spilled from a full-bore pipeline rupture occurring at a location downstream of the Port Mann Bridge (500m west of the Port Mann Bridge, 400m from the Fraser River and 30km upstream from the mouth of the estuary).⁴² The Application presents a worst case scenario as a full-bore rupture at this location resulting in the release of 1250m³ of diluted bitumen.⁴³ This spill volume assumes perfect functioning of leak detection, the ability to shut off valves, and a lack of human error, resulting in detection and shutdown within 15 minutes.⁴⁴ The majority of the oil in this scenario would be transported directly into the Fraser River.⁴⁵

3) Effects of a spill from the Project on Fraser River fish

58. A spill in the lower Fraser or a tributary would spread quickly on the surface of the water and would move downstream.⁴⁶ Movement of the oil would depend in part on the time of year. The Application estimates that oil spilled near the Port Mann Bridge

⁴⁰ Exhibit B8-1, Vol 5C TR 5C7 01 of 45 Fish BC, Filing ID A3S2C1, at pages 1-3, 4-22 and 4-24.

⁴¹ Exhibit C291-1-3, Logan, Filing ID A4L9F4, at page 57.

⁴² Exhibit B18-15, Vol 7 TR 71 01 of 02 ERA Pipeline, Filing ID A3S4W9 at pages 6-16 to 6-17.

⁴³ *Ibid.*

⁴⁴ Exhibit C291-1-3, Logan, Filing ID A4L9F4, at pages 29-30.

⁴⁵ *Ibid* at pages 29-30.

⁴⁶ *Ibid* at page 10.

would take only one day to reach the Fraser River estuary in summer high flows, and one to two days in other seasons.⁴⁷

59. Oil would strand on shorelines, in different amounts depending on the time of year and corresponding flow levels. The Application likely underestimates stranding by assuming a straight channel and omitting from consideration factors such as channel braiding, debris, backwater, log jams and other impediments to waterborne travel, all of which are present in the Lower Fraser.⁴⁸ The amount of oil stranded on shorelines would vary from 60% to 80% stranding in the main stem within three days of a spill, depending on higher or lower flows; whether and how much oil would additionally strand in side channels, wetlands and sloughs would also vary.⁴⁹ A spill resulting in large amounts of diluted bitumen in confined sloughs and channels could be disastrous for juvenile salmon if it occurred during the spring outmigration of the juveniles of many populations.⁵⁰

60. The Application acknowledges that cleanup of oil on shorelines might leave approximately 1kg/m³ of diluted bitumen.⁵¹ Oil stranded in rip rap (a rock constructed embankment used throughout the lower Fraser) would be challenging to clean up, and oil spilled in low water levels in winter and stranded on sandy or muddy beaches might percolate into sediments; both could be protected from weathering and retain some toxicity.⁵² If stranded oil accumulates on intertidal particulate matter, it is more likely to sink if reintroduced to water by waves, rising water levels or cleanup activity. This pathway has the potential to greatly increase the amount of oil from a spill that will end up in bed sediments or suspended in the water column.⁵³ Contaminated surface sediments can also be carried with other sediment downstream to form new bars within the river.

⁴⁷ *Ibid* at page 30.

⁴⁸ *Ibid* at page 38.

⁴⁹ *Ibid* at pages 10, 38-39.

⁵⁰ *Ibid* at page 57.

⁵¹ *Ibid* at page 38.

⁵² *Ibid* at pages 39-40.

⁵³ *Ibid* at page 41.

61. A spill from a tanker in Georgia Strait could reach the shoreline of the outer Fraser delta and oil could potentially be carried into the estuary and the Fraser River as far as New Westminster, depending on the season.⁵⁴ The Gainford study included in the Application predicts that at 20 parts per thousand salinity weathered diluted bitumen has a tendency to form thick mats on the surface of water, which, with continued weathering and agitation, would be expected to form tar balls.⁵⁵ Tar balls may wash up on shorelines and would create potential for chronic oil release and ongoing exposure for aquatic organisms.⁵⁶

62. Oil spilled on land may weather significantly before reaching the river, and accumulate soil particles, vegetation and other debris which will make it more likely to sink. Trans Mountain's statement that sediment levels in the Fraser River are not high enough for oil-sediment aggregate formation ignores potential overland flow of oil.⁵⁷

63. Spilled oil can harm salmon by: exposing them to toxicity of hydrocarbons dissolved in water, direct contact, coating habitat where they feed and rear, contaminating the invertebrate species that make up juvenile salmon's food supply, and depleting their food supply.⁵⁸

64. A spill might cause immediate fish kills. Low molecular weight hydrocarbons, found in diluted bitumen, are sufficiently soluble in water to cause immediate fish kills, with acutely lethal conditions occurring in any area covered with an oil slick and generally not persisting longer than 24-48 hours.⁵⁹ The predicted rapid transit of spilled oil, which would take, for example, only in 1-2 days to travel from the Port Mann Bridge to the estuary or for oil spilled in Georgia Strait to reach the delta, means that oil may still contain acutely toxic components when it reaches the estuary.⁶⁰

⁵⁴ *Ibid* at page 10.

⁵⁵ *Ibid* at page 36.

⁵⁶ *Ibid* at page 36.

⁵⁷ *Ibid* at page 94.

⁵⁸ *Ibid* at page 63.

⁵⁹ *Ibid* at pages 9-10, 68.

⁶⁰ *Ibid* at page 64.

65. In addition to immediate fish kills, ecological impacts of oil spills in rivers are associated primarily with sediment contamination, which affects both food supply (due to oil toxicity to benthic invertebrates, which fish consume) and spawning and rearing habitat (due to oil toxicity to fish species that deposit eggs in bed sediments).⁶¹ Weathered bitumen may submerge or sink, potentially causing chronic toxicity to aquatic species.⁶² Water-in-oil emulsions, stabilized by low salinity and high particulate matter of the kind found in the Lower Fraser, can persist long after a spill, and the oil inside emulsions can remain fresh as the exterior weathers, posing an ongoing threat of toxicity.⁶³ Oil entrained in sediments does not wash out quickly but rather releases its constituents slowly over time.⁶⁴ If oil submerges or sinks and becomes entrained in riverbed sediments, including the interstitial waters of spawning shoals, it will remain there for months to years, depending on the amount of oil and on flow rates through the substrate, which would pose a risk to developing salmonids.⁶⁵ Areas where water flow through bed sediments creates good spawning habitat can also entrain dissolved and particulate oil in bed sediments; oil spills can render these sediments unusable for spawning.⁶⁶ Unrecovered oil would likely also damage the food web on which juvenile salmon depend for their survival.⁶⁷ Multiple weak or missing year classes could result from sediment contamination.⁶⁸

66. It is unclear whether adult salmon would avoid oil-contaminated habitat or oil slicks. If they did, and were unable to successfully reach spawning areas, they would lose reproductive potential if no other suitable habitat was available. If they did not avoid contaminated habitat or oil slicks, they could expose themselves or their offspring to toxic effects.⁶⁹

⁶¹ *Ibid* at pages 43, 57-58.

⁶² *Ibid* at page 9.

⁶³ *Ibid* at page 10.

⁶⁴ *Ibid* at page 56.

⁶⁵ *Ibid* at page 12.

⁶⁶ *Ibid* at pages 43-44.

⁶⁷ *Ibid* at page 58.

⁶⁸ *Ibid* at page 12.

⁶⁹ *Ibid* at pages 11, 64, 76.

67. Fish embryos are particularly susceptible to toxicity because they are immobile, resulting in continuous exposure; however, even short-term exposures can impact the viability of larva.⁷⁰ If oil is stranded in or near spawning areas, concentrations of toxic oil components (PAHs) may be high enough to cause toxicity to embryos for months or years.⁷¹ Chronic exposure to PAHs causes blue sac disease, with symptoms including cardiac dysfunction, deformities, reduced growth, and increased mortality.⁷² Toxicity for embryos may be exacerbated by light-driven photomodification within the tissue of transparent embryos, resulting in cell damage, cell death, and acute mortality.⁷³ Delayed effects of exposure as eggs and embryos may reduce survival during growth and maturation and result in reduced returns of adult salmon.⁷⁴ Species whose embryos would be chronically exposed to oil in bed sediments for an extended time (as long as four to six months) due to their immobility would be most vulnerable to population-level impacts.⁷⁵

68. Exposure of fish to PAHs in oil may cause genotoxicity (including chromosomal damage and altered regulation of various genes), which can result in mutations, reproductive impacts, and a compromising of the ability to physiologically adapt to changing conditions.⁷⁶ Salmon transitioning from contaminated freshwater systems have shown a lower survival rate and compromised ability to adapt when transitioning to saltwater.⁷⁷

69. Effects of chronic toxicity may include decreased growth rates, deformities (or increased frequency and severity of deformities), and increased mortality rates.⁷⁸ Existing stressors such as thermal stress or prey shortages due to factors such as climate change

⁷⁰ *Ibid* at pages 63-64.

⁷¹ *Ibid* at page 81.

⁷² *Ibid* at page 71.

⁷³ *Ibid* at page 84.

⁷⁴ *Ibid* at pages 12, 72.

⁷⁵ *Ibid* at pages 11, 30.

⁷⁶ *Ibid* at page 74

⁷⁷ *Ibid* at page 92.

⁷⁸ *Ibid* at page 11.

and habitat loss make salmon more susceptible to the effects of an oil spill than they may have been in the past.⁷⁹

70. All fish species in the Lower Fraser are sediment spawners on either the surface or sub-surface of the river bed. Spill response that includes removal of contaminated substrates would pose other risks, such as habitat disruption or destruction and remobilization of contaminants.⁸⁰

71. Species with few populations, shorter life cycles, and longer residence times in the lower Fraser River or its tributaries (relying heavily on spawning areas in the lower Fraser) are most likely to be affected by a spill.⁸¹ This includes ocean-type Chinook, which are at high risk due to their reliance on the estuary and on streams downstream of the pipeline's Fraser River crossing for an extended period of feeding and rearing before outmigration. During this period they are effectively stuck in the estuary while they undergo physiological transformations, a stressful stage at which juvenile salmon are sensitive to additional stressors.⁸²

72. Chinook also have the greatest year-round presence in the Salish Sea, rearing for extensive periods in estuaries, remaining within 200-400 km of their natal rivers until their second year at sea, and returning to the Salish Sea as adults between May and September; juvenile, immature or adult Chinook are present in the Salish Sea. As such they would be comparatively vulnerable to a spill from a Project-related tanker.

73. Spill effects will interact with stress levels associated with migration, reproduction, feeding, and growth, and environmental factors such as temperature, salinity, disease, prey availability and quality, and other pollutants, and effects of human activity.⁸³

⁷⁹ *Ibid* at page 48.

⁸⁰ *Ibid* at page 12.

⁸¹ *Ibid* at page 58.

⁸² *Ibid* at pages 58, 64.

⁸³ *Ibid* at pages 86-87.

4) Trans Mountain underestimates Project effects on Fraser River fish

74. The evidence filed by Raincoast, described above, indicates that the Project would have significant adverse effects on Fraser River fish, due to the impacts of a potential oil spill. Notably, the evidence concludes that fish whose embryos would be chronically exposed to oil entrained in bed sediments would be the most vulnerable to population-level effects, and that toxic effects on multiple life stages of fish (developing embryos, resident juveniles and adult salmon) are likely in the event of an oil spill into the Fraser and would likely have effects in multiple year classes.⁸⁴ The evidence demonstrates that there is no safe time of year when fish are not vulnerable to an oil spill in the Lower Fraser. Effects on commercially important species, species important to First Nations, Chinook (which are the main prey of the SARA-listed endangered Southern Residents and one of the three main factors influencing their viability), and at-risk species of fish would be particularly significant.

75. In contrast, Trans Mountain underestimates effects on Fraser River fish. It concludes that residual effects on salmon indicator species are “unlikely and of negligible magnitude” and that the Project’s effects on fish or fish habitat generally will not be significant.⁸⁵ Trans Mountain states that, if a spill from the pipeline affected fish, “[t]he most likely outcome [...] is that a portion of the reproductive capacity of a single year-class of fish would be lost, but that recovery would occur in subsequent years.”⁸⁶

76. Overall, Trans Mountain fails to properly characterize the nature and extent of fish habitat and use of habitat within the Lower Fraser, and appears to make unrealistic or overly optimistic assumptions about the fate of spilled diluted bitumen in freshwater and estuarine environments, spill response and the recovery of oil, and recovery of habitat. As

⁸⁴ *Ibid* at page 11.

⁸⁵ Exhibit B18-29, Vol 8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3 at page 8A-304.

⁸⁶ Exhibit B18-2, Vol 7 5.2.8.3 F5.2.5 TO 10.0 Risk Assess Mgmt Spills, Filing ID A3S4V6, at page 7-82.

a result Trans Mountain underestimates the risk to Fraser River fish. Some specific additional shortcomings of its assessment are described below.

77. Trans Mountain's Gainford study concluded that oil would not sink or submerge. However, the study did not include freshwater or the addition of sediment or particulate matter, and its conclusions are therefore difficult to apply to a spill in a freshwater river or estuarine environment.⁸⁷

78. Trans Mountain acknowledges the potential for high levels of mortality resulting from immediate fish kills; however, it largely discounts the possibility of effects on eggs in spawning substrate, though it acknowledges this may occur.⁸⁸

79. Trans Mountain has not addressed the possibility of oil submerging or sinking in its clean-up plans or environmental protection plans.⁸⁹ The Application indicates that restoration and recovery could take up to five years following a spill in the Lower Fraser.⁹⁰ If so, it is likely that various life stages would experience chronic exposure, and species with life cycles of five years or less could face exposure in each year class.⁹¹

80. Trans Mountain underestimates the potential effects of an oil spill on fish by underestimating the toxicity of oil to fish. The Gainford study measured concentrations of total PAH in water that were orders of magnitude greater than concentrations known to be toxic to fish (including pink salmon and rainbow trout) and known to result in lethal and sub-lethal effects, including reduced growth and embryo deformities.⁹² While the study stated that concentrations were below detection thresholds in nearly all cases, those detection thresholds were three orders of magnitude above levels at which effects on fish have been observed. In other words, the method used in the study are unable to detect

⁸⁷ Exhibit C291-1-3, Logan, Filing ID A4L9F4, at page 35.

⁸⁸ Exhibit B18-2, Vol 7 5.2.8.3 F5.2.5 TO 10.0 Risk Assess Mgmt Spills, Filing ID A3S4V6 at page 7-82.

⁸⁹ Exhibit C291-1-3, Logan, Filing ID A4L9F4, at page 57.

⁹⁰ Exhibit B18-15, Vol 7 TR 71 01 of 02 ERA Pipeline, Filing ID A3S4W9, at pages 6-92, 6-93, 6-97.

⁹¹ Exhibit C291-1-3, Logan, Filing ID A4L9F4, at pages 56-57.

⁹² *Ibid* at pages 77-79.

PAH concentrations that are known to be toxic to fish. Therefore, the study is not informative with respect to toxicity concerns.⁹³

5) Trans Mountain fails to acknowledge significant adverse environmental effects on Chinook or the effects of loss of Chinook on the Southern Residents

81. Trans Mountain has described existing cumulative effects on Chinook salmon as “not significant to significant” – that is, potentially significant – based on its prediction of immediate to long-term effects of medium to high magnitude and high probability.⁹⁴ The Project’s contribution to cumulative effects on Chinook is described as low magnitude and not significant.

82. Trans Mountain fails to address effects on Southern Resident Killer Whales related to effects on their main prey, Chinook salmon. Trans Mountain states that it has not considered “indirect effects to marine mammals associated with potential Project-related loss of prey (as the result of direct effects to fish and fish habitat)”, on the basis that, in its opinion, “residual effects of the Project on [...] Pacific salmon indicators are unlikely and of negligible magnitude. Potential Project-related effects on freshwater fish and fish habitat (i.e. potential prey) were deemed to be of low to medium magnitude.”⁹⁵

83. The combination of Trans Mountain’s underestimation of Project impacts on fish and improper focus on residual effects at the expense of cumulative effects results in a failure to address an important potential effect on a SARA-listed endangered species.

6) Trans Mountain fails to adequately assess impacts on forage fish

84. Trans Mountain also fails to adequately assess, and underestimates, Project impacts on forage fish, and in particular Pacific herring.

⁹³ *Ibid* at page 79.

⁹⁴ Exhibit B239-13, Trans Mountain Response to NEB IR No. 2 (2.041), Filing ID A3Z4T9, at pages 117-120.

⁹⁵ Exhibit B18-29, Vol 8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at page 8A-304.

85. Baseline information on Pacific herring is poor, and this affected Trans Mountain's ability to use Pacific herring as an indicator species and to assess Project impacts on herring. Furthermore, the Application is selective with the existing baseline information, omits some of the available relevant studies, and fails to address all existing habitat disturbances.⁹⁶

86. Trans Mountain also fails to adequately assess potential Project effects such as behavioural impacts of underwater noise on fish, the full range of which were not considered, and small but more frequent discharges of oil (chronic spills), which were not identified as a Project effect on the basis of monitoring and enforcement of existing legislation, despite the fact that chronic spills nevertheless occur.⁹⁷

87. Finally, Trans Mountain underestimates the impacts of larger oil spills on forage fish. The Application assumes that the sensitivity of marine fish and fish habitat to hydrocarbon exposure is a function of the degree of exposure to hydrocarbons, without regard to individual species' specific sensitivity.⁹⁸ It fails to consider the impacts of subsurface oil on Pacific herring and other wildlife.⁹⁹ The Application also makes an unsupported claim that in the event of a worst-case spill Pacific herring will recover in one to two years, in spite of information to the contrary from the Exxon Valdez Oil Spill Trustee Council and the life-history of herring (which take three years to recruit to the adult population).¹⁰⁰

⁹⁶ Exhibit C291-1-2, Fox, Filing ID A4L9F3, at pages 4-5.

⁹⁷ *Ibid* at pages 6, 8-10.

⁹⁸ *Ibid* at page 7; Exhibit C214-18-2, Attachment A to written evidence of Living Oceans – Fate and Effect of oil spills in Burrard Inlet and Fraser River Estuary, Dr. Short, Filing ID A4L9R7 [Short 1], at page 6.

⁹⁹ Exhibit C291-1-2, Fox, Filing ID A4L9F3, at page 8; Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 6.

¹⁰⁰ Exhibit C291-1-2, Fox, Filing ID A4L9F3, at pages 8, 10-12.

B) The Project's significant adverse effects on Southern Residents Killer Whales and their critical habitat

88. The Project will potentially affect numerous SARA-listed marine species, including:

- a) endangered Basking shark, Blue whale, eulachon and the Southern Residents;
- b) threatened humpback and fin whale, transient and offshore killer whale; and
- c) Stellar sea lion, Grey Whale, harbour porpoise, Ancient murrelet and Black-footed albatross which are all species of special concern.¹⁰¹

89. Although they are concerned about the adverse effects of the Project on all species at risk, Living Oceans and Raincoast are particularly concerned about the adverse effects of the Project on the Southern Residents, including increased noise pollution and disturbance from Project-related tankers, oil spills and other marine pollution from Project-related tankers, availability of Chinook salmon prey, and effects on critical habitat.

90. Living Oceans and Raincoast are further concerned that Trans Mountain has failed to adequately consider and address these adverse impacts.

1) The Project will exacerbate existing threats to the Southern Residents' Survival and Recovery

91. The Southern Residents are an endangered population of approximately 80 remaining whales.¹⁰² Based on the evidence on the record and described below, Living Oceans and Raincoast submit that it is abundantly clear that Southern Resident survival and recovery is jeopardized by the Project.

¹⁰¹ Exhibit B18-26, V8A 4.2.8.3-F4.2.27 Mar Trans Assess, Filing ID A3S4Y0, at pages 8A-184 to 8A-187.

¹⁰² Exhibit C291-1-1, Statement of Written Evidence of Raincoast Conservation Foundation, Dr. Paquet [Raincoast Statement], Filing ID A4L9F2, at pages 9-11, 12-14.

92. Existing threats to this population and its critical habitat (each described below) have led to the Southern Residents being listed as an endangered species under SARA. The evidence indicates that Project-related tankers and oil spills in critical habitat will exacerbate all of these threats.

93. Further, the evidence before the Board suggests that no measures have been identified to avoid Project related effects on Southern Residents. Determining how to address Project-related effects on Southern Residents needs to be done before the Board can recommend the Project can be approved, as the record clearly indicates that without mitigation the Project's adverse effects will clearly cause a decline in the Southern Resident population, jeopardizing their survival and recovery.

a) Southern Residents are threatened by diminished prey, contamination and disturbance from vessels

94. The Southern Residents are listed under both SARA and US federal law as an endangered species at risk of extinction.¹⁰³ The Southern Residents are designated as endangered due to their small population size, low reproductive rate, and three key human caused threats or stresses which threaten their survival and recovery: reduced availability of their preferred prey (Chinook salmon), marine pollution including oil spills, and physical disturbance and noise pollution caused primarily by vessels.¹⁰⁴ These are discussed in detail below.

95. The threats to the Southern Residents often work in concert, such that increasing one threat exacerbates the other threats as well. For example, Chinook stocks are at low levels of abundance compared with historic pre-industrial numbers. When the ocean gets noisier, it makes it harder for whales to find scarce prey. When whales can't find enough to eat, they start burning their stored fat to meet energetic demands. Contaminants are

¹⁰³ *Ibid* at pages 11-12.

¹⁰⁴ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 1, 16-34.

stored in blubber so chemicals that may have been harmless when stored in fat become metabolized and can cause health problems in the whales.¹⁰⁵

b) Recovery requires keeping existing threats at bay – especially in critical habitat

96. The Southern Resident Recovery Strategy identifies the following recovery goal for the Southern Residents:

5.2 Recovery Goal

Ensure the long term viability of resident killer whale populations by achieving and maintaining demographic conditions that preserve their reproductive potential, genetic variation, and cultural continuity.¹⁰⁶

97. The Southern Resident Recovery Strategy also identifies the following four recovery objectives:

Objective 1

Ensure that resident killer whales have an adequate and accessible food supply to allow recovery

Objective 2

Ensure that chemical and biological pollutants do not prevent the recovery of resident killer whale populations

Objective 3

Ensure that disturbance from human activities does not prevent the recovery of resident killer whales

Objective 4

Protect critical habitat for resident killer whales [...]¹⁰⁷

¹⁰⁵ Exhibit C291-1-5, Attachment D to written evidence of Raincoast – Potential acoustic impact of vessel traffic on SRKW, Dr. Clark [Clark], Filing ID A4L9G0, at page 4; Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at page 19.

¹⁰⁶ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 47.

¹⁰⁷ *Ibid* at pages 48-51.

98. An Action Plan for Southern Residents based on the Southern Resident Recovery Strategy was to have been completed by March 2013.¹⁰⁸ As of the date of this final argument, no Action Plan exists. A draft Action Plan circulated for public comment in 2014 confirmed the goals and objectives for recovery set out in the Southern Resident Recovery Strategy.¹⁰⁹

c) The Project will affect both the Southern Residents and their critical habitat

99. The Southern Residents occupy the transboundary waters of the Salish Sea for much of the year. Much of this area is identified in the Southern Resident Recovery Strategy as critical habitat of the Southern Residents.¹¹⁰ For this reason the Project will affect the whales, and also affect their critical habitat.

100. The Project's proposed tanker route transects the Canadian portion of Southern Resident critical habitat.

101. Critical habitat is defined in SARA as the habitat "necessary for the survival and recovery" of the Southern Residents.¹¹¹ As confirmed by the Federal Court, Southern Resident critical habitat includes the biological attributes that make it useful for killer whales, such as its acoustic and environmental quality and the availability of Chinook salmon prey.¹¹² The biological features of critical habitat are legally protected from destruction under Canadian law.¹¹³

¹⁰⁸ *Ibid* at pages 54-5.

¹⁰⁹ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at pages 11-12.

¹¹⁰ *Ibid* at pages 30-33; Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F4, at pages 36-38.

¹¹¹ SARA, s. 2.

¹¹² *David Suzuki Foundation v Canada (Fisheries and Oceans)*, 2010 FC 1233; upheld 2012 FCA 40.

¹¹³ SARA, s. 58; Critical Habitats of the Northeast Pacific Northern and Southern Resident Populations of the Killer Whale (*Orcinus orca*) Order, SOR/2009-68.

102. Reduced prey availability; marine pollution, including from an oil spill; and increased physical and acoustic disturbance from vessels are threats to the integrity of critical habitat.¹¹⁴

103. As discussed in detail below, Southern Resident critical habitat is already noisy, disrupted by vessels, polluted, and less abundant in Chinook salmon compared with the natural, pre-industrial conditions in which the whales evolved.¹¹⁵

104. Critical habitat is a very important area for the Southern Residents, which they rely on as a foraging range, in particular during the annual Chinook salmon migration. Due to the traditional availability of salmon in these waters, it is an area where all three Southern Residents pods are found for extended periods – at times even grouping together to form a “super pod”.¹¹⁶ This makes the Southern Residents particularly vulnerable to the effects of Project-related tankers in critical habitat such as increased noise and disturbance, and vessel-related pollution including and oil spill.

105. The Project threatens to degrade critical habitat important to the whales for foraging. For critical habitat to function as a hunting ground, human caused ambient noise needs to be limited. This is because, as discussed in more detail below, the Southern Residents rely on “echolocation” to identify and capture prey. Echolocation is a sonar-like call used to detect and locate objects by emitting typically high-pitched sounds that reflect off the object and return to the animal's ears. This makes the Southern Residents and Southern Resident critical habitat particularly vulnerable to the effects of vessel noise. As discussed below, vessel noise can mask echolocation signals and also introduce background or ambient noise that shrinks the whales’ communication space or acoustic habitat.¹¹⁷

¹¹⁴ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 40-42.

¹¹⁵ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at pages 4-6.

¹¹⁶ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 36-38.

¹¹⁷ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 9.

106. It is clear from the evidence on the record that the Project would exacerbate threats to the Southern Residents, risking the extinction of this iconic species.

107. Trans Mountain itself concedes that there will be significant adverse effects on the Southern Residents from vessel noise caused by Project-related tankers.¹¹⁸ Increased noise pollution will also have a significant effect on their critical habitat.

108. The significant adverse effect of Project-related tankers on Southern Residents is confirmed by the evidence of Dr. Christopher Clark – a world expert on marine mammal acoustics. Dr. Clark’s evidence is that the Project will “definitely increase” noise pollution and disturbance in critical habitat;¹¹⁹ and that there is a “reasonable likelihood” that this increased noise and disturbance will have “population level” consequences on the Southern Residents and “ecological consequences” on the marine environment in the vicinity of the tanker route, which includes critical habitat.¹²⁰

109. Population level consequence are effects that go beyond effects on individual animals and impact the growth rate of a wildlife population, causing it to decline (or increase). Ecological effects go beyond any one species, affecting the quality of the environment for all species in an area. The unique characteristics of small wildlife populations mean that in a small population like the Southern Residents, the loss or impairment of any individual whale may have population level effects.¹²¹

110. Increasing oil tanker traffic in critical habitat from 120 to 816 tanker transits annually would increase the risk of an oil spill in critical habitat. The Southern Resident Recovery Strategy identifies existing and “proposed expansion” of tanker traffic in the Strait of Georgia as a risk to the Southern Residents. It states that the threat of an oil spill in critical habitat poses an “immediate and acute risk to the health of the [Southern

¹¹⁸ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8 at page 310.

¹¹⁹ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at pages 4, 6, 7.

¹²⁰ *Ibid* at page 10.

¹²¹ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at pages 18-19, 36; Exhibit C291-1-6, Attachment E to written evidence of Raincoast – Population Viability Analysis – Dr. Lacy et al [PVA], Filing ID A4L9G2 at page 30.

Residents]’¹²² According to the experts who prepared the Southern Resident Recovery Strategy, an oil spill has the potential to make critical habitat areas “un-inhabitable for an extended period of time”. They concluded that the effect of an oil spill on Southern Residents would be “potentially catastrophic”.¹²³

111. Finally, as explained in more detail below, the Population Viability Assessment (“PVA”) commissioned by Raincoast to model the long term effect of Project-related threats on the viability of the Southern Resident population, shows that the Project will intensify existing threats to the whales and to their critical habitat, accelerating the rate of decline in the Southern Residents and possibly leading to a complete extinction.¹²⁴

2) The PVA shows Project-related effects cause Southern Resident decline

112. The PVA considers the risks associated with multiple aspects of the Project. The PVA models the future population based on current conditions with no Project, and contrasts that outcome with a scenario that assumes the Project is approved. The authors find that if current conditions persist, the Southern Resident population will most likely remain about at its current size or continue a very slow decline. By contrast, the modelling shows that the increased threats from Project-related effects increase the risk of extinction and accelerate decline.¹²⁵

113. The PVA is a species-specific risk assessment of a type frequently used in conservation biology. It uses quantitative methods to evaluate and predict the likely future status of the Southern Resident population based on certain scenarios. A PVA is one way to try to predict the combined long term effect of the various Project-related effects on the Southern Residents.¹²⁶

114. The PVA models the impacts of three potential Project-related adverse effects on Southern Residents: oil spills, increased acoustic and physical disturbance from ships,

¹²² Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 41.

¹²³ *Ibid* at page 34.

¹²⁴ Exhibit C291-1-6, PVA, Filing ID A4L9G2, at page 2.

¹²⁵ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at page 41.

¹²⁶ *Ibid* at page 40.

and ship strikes. The PVA also models the effect of availability of Chinook salmon prey on the long term health and viability of the Southern Resident population.

115. The PVA modeled the Southern Resident population's trajectory over 100 years. The probability of complete extinction (no remaining animals) in any of the models, was low. Because individual killer whales can live to be almost 100 years old, and a demographically collapsing killer whale population would likely have at least a few individuals still alive 100 years from now, this provides a misleading picture of population viability. The probability of the population dropping below 30 animals, which is the number below which the Southern Residents are unlikely to survive (also known as quasi-extinction), is a more useful measure of the threat to population persistence.¹²⁷

116. The PVA shows that Chinook availability has the biggest single effect on Southern Resident population. Reducing Chinook abundance is projected to have a substantial negative impact on the Southern Residents population. Conversely, increasing Chinook abundance can lead to relatively robust population growth and protection from extinction or serious decline.¹²⁸

117. This is important and positive news. It indicates that reducing other stressors, such as ocean noise and pollution, and ensuring Chinook are available for the whales will grow the Southern Resident population – a move in the direction of recovery.

118. By contrast, increasing threats to Southern Residents results in a declining population¹²⁹ – a move away from recovery and towards extinction.

119. Noise disturbance alone has a moderate but significant effect on population viability. The modeled effects of noise and physical disturbance accompanying Project-

¹²⁷ Exhibit C291-1-6, PVA, Filing ID A4L9G2, at page 37.

¹²⁸ *Ibid* at pages 2, 18-21.

¹²⁹ *Ibid* at pages 36-37.

related tanker traffic are accelerated population decline, smaller mean population size, and increased probability of extinction.¹³⁰

120. Large or medium oil spills occurring at the frequency predicted in Trans Mountain's evidence could depress long-term average population growth and lead to a considerable chance of the population declining below 30 animals (a quasi-extinction).¹³¹

121. A ship strike would have smaller impacts, but would still result in reduction of population viability.¹³²

122. Unsurprisingly, the modeled effect of all Project-related effects combined had the greatest impact. Together, the Project-related effects of oil spills occurring at the frequency estimated by Trans Mountain, noise from increased tankers, and occasional mortality due to ship strike (one in 10 years) would cause the Southern Resident population to become vulnerable to extinction, with a 50% probability of decline below 30 animals (a quasi-extinction).¹³³

3) Increased vessel noise disturbance will have significant adverse effects on Southern Residents and their critical habitat

123. Raincoast and Living Oceans are particularly concerned about the effects of noise pollution from increased tanker traffic.

124. The Project will increase the number of tankers departing from the Westridge Marine Terminal from approximately five per month to approximately 34 per month – which equates to an increase from 120 to 816 tanker transits annually. This increase will likely result in daily exposure of Southern Residents to oil tankers, and the near-continuous presence of oil tankers in critical habitat.¹³⁴ According to Trans Mountain the

¹³⁰ *Ibid* at pages 2, 25-28, 36.

¹³¹ *Ibid* at pages 2, 21-25.

¹³² *Ibid* at pages 30-31, 36-37.

¹³³ *Ibid* at page 2.

¹³⁴ Exhibit B18-29, Vol 8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at page 8A-318.

cumulative effect of increased tanker traffic and existing vessel traffic will be close to constant disturbance of Southern Residents.¹³⁵

125. The evidence provided by marine acoustics expert Dr. Christopher Clark about the potential acoustic impacts of Project-related tankers on the Southern Residents (the “Clark Report”)¹³⁶ and the PVA both describe numerous adverse effects of vessel noise which would lead to population decline.

126. Adverse effects of increased noise pollution on the Southern Residents and their critical habitat include: making it harder for Southern Residents to carry out basic life functions like hunting, socializing, and mating; causing the whales to expend vital energy avoiding disturbance, and making the whales work harder to find prey; degrading critical habitat to the point it is no longer usable to the whales.¹³⁷ The population level consequence of increased noise is population decline.¹³⁸

a) Ability to hear is essential for killer whales

127. Sound is as important to whales as vision is to humans. Killer whales send and receive acoustic signals to obtain most of their knowledge about other killer whales and their environment. The Southern Residents produce and listen to sounds in order to establish and maintain critical life functions: to navigate, find and select mates, maintain their social network, and locate and capture prey.¹³⁹

128. As stated above, killer whales identify and capture prey using echolocation. They emit high pitched sounds which bounce off objects and return to the whales. The Southern Residents have to listen for these returning sounds to identify whether the object is a Chinook salmon, and therefore edible, or something else. It will be harder for a killer whale that cannot hear well – because of loss of hearing or chronic background

¹³⁵ *Ibid* at pages 8A-299 and 8A-319.

¹³⁶ Exhibit C291-1-5, Clark, Filing ID A4L9G0.

¹³⁷ *Ibid* at pages 6-10.

¹³⁸ Exhibit C291-1-6, PVA, Filing ID A4L9G2, at pages 25-28.

¹³⁹ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 3.

noise – to identify and capture food.¹⁴⁰ A whale that cannot hear well will expend more energy to meet daily caloric requirements; this could possibly lead to malnutrition and starvation, potentially compromising the whales’ reproductive and immune systems, and leading to reduced calving and increased mortality.¹⁴¹

b) Critical Habitat is necessary for Southern Resident Survival and Recovery

129. As stated above, the proposed tanker route transects the Canadian portion of Southern Resident critical habitat.¹⁴² Critical habitat is characterized by narrow channels with strong currents, which act as a geographical funnel that concentrates migrating salmon bound for the Fraser River (which has the largest salmon production in the region) and other smaller river systems flowing into the Strait of Georgia and Puget Sound.¹⁴³

130. The Southern Residents use and rely on critical habitat surrounding the proposed tanker route as a seasonal hunting ground for their preferred prey, Chinook salmon, which is identified by experts as a feeding ground necessary for the survival and recovery of the Southern Residents.¹⁴⁴ Southern Resident presence in critical habitat is strongly correlated to the timing of the salmon’s presence.¹⁴⁵ In other words, one of the main reasons that the Southern Residents are in the Canadian portion of critical habitat is to forage and feed.

131. The Southern Residents’ continued use of their designated critical habitat does not mean that vessel noise is not detrimental to them. Rather, as acknowledged by Trans Mountain, “[a]s distribution of many marine mammal species is often highly correlated to the distribution of their prey, the importance of accessing foraging grounds may to some

¹⁴⁰ *Ibid* at page 4.

¹⁴¹ *Ibid* at pages 8-9.

¹⁴² Exhibit B18-25, Vol 8A, 4.2.6.5.2-4.2.26 Mar Trans Assess, Filing ID A3S4X9, at page 8A-154, Figure 4.2-22.

¹⁴³ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 36.

¹⁴⁴ *Ibid* at pages 35-38

¹⁴⁵ *Ibid* at page 37.

degree outweigh other negative aspects (*e.g.*, loud ambient conditions) associated with that habitat.”¹⁴⁶

132. The acoustic environment is an essential component of Southern Resident critical habitat. To continue to function as critical habitat the Southern Resident Recovery Strategy states this area requires a “lack of acoustic disturbance” that would “prevent the area from being used for foraging, socialising, mating, and resting”.¹⁴⁷ The Recovery Strategy clearly states that the acoustic environment must be managed in critical habitat in order that Southern Residents can maintain communication, and detect and capture prey while in that important area.¹⁴⁸

133. Put another way, there is expert consensus that to survive and recover the Southern Residents require that the very area transected by the proposed tanker route remain quiet enough for the Southern Residents to carry out critical life functions, and in particular to hunt and capture prey.

c) Noise pollution in critical habitat is already a problem for Southern Residents

134. The Salish Sea is already a noisy place, as illustrated by the following evidence before the Board:

- a) Empirical measurements of ambient sounds levels at 12 sites on the B.C. coast from Haro Strait to Dixon Entrance found that sites within the Southern Residents’ critical habitat have the highest noise levels of all sites sampled.¹⁴⁹
- b) A recent prediction of sound levels from existing shipping activities throughout Canada’s Pacific waters found that the entire area that would be affected by

¹⁴⁶ Exhibit B18-29, Vol 8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at page 8A-319.

¹⁴⁷ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 36.

¹⁴⁸ *Ibid* at page 41.

¹⁴⁹ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 9.

Project-related tankers already experience levels that are above a threshold used in Europe to define “favourable conservation status” of marine habitats.¹⁵⁰

- c) The most recent study evaluating available “communication space” for Southern Residents found that under present-day median noise level conditions in Haro Strait, killer whales lose 62% of their opportunities to communicate beyond a range of 8 km (the range at which sound would be used by the whales under naturally quiet conditions). This loss of communication space rises to 97% during busy traffic periods.¹⁵¹
- d) Trans Mountain states that the existing level of noise under the loudest conditions in critical habitat is already capable of causing behavioural responses in Southern Residents.¹⁵²

135. Critical habitat is already much louder than the conditions under which Southern Residents evolved. It is already too loud, and any additional vessel noise will exacerbate this problem.¹⁵³

d) The Project will increase noise pollution in critical habitat

136. As stated above, the Project will see an increase in oil tankers transiting critical habitat, and therefore in overall vessel traffic. It is obvious and uncontested that the increase in Project-related tankers will contribute to noise pollution in critical habitat.¹⁵⁴ Each boat, as it transits through critical habitat, causes noise and disturbance. Thus, approving the Project will result in increased noise and disturbance in critical habitat.

¹⁵⁰ *Ibid* at page 4.

¹⁵¹ *Ibid* at page 9.

¹⁵² Exhibit B18-29, V8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at page 8A-321.

¹⁵³ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at pages 4, 5, 7, 9, 11.

¹⁵⁴ *Ibid* at pages 4, 6, 7.

e) Increasing noise pollution in critical habitat has adverse effects on Southern Residents

137. The Southern Resident Recovery Strategy identifies noise pollution from vessels as a threat to survival and recovery.¹⁵⁵ All of the evidence before the Board, including the evidence of Trans Mountain, indicates that increasing vessel noise will have significant adverse effects on the Southern Residents. The long term implication of the adverse effect of increased vessel noise is population decline.¹⁵⁶

138. Vessel noise harms Southern Residents and their critical habitat in several ways including: causing physical injury, affecting behaviour (for example by interrupting foraging activity); reducing the whales' communication space; and degrading critical habitat by contributing to cumulative noise pollution.¹⁵⁷ The evidence before the Board indicates that all of these will be effects of the Project.

139. As discussed above, these effects can have consequences for specific whales (individual effects), the Southern Resident population (population level effects), and critical habitat (environmental effects). It is important to note that in a small endangered population such as the Southern Residents, in which each remaining whale is important, all adverse effects have the potential to have population level consequences. An adverse population level effect in an endangered population is always significant.

(i) Physical injury and behavioural response

140. Vessels can generate noise levels that cause injury in whales.¹⁵⁸ Physical injury in whales is usually caused by loud sounds or sounds at particular frequencies (for example certain kinds of sonar). Although it does discuss other effects, Trans Mountain's acoustic assessment focuses on these types of impacts.¹⁵⁹ Physical injuries from vessel noise can

¹⁵⁵ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 27-9, 32-34 and 41.

¹⁵⁶ Exhibit C291-1-6, PVA, Filing ID A4L9G2, at pages 25-28.

¹⁵⁷ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at pages 6-10.

¹⁵⁸ *Ibid* at page 10.

¹⁵⁹ *Ibid*.

be very harmful to whales and even result in death. They are however, unlikely, including because killer whales are good at avoiding or escaping this kind of noise – although such avoidance behaviour comes at an energetic cost to the whale.¹⁶⁰

141. Behavioural changes result when whales are disturbed by sound. Whales are disturbed by vessel noise at various frequencies (i.e. broad band noise).¹⁶¹ When a killer whale hears the sounds from a vessel, the whale engages in a complex cost benefit analysis to determine whether the cost of responding to the vessel (e.g. lost feeding or mating opportunity, dislocation from pod, energetic cost of avoidance) outweighs the benefit (e.g. the reduced possibility of temporary hearing loss or collision with vessel).¹⁶²

142. The likelihood of vessel noise disturbing whales and resulting in behavioural changes depends in part on the level of noise but also on what the whales are doing when exposed to the noise. For example, killer whales are less likely to change behavior due to vessel noise when they are travelling than if they are feeding.¹⁶³

143. The problem with this kind of disturbance is that the whale’s attention is switched from engaging in a naturally beneficial activity to something that is an unnatural distraction.¹⁶⁴ Each time a whale has to disrupt what it is doing to respond to a vessel, it is replacing a critical life function such as feeding, resting, or mating with vigilance and avoidance.¹⁶⁵

144. Trans Mountain’s evidence shows that the Project’s contribution to underwater noise will exceed standards established by the US National Oceanic and Atmospheric Agency (NOAA) for sensory disturbance in cetaceans, and that whales within 4-7 km of the shipping lanes are expected to experience noise capable of “causing sensory

¹⁶⁰ *Ibid* at page 3.

¹⁶¹ *Ibid* at page 8.

¹⁶² *Ibid* at page 7.

¹⁶³ *Ibid.*

¹⁶⁴ *Ibid* at page 8.

¹⁶⁵ *Ibid.*

disturbance from Project-related vessels” – noises that may result in behaviour modification.¹⁶⁶

145. A single instance of behavioural change might not have a significant impact. However, the cumulative effect of behavioural changes can have longer term population level consequences if whales are repeatedly exposed to noise that causes them to change from beneficial behaviour to avoidance behavior, such as switching from foraging for prey to listening to the sound a boat is making to assess whether to swim away.¹⁶⁷

146. As mentioned above, if the Project is approved Project-related tankers will have a near-continuous presence in critical habitat. If left unmitigated, repeated or continuous disturbance can cause population level consequences in marine mammals.¹⁶⁸ Killer whales spend 18-25% less time feeding in the presence of boats than in their absence.¹⁶⁹ Feeding is an important activity for Southern Residents in critical habitat. Thus, the Clark report cautions that disturbance from increased tanker traffic may cause population-level effects for the already food-limited Southern Residents.¹⁷⁰ The Clark Report concludes that there is a “reasonable likelihood” of population level consequences for Southern Residents from Project-related increases in vessel noise.¹⁷¹ This conclusion is confirmed by the PVA, which shows that vessel noise will have population-level effects.

(ii) Effects of chronic vessel noise and degradation of critical habitat

147. In addition to inducing behavioral responses, chronic vessel noise can – as the Recovery Strategy cautions – degrade or destroy acoustic habitat.¹⁷² Vessel noise can mask a killer whales’ ability to detect biologically meaningful sounds, and chronic vessel

¹⁶⁶ Exhibit B18-29, V8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at pages 8A-474 to 8A-475.

¹⁶⁷ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 8.

¹⁶⁸ *Ibid* at page 9.

¹⁶⁹ *Ibid* at page 8.

¹⁷⁰ *Ibid* at page 9.

¹⁷¹ *Ibid* at page 10.

¹⁷² Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 41.

noise shrinks the whales' available communication space.¹⁷³ Trans Mountain's evidence and argument do not address the effect of chronic noise on critical habitat.

148. Acoustic habitat or communication space is an area in which the whale can hear biologically important sounds.¹⁷⁴ Chronic vessel noise reduces the range out to which an animal can detect and recognize sounds of biological importance such as calls of other whales or the echolocation signal reflecting off a Chinook salmon.¹⁷⁵ Thus, chronic vessel noise hinders the opportunities for killer whales to acquire, broadcast and share acoustic information.

149. A simple way to translate elevated or increasing noise pollution into a biologically meaningful metric is the concept of "lost communication space." As background noise increases, the range within which the whale can effectively communicate gets smaller. The additional chronic vessel noise effectively shrinks the whales' acoustic habitat and the whales can no longer hear sounds coming from farther away that they previously could.¹⁷⁶

150. Just as being in a crowded restaurant makes it harder to hear dinner conversation, increased ambient noise makes it more difficult for killer whales to successfully use echolocation to detect scarce prey than under quieter conditions.¹⁷⁷ For example, in the case of hunting salmon, Chinook would need to be closer to the whale in a noisy environment than in a quieter environment. At a certain point – just like in the crowded restaurant at dinner time – it becomes impossible for the whale to pick out and understand discrete sounds. At this point it does not matter if Chinook are scarce or plentiful, because habitat is degraded to a point where it is no longer usable for hunting.

¹⁷³ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 9.

¹⁷⁴ *Ibid* at pages 3, 4, 8, 9.

¹⁷⁵ *Ibid* at pages 3, 9.

¹⁷⁶ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 4.

¹⁷⁷ *Ibid* at page 8.

151. Trans Mountain recognizes that chronic vessel noise could result in “communication masking”,¹⁷⁸ but suggests that the population level impacts of increased noise are “unknown”.¹⁷⁹

152. By contrast, the Clark report concludes that there is “reasonable likelihood” of population and ecological consequences for Southern Residents from “chronic deterioration of the whales’ acoustic habitat.”¹⁸⁰ He further suggests that Trans Mountain underestimates the impacts of vessel noise, including by failing to consider the impact of chronic noise on critical habitat.¹⁸¹

153. The PVA indicates that the increase in vessel noise and physical disturbance resulting from Project-related increased vessel traffic alone, absent other stressors, results in accelerated population decline, smaller mean population size and increased probability of complete or quasi-extinction.¹⁸²

(iii) The Project’s incremental increase in chronic noise does not reflect its effect on Southern Residents

154. Trans Mountain recognizes that Project will increase underwater noise in critical habitat.¹⁸³ However, it suggests that the evidence shows the increase relative to the existing noise levels is small. It is misleading, when considering the significance of the effect of increased noise on Southern Residents, to base that evaluation on evidence about measurable increase in noise level. Instead, the Board should look at the evidence of the effects on the Southern Residents of the increase in noise.

155. Trans Mountain’s assessment of the effects of vessel noise on Southern Residents uses existing or “status quo” noise level as the baseline for all their studies. Choosing

¹⁷⁸ Exhibit B18-29, V8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at page 8A-322.

¹⁷⁹ *Ibid* at page 8A-322.

¹⁸⁰ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 10.

¹⁸¹ *Ibid* at pages 10, 11.

¹⁸² Exhibit C291-1-6, PVA, Filing ID A4L9G2, at pages 2, 25-28, 30-31.

¹⁸³ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8 at pages 308-310.

present day noise levels as a baseline assumes that existing noise levels are adequate for Southern Residents to carry out their essential life functions – which is not the case. The evidence before the Board indicates that Southern Residents are already losing 62% of their opportunities to communicate acoustically, and that level rises to a 97% loss of acoustic communication space during periods of busy ship traffic.¹⁸⁴

156. In order to properly understand the effects of increased vessel noise on the Southern Residents and their critical habitat, the Board should also consider the pre-industry ambient noise levels in critical habitat. These were the conditions under which the whales evolved. Pre-industry ambient noise levels were at least 10-20 dB lower than present day levels.¹⁸⁵

157. This approach is supported by the Board’s Filing Manual, which requires that:

[w]here the current state of the environment has been significantly altered from the past, the applicant must first describe how far back in time past activities are relevant and then also describe the past activities or past state of the environment. This may be particularly relevant for assessing cumulative effects or identifying a baseline for reclamation goals”.¹⁸⁶

158. Trans Mountain has not done this.

159. The Clark Report cautions that “present noise levels [in critical habitat] under busy ship traffic conditions are already so high that additional ship traffic seem to have little impact on communication space, when in fact that additional noise could essentially eliminate even those few remaining opportunities for killer whales to communicate.”

160. While Trans Mountain argues that the measurable increase in ocean noise from Project-related tankers is small, such a focus on increase in sound level “is not representative of the potential impact that the Project activities could impose on Southern Resident critical habitat”.¹⁸⁷

¹⁸⁴ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 5.

¹⁸⁵ *Ibid* at page 5.

¹⁸⁶ National Energy Board, *Filing Manual*, (Calgary: National Energy Board, 2004), Release 2015-01 at page 4A-26.

¹⁸⁷ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 5.

161. As Trans Mountain has limited its assessment to the effects on the Southern Residents, and not considered degradation of critical habitat, the only evidence before the Board that directly addresses effects on critical habitat are the Recovery Strategy and the Clark report. As stated above, the Recovery Strategy cautions that vessel noise could degrade critical habitat making it unusable by the whales. The Clark report shows that we may already be at or beyond the threshold for tolerable noise pollution in critical habitat. Any additional noise pollution may push that important habitat over the edge.

4) The Project will result in increased pollution in Southern Resident critical habitat

162. Southern Residents carry contaminants in their bodies. This contamination was one of the reasons for the designation of the Southern Residents as an endangered species in 2001 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).¹⁸⁸ At the time of listing COSEWIC was concerned that contaminants might already be compromising the whales' reproductive and immune systems, leading to reduced calving and or increased mortality rates.¹⁸⁹

(i) Large or medium oil spills

163. Marine pollution, including from oil spills, is identified as a key threat to the whales and their habitat in the Southern Resident Recovery Strategy – which identifies increasing tanker traffic as increasing that risk.¹⁹⁰ Trans Mountain's assessment confirms that the Project will increase marine pollution harmful to Southern Residents by increasing the incidence of oil spills affecting critical habitat.¹⁹¹

164. The Recovery Strategy states that while the probability of Southern Residents being exposed to an oil spill is low, the impact would be “potentially catastrophic”; that

¹⁸⁸ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 1.

¹⁸⁹ *Ibid.*

¹⁹⁰ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 17-23, 34, 41.

¹⁹¹ Exhibit B300-2, Trans Mountain Response to NEB IR TERMPOL Rpt and Outstanding Filings, Filing ID A4G3U5 at page 21.

an oil spill in critical habitat poses an “immediate and acute risk to the health of [Southern Residents]”; and that it has “the potential to make critical habitat areas uninhabitable for an extended period of time.”¹⁹²

165. The US recovery strategy also states that an oil spill in critical habitat could be catastrophic to Southern Residents because they are already severely compromised, and because they are highly social and tend to hunt and travel together in large groups, meaning that they could be affected in large numbers by a single spill.¹⁹³

166. Empirical evidence gathered during the Exxon Valdez oil spill indicates that killer whales do not avoid oil, and that individuals may die from immediate or delayed effects of exposure through inhalation or ingestion, and populations may experience unprecedented mortalities.¹⁹⁴ The AT1 population and AB pod, individuals of which surfaced in the Exxon Valdez oil slicks, suffered exceptionally high mortality rates, potentially due to inhalation of vapours by directly exposed whales or consumption of contaminated prey, and experienced population-level effects resulting from the individual mortalities.¹⁹⁵ The AT1 population has not produced calves since the spill and is expected to become extinct.¹⁹⁶

167. Trans Mountain understates the effects of a spill, arguing that the effects of exposure would likely only be lethal for “weaker animals [...] or animals that were exposed to heavy surface oiling and inhalation of vapours from fresh oil, as could occur in the immediate vicinity of the spill location”.¹⁹⁷ Even if this were the case, the evidence before the Board indicates that even the loss of one “weaker” whale will have population level consequences for the critically small population for the Southern Residents.¹⁹⁸

¹⁹² Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 34, 41.

¹⁹³ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at pages 14-15 and 30-31.

¹⁹⁴ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 47.

¹⁹⁵ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at pages 31-33; Barret-Lennard, Lance – Letter of Comment, Filing ID A72156.

¹⁹⁶ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at page 31.

¹⁹⁷ Exhibit B18-36, V8A 5.6.2.4.1 F5.6.2.9 to F5.7.3.3 Mar Trans Assess, Filing ID A3S4Y9, at page 8A-692.

¹⁹⁸ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at pages 18-19.

168. The number of mortalities caused by an oil spill would be a function of the size of the spill and the number of the Southern Residents directly exposed to oil. The extent of the direct impact on the whales will vary depending on the time of year and number of whales present when the spill occurs. A spill during the peak of salmon migration, when the whales hunt together in a “super pod” would have the greatest direct impact on the Southern Residents.¹⁹⁹

169. Whether the whales are present or absent during a spill does not diminish the long term adverse effect on Southern Resident critical habitat. The Recovery Strategy identifies “oil spills” an “activity likely to result in destruction of critical habitat”.²⁰⁰ It further states an oil spill in critical habitat has the potential to make critical habitat uninhabitable for an extended period of time.²⁰¹

170. The extent of the long term contamination will depend in part on how much of the oil can be recovered from the spill. Given uncertainty (discussed below) about how to recover spilled diluted bitumen (“dilbit”) in the marine environment, and the dynamic environment of the Salish Sea (strong and varied currents, extensive inter-tidal areas with kelp and eel grass beds, and complex underwater topography), it may be very difficult to effectively recover dilbit spilled in critical habitat.²⁰² Unrecovered oil in critical habitat prolongs the possibility of contamination, contributing to the existing problem of contaminant loading in Southern Residents.

171. The PVA models the risk of both a large and a small oil spill occurring with the frequency estimated by Trans Mountain on the long term viability of the Southern Resident population. The risk assessment in the PVA is based on the estimated overlap, as modelled by Trans Mountain, between the area covered by oil from a spill and the area identified as critical habitat.²⁰³

¹⁹⁹ *Ibid* at pages 28, 29 (Section 4.5.2.3.1).

²⁰⁰ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 41.

²⁰¹ *Ibid* at page 41.

²⁰² Barret-Lennard, Lance – Letter of Comment, Filing ID A72156.

²⁰³ Exhibit C291-1-6, PVA, Filing ID A4L9G2, at pages 19-23.

172. The PVA predicts that the overall mortality due to a large spill in critical habitat would be 50% of the population, and overall mortality due to a smaller spill would be 12.5% of the population. The long term effect of a large or medium oil spill occurring with the frequency estimated by Trans Mountain is the depression of long term population stability and growth, leading to a considerable risk of the population declining to 30 animals (a quasi-extinction).²⁰⁴

(ii) Oil spills from Chronic Sources and vessel related marine pollution

173. Chronic toxicological effects from small oil spills are a serious concern for killer whales. Chronic discharges of oil into oceans greatly exceed the volume released by major spills and represent another potential adverse effect of the Project on Southern Residents. The long term effects of repeated ingestion of sub-lethal quantities of petroleum hydrocarbons on marine mammals such as the Southern Residents is not known.²⁰⁵

174. The increase in Project-related tankers increases the risk of small chronic releases of oil. Trans Mountain has not considered or assessed the potential effect of exposure to small chronic releases of oil on the Southern Residents, the potential of these releases to contribute to the existing problem of contaminant loading in Southern Residents, or the potential of small chronic releases of oil to contaminate and degrade critical habitat.

175. Finally, increasing shipping of oil through critical habitat will also increase pollution from vessels. The Recovery Strategy states that “shipping represents a risk to the ecological integrity of coastal regions”. Both intentional and unintentional discharge of chemicals and biological waste are added sources of pollution in all coastal areas, but particularly in high traffic zones.²⁰⁶

²⁰⁴ *Ibid.* at pages 21-25.

²⁰⁵ Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at pages 27-28.

²⁰⁶ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 22; Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at page 28.

176. While Trans Mountain does identify the general risk to the marine environment from vessel source pollution, it suggests that current regulation precludes vessel source pollution in critical habitat. However, Trans Mountain does acknowledge accidents or malfunctions can occur.²⁰⁷ Trans Mountain does not consider the significance of such vessel source pollution on the Southern Residents or their critical habitat.

5) The Project could affect prey availability for Southern Residents

177. Reduced prey availability is a key threat to Southern Resident survival and recovery.²⁰⁸ Chinook salmon is one of the least abundant species of salmon in BC. Unlike other salmon, many populations of Chinook remain in nearshore waters during the ocean phase of their life cycle, making them more vulnerable to contamination, including from an oil spill.²⁰⁹ New studies of the effect of vessel disturbance on various fish species suggest that Chinook are also affected by vessel noise.

178. Trans Mountain acknowledges that cumulative effects on Chinook may be “significant”.²¹⁰ However, Trans Mountain does not consider the effect of loss of prey on Southern Residents, on the basis that, in its opinion, “residual effects of the Project on [...] Pacific salmon indicators are unlikely and of negligible magnitude”, and “Project-related effects on freshwater fish and fish habitat (i.e. potential prey) [...] were determined to be of low to medium magnitude.”²¹¹

179. As evidenced by the PVA, Chinook availability is the factor with the greatest impact on survival and recovery of the Southern Residents.²¹² Chinook are particularly vulnerable to the effects of pollution from an oil spill from the pipeline into the lower Fraser River or the estuary, as discussed above. Thus, an oil spill from the pipeline or a Project-related tanker could reduce the availability of Chinook for Southern Residents.

²⁰⁷ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 306.

²⁰⁸ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 23-25.

²⁰⁹ *Ibid* at page 24.

²¹⁰ Exhibit B239-13, Trans Mountain Response to NEB IR No. 2 (2.041), Filing ID A3Z4T9, at pages 117-120.

²¹¹ Exhibit B18-29, V8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at page 8A-304.

²¹² Exhibit C291-1-6, PVA, Filing ID A4L9G2, at pages 18-21, 2.

Additionally, pollution from an oil spill could degrade the quality of Chinook as prey by increasing contaminants they store in their fat.

180. Despite the importance of Chinook to the Southern Residents and the vulnerability of Chinook to an oil spill, Trans Mountain does not identify or consider the significance of an oil spill on Chinook availability for Southern Residents.

181. The Southern Resident Recovery Strategy cautions that underwater noise can displace prey.²¹³ Best available science indicates that Chinook salmon are affected by vessel disturbance and noise.²¹⁴ Trans Mountain takes the position that there is inadequate scientific information to properly assess the effects of vessel noise on Chinook and the corresponding effect on Southern Residents. Trans Mountain draws the unsupported conclusion that there will be no adverse effect on Southern Residents.²¹⁵

182. Living Oceans and Raincoast submit that in the case of scientific uncertainty the Board cannot and should not conclude that effects will be insignificant. As in this case, an unfounded assumption that an apparent lack of data means no impact could have serious negative consequences for the Southern Residents.

C) Trans Mountain’s Marine Ecological Risk Assessment is flawed and incomplete

183. The Trans Mountain Marine Environmental Risk Assessment (“Marine ERA”)²¹⁶ fails to meet requirements imposed by the Board, and professional risk assessment generally, due to its failure to examine “accidents and malfunctions [...] at representative locations along the marine shipping routes.” More specifically, the Marine ERA ignores

²¹³ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 27.

²¹⁴ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at page 6.

²¹⁵ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 302, 306, 307.

²¹⁶ Exhibit B19-14, Vol 8B TR 8B7 ERA MAR SPILL, Filing ID A3S4K7-A3S4R0.

the Board’s direction that the “[s]election of locations should be risk informed considering both probability and consequence.”²¹⁷

184. Evidence prepared for Living Oceans by Dr. Jeffrey Short identifies four fundamental deficiencies in the Marine ERA, which, in his expert opinion, render it insufficient as the basis for determining the Project’s potential impacts.²¹⁸ They are as follows:

- a) it fails to integrate oil exposure risk based on multiple locations within ecologically distinct sub-regions along the marine shipping routes, including at or near ecologically sensitive areas;
- b) it fails to assess hazard independently of exposure. Trans Mountain concludes that hazard is minimal based on its conclusion that there is a low probability of oiling. However, Trans Mountain should have assessed hazard based on species’ sensitivity to oiling independently;
- c) it fails to assess the possibility of organisms being exposed to submerged oil; and
- d) it fails to consider all the ways that oil can harm organisms.²¹⁹

185. The deficiencies identified in subparagraphs (a) and (b) above speak directly to the failure of the Marine ERA to conform to the direction of the Board and well-established principles of environmental risk assessment. Rather than selecting representative areas based on ecological sensitivity of “consequence”, Trans Mountain has chosen them based on probability of oiling or “risk” alone, thereby confounding two discrete and critical components of professional risk assessment. Further, it fails to

²¹⁷ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 3.

²¹⁸ *Ibid* at page 8; Exhibit C214-18-3, Attachment B to written evidence of Living Oceans – Fate and effect of oil spills, Dr. Short [Short 2], Filing ID A4L0R8, at page 5.

²¹⁹ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 3.

provide adequate justification for the selection of those sites where it chose to model impacts, effectively substituting its judgment of hazards for that of the Board.²²⁰

186. The practical effect of the approach in the Marine ERA is summarized by Dr. Short as follows:

By assuming that a single point of origin spill is typical for the Strait of Georgia, the Trans Mountain ERA implicitly assumes that the only accidents that could ever occur would involve collisions between ferry and oil tanker vessels. In reality, oil spill accidents usually involve combinations of events that appear highly unlikely in retrospect. This is why these accidents are both rare and difficult to anticipate. 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. More importantly, spills that originate at different locations along the route can have very different trajectories, and hence impact habitats differently. The potential effects of these differences are lost by only considering a single location for spill origin.²²¹

187. The deficiencies identified in subparagraphs (c) and (d) above address the comprehensiveness of the Marine ERA and support the conclusion that it is inadequate to enable the Board to assess the full range of potential impacts on species. Dr. Short's evidence indicates that these failures stem in part from a faulty and incomplete appreciation of the fate and behaviour of spilled diluted bitumen in the waters to be traversed by the oil tankers serving the Project.

188. Dr. Short conducted two separate and complementary peer reviews of the Marine ERA, each with a distinct emphasis. One focuses on the fate and effects of oil spills in Burrard Inlet and the Fraser River Estuary ("Short 1").²²² The other focuses on the fate and effects of oil spills for the Gulf Islands and Strait of Juan de Fuca, and considers the efficacy of chemical dispersants in treating a spill of diluted bitumen in either marine or freshwater environments, ("Short 2").²²³ Short 2 also considers lessons from two other

²²⁰ *Ibid* at page 4.

²²¹ *Ibid* at page 4.

²²² *Ibid*.

²²³ Exhibit C214-18-3, Short 2, Filing ID A4L0R8.

spills – the 1970 Arrow and the 1988 Nestucca oil spills, both of which spilled Bunker C oils and would be comparable in impact to a dilbit spill.²²⁴

189. This Part will address the four fundamental deficiencies in the Marine ERA identified above, and their implications for the Board’s obligations in relation to the environmental assessment of the Project. Living Oceans and Raincoast submit that the flaws with the Marine ERA are such that the Board must require a more thorough and fulsome review of potential impacts of marine oil spills before any determination is made about the likelihood of significant adverse environmental effects as a result of a marine oil spill. This is particularly so given that the CEAA 2012 requires that the Board approach these issues in a “careful and precautionary manner.”²²⁵

190. This Part will also address Dr. Short’s findings concerning the fate and behaviour of spilled oil in the marine environment and the resulting adverse environmental effects on various species in the Burrard Inlet, the Fraser River, the Gulf Islands, and the Strait of Juan de Fuca.

1) Trans Mountain’s Marine ERA does not base oil exposure risk on representative locations within ecologically distinct sub-regions along the route

191. The Marine ERA considered exposure risks based on oil spill trajectory models that it deemed representative, but that are in reality not representative of the region or the risks. For example, both English Bay and Roberts Bank were rejected as possible scenarios.²²⁶ As a result it fails to consider locations near ecologically sensitive areas, such as Sturgeon Bank and the South Arm Marshes, which are some of the most sensitive habitats in the Salish Sea, and it fails to account for the fact that spills originating at different locations can have very different trajectories.²²⁷

192. By limiting the spill trajectory scenarios to a single location for the spill origin for each of four sub-regions, the Marine ERA effectively presumes that the likelihood of a

²²⁴ *Ibid* at pages 19-20.

²²⁵ CEAA 2012, s 4(1)(b).

²²⁶ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 21.

²²⁷ *Ibid* at page 4.

spill originating at any other site is “not just low, but zero.” This means that no consideration is given to other potential scenarios. For example, had the origin of the Georgia Strait spill scenario been located closer to the Outer Harbour of Burrard Inlet, “the trajectory modelling would likely have led to considerably increased likelihood of oiling on Sturgeon Bank, possibly placing tens to hundreds of thousands of shorebirds at risk of oiling.”²²⁸

193. A more thorough approach to the selection of locations would have been to conduct a “threat zone analysis” for habitats of high concern, which would more fully reflect the risks to points of particular concern throughout the region.²²⁹ Analysis of locations selected using this approach would in turn more fully reflect locations and species that are particularly sensitive to oil exposure such as areas where vulnerable species like birds frequent, or habitats like armoured shorelines or tidal marshes where oil retention may be prolonged in the event of a spill.²³⁰

194. Given the ecological significance of the region – the Fraser River is the largest single salmon producing river on the Pacific Coast of North America,²³¹ and its estuary has significant biological productivity²³² – a more robust approach to the selection of locations should have been employed.

195. Trans Mountain fails to defend its methodology in its argument under “Risk Modelling-Location Selection”.²³³ Instead, it reiterates the fundamental error in the Marine ERA, conflating risk and consequence. In so doing, Trans Mountain also misrepresents the evidence of Dr. Short, whose evidence does not speak to the role of “engineering controls, safety management systems and mitigation to avoid such

²²⁸ *Ibid* at page 22, para 79.

²²⁹ *Ibid* at pages 22-23, para 80.

²³⁰ *Ibid* at page 26, para 82.

²³¹ *Ibid* at pages 1-2, paras 4-5.

²³² *Ibid* at page 58

²³³ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 335-336.

events” — these are beyond the scope of his review, and are addressed in another report filed by Living Oceans.²³⁴

196. Consideration of the consequences of a spill must occur independent of consideration of measures to avoid a spill – they are separate inquiries. Proper ecological risk assessment does not dismiss the possibility of harm to a species based on a potentially optimistic reliance on mitigation measures designed to prevent an accident – it identifies the harm to the species and then goes on to consider what mitigation measures might be applied to reduce or eliminate that harm.

197. To do otherwise is to render the ecological risk assessment process altogether moot: one could simply say that a project has been designed so as never to experience an accident and so no inquiry into the consequences of the risk it poses is required. Trans Mountain’s Marine ERA methodology is akin to this, allowing only for a consideration of accidents and impacts occurring at locations selected by it based on a fallacious notion of the causative factors in accidents which, as Dr. Short observes,

usually involve combinations of events that appear highly unlikely in retrospect. This is why these accidents are both rare and difficult to anticipate. Arbitrarily dismissing all other possibilities for accidents ... amounts to unreasonably eliminating much or even most of the risk of a spill occurring.²³⁵

2) The Marine ERA does not assess hazard independently of exposure

198. An environmental risk assessment assesses risk based on two discrete considerations: species’ sensitivity to exposure and the probability of exposure. However, the Marine ERA fails to consider sensitivity to exposure discretely from probability of exposure. It presumes that assessments of injury to specific populations are not necessary if their estimated risk of exposure is sufficiently small.

²³⁴ Exhibit C214-18-6, Attachment E to written evidence of Living Oceans – Review of Countermeasures Technologies for Viscous Oils that Submerge, Solsberg [Solsberg], Filing ID A4L9S1.

²³⁵ Exhibit C214-18-2, Short 1, Filing ID A4L9R7 at page 4, para 14.

199. The oil slick trajectory scenarios identified habitats and shoreline types deemed by Trans Mountain most likely to be oiled, and incorrectly presumed these results to be typical of the ecosystems being assessed. The Marine ERA then presumed that habitats and species that had low estimated likelihoods of oiling also had low sensitivity to oiling.

200. This approach falsely equates exposure risk and hazard assessment. As Short states, “[t]his confounding alone invalidates the Trans Mountain ERA.”²³⁶

3) The Marine ERA fails to assess the possibility of organisms being exposed to submerged oil

201. Trans Mountain submits that its risk assessment approach in the Marine ERA follows standard risk assessment methodology and meets legal requirements.²³⁷ However, the failure to consider the potential that organisms could be exposed to submerged oil is an important gap in the assessment, as it dismisses the possibility of exposure to submerged diluted bitumen, rendering the Marine ERA incomplete.

202. Trans Mountain’s conclusion that spilled diluted bitumen is unlikely to sink or submerge is inconsistent with its own evidence and Living Oceans’ evidence. A report tabled in its reply evidence acknowledges that sinking or submergence of oil may occur:

weathered oil interaction with suspended sediment may contribute to a portion of weathered oil to submerge and/or sink given specific conditions including density of receiving water, agitation, sediment type, size and suspended load, and turbulence.²³⁸ (emphasis in original)

Similarly, in its Final Argument, Trans Mountain acknowledges that certain wind and wave conditions and sediment concentrations may result in submergence.²³⁹

²³⁶ *Ibid* at page 24, paras 84 and 85.

²³⁷ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 291.

²³⁸ Exhibit B418-8, Trans Mountain Reply Evidence, Attachment 1.09 – reply to City of Vancouver, Tsleil-Waututh Nation, Living Oceans Society “Fate and Effects of Oil Spills from the Trans Mountain Expansion project in the Gulf Islands, Strait of Juan de Fuca, and Fraser River”, Filing ID A4S7K6, at page 12.

²³⁹ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 343.

203. Dr. Short's evidence assesses laboratory and tank studies that have been done to date on diluted bitumen, and observes that it suffers from some important shortcomings: first, environmental conditions likely to be encountered in an ocean spill situation are poorly mimicked in laboratory conditions; and second, tank tests performed to date have been conducted on oil slicks of a thickness far greater than would be encountered in accidental spill situations.²⁴⁰

204. Diluted bitumen is a heavy oil, naturally prone to submergence in fresh and brackish waters.²⁴¹ Experiments performed to assess how fast the density of diluted bitumen would increase during an oil spill have seriously overestimated the time required for it to submerge. Under worst-case ambient conditions of warm summer temperatures and moderate winds, spilled diluted bitumen may begin to submerge in the surface layer of brackish waters (such as are found in the Fraser River plume and Burrard Inlet) after about 24 hours following the initial release.²⁴²

205. In the Strait of Juan de Fuca and west coast of Vancouver Island, where water salinity is higher, diluted bitumen might not submerge as a result of its density alone. However, the higher sea states typical of these more exposed waters would promote entrainment of diluted bitumen into the water column, making the oil difficult to track. The resulting uncertainty of shoreline oil deposition would likely never be fully resolved owing to the expense involved in surveying the thousands of kilometers of potentially oiled shorelines.²⁴³

206. The experience of heavy oil spills on the west coast of Vancouver Island bears out the concern with respect to rapid entrainment of diluted bitumen in the water column. In the case of the Nestucca spill in 1988, a heavy oil was spilled that became submerged, rendering it impossible to track or recover. That relatively small oil spill (875 cubic metres) spread some 600 kilometres north, oiling shorelines all along Vancouver Island.

²⁴⁰ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 98, Appendix 3 and pages 45, 56.

²⁴¹ *Ibid* at page 45.

²⁴² *Ibid.* at page 51.

²⁴³ Exhibit C214-18-3, Short 2, Filing ID A4L0R8 at page 8, para 27.

Some of it sank to the bottom, contaminating Dungeness crabs and other benthic organisms.²⁴⁴

207. Marine oil spill response equipment is effective where oil spills can be confined, to prevent them from spreading; the oil is then recovered from the confined pools on the surface of the water by mechanical means. Diluted bitumen is unlikely to be amenable to conventional spill response technology because:

- a) if it submerges because of its density or the mixing energy provided by high sea states, it is difficult if not impossible to track and confine, so as to employ conventional spill response technology;
- b) its density and viscosity increase so rapidly that the weathered oil sticks to the skimming equipment and clogs pumps, resisting efforts to deposit it in containment vessels;
- c) if it sinks to the ocean floor, commercially available spill response technology is of little use in recovery operations.²⁴⁵

208. Diluted bitumen is also unlikely to be remediated by natural, biological processes in the same way that conventional crude oils degrade. Bitumen is essentially heavily biodegraded crude oil, which is to say that it has already undergone a process of natural biodegradation and it has little remaining scope for bioremediation.²⁴⁶

209. Trans Mountain's assertion that: "[b]iological recovery from spilled oil, where shoreline communities were contacted by and harmed by the oil or by subsequent clean-up efforts, would be expected to lead to recovery of the affected habitat within two to five years" and that "[b]y comparison, whether cleaned or not, intertidal communities had recovered within five years after the EVOS [Exxon Valdez Oil Spill]" is accordingly without scientific support. It is also contradicted by the evidence contained in the application itself in Table 5.6.2.1 of section 5.6.2.1, where intertidal communities are

²⁴⁴ *Ibid.* page 7, paras 22-25, and page 24, para 65.

²⁴⁵ Exhibit C214-18-6, Solsberg, Filing ID A4L9S1 at pages 14-16.

²⁴⁶ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 48, para 126-127

listed as “recovering” (but not as “recovered”) on the basis of the 2010 Recovery Status from the Exxon Valdez Oil Spill Trustee Council. Furthermore, the Marine ERA does not provide a clear definition of what is meant by “recovery”, without which statements regarding recovery status or prospects are vague and possibly meaningless.²⁴⁷

210. Living Oceans and Raincoast are concerned that the Board does not have some of the most credible and recent publications on this matter before it. In December 2015, Living Oceans and Raincoast filed a motion to introduce into evidence a report by the U.S. National Academy of Science, released in December 2015. The report, entitled “Spills of Diluted Bitumen from Pipelines: A Comparative Study of Environmental Fate, Effects, and Response” addresses issues directly relevant to this application, namely whether transport of dilbit in pipelines has environmental consequences that are sufficiently different from commonly transported crude oils to require different spill response planning. The Board also does not have before it the November 2015 Royal Society of Canada expert panel report entitled “Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments”, prepared at the request of the Canadian Energy Pipeline Association and the Canadian Association of Petroleum Producers, which was also published after the evidentiary record closed.²⁴⁸ The Board’s exclusion of this evidence from its considerations is of concern to Living Oceans and Raincoast, given the Board’s obligations under CEEA 2012 to determine whether there will be significant adverse environmental effects in the event of a marine oil spill of diluted bitumen.²⁴⁹

²⁴⁷ Exhibit C214-18-3, Short 2, Filing ID A4LOR8 at page 6, para 17.

²⁴⁸ The Royal Society of Canada, *Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments: An Expert Panel Report prepared at the request of the Royal Society of Canada for the Canadian Energy Pipeline Association and the Canadian Association of Petroleum Producers (November 2015)* (Ottawa: The Royal Society of Canada, 2015).

²⁴⁹ Exhibit C214-31-2, Notice of Motion to file late evidence, Filing ID A4W3Y9; Exhibit A241-1, Ruling No. 105 Living Oceans Society and Raincoast Conservation Foundation – Notice of Motion to file late evidence, Filing ID A74837.

4) The Marine ERA fails to consider relevant possibilities for exposure of organisms to oil and resulting harm to organisms

211. Because the Marine ERA failed to recognize bitumen's susceptibility to submerge in water, it dismissed the possibility of exposure to submerged oil. As a result, "potentially major oil exposure pathways are excluded".²⁵⁰

212. For example, submerged bitumen could expose a host of species to oil, including those with commercial and subsistence harvest values.²⁵¹ It can be ingested by species inhabiting the water column or adjacent shorelines, such as juvenile herring in the estuary, out-migrating salmon from the Fraser River and Burrard Inlet, returning adult salmon, and suspension-feeding invertebrates; this in turn exposes their predators.²⁵² Submerged bitumen is more difficult to observe or sample, resulting in uncertainty regarding severity or extent of contamination.²⁵³

213. Examples of the implications of these shortcomings of the Marine ERA are identified by Dr. Short and include inadequate assessment of threats to seabirds, shorebirds, marine mammals and intertidal biota, and of the potential for stranding of diluted bitumen on armoured beaches, marshes and mudflats, all of which are common within Burrard Inlet, the Fraser River Estuary, the Gulf Islands and the Strait of Juan de Fuca.²⁵⁴

214. As well, the Marine ERA fails to consider consequences to species that may result from photo enhanced toxicity – a mechanism important for species such as the Pacific herring. Pacific herring deposit eggs on intertidal reaches of shorelines. Certain compounds in bitumen can dissolve into water and then be absorbed by herring embryos.

²⁵⁰ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 6, para 24.

²⁵¹ *Ibid* at page 26, para 89.

²⁵² *Ibid* at page 11.

²⁵³ *Ibid* at page 26; Exhibit No. C214-18-6, Solsberg, Filing ID A4L9S1, at page 2.

²⁵⁴ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 56; Exhibit C214-18-3, Short 2, Filing ID A4L0R8 at pages 24-34.

Sun exposure promotes oxidation of oil-affected tissues in embryos, in effect burning them.²⁵⁵

215. Another omission is failure to adequately consider that, even where diluted bitumen does not sink, its effects on species inhabiting the marine surface would be significant in the event of a spill. Surface oil is a contact hazard for birds and marine mammals. For marine mammals, which inhabit the surface, it also poses a risk of inhalation of hydrocarbon fumes, possibly leading to narcosis and drowning.²⁵⁶

216. Sea and shorebirds are sensitive to oil exposure, and the Marine ERA fails to consider the numbers of resident and migratory birds at risk of exposure to spilled oil. The Marine ERA fails to adequately value, and assess risks to, the high biological productivity, diversity, and ecological importance of the Fraser River estuary, which is arguably the most important estuarine ecosystem on the Pacific coast of North America. A spill near this estuary could kill more than 100,000 sea and shorebirds, which would also have cascading effects that could penetrate into the food web of the Fraser River estuary, including Burrard Inlet.²⁵⁷

217. The Marine ERA obscures the magnitude of shoreline oiling impacts throughout the study area, leading to incorrect conclusions about shoreline recovery time and the spatial and temporal extent of the likely impacts on species. By failing to identify the spatial extent of specific shoreline types within the study area, it provides no useful guidance for assessing potential impacts or recovery times. These details are crucial because recovery times and remediation costs, as well as impacts on species, depend heavily on the type of shoreline oiled.²⁵⁸

218. The Marine ERA misrepresents the oil-retention capacity of some shoreline types that may retain oil for years or decades, states that most shoreline oil would be recovered despite prominent contradictory examples, misstates the status of shorelines affected by

²⁵⁵ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 31.

²⁵⁶ *Ibid* at page 10.

²⁵⁷ *Ibid* at pages 69 and 10-11; Exhibit C214-18-3, Short 2, Filing ID A4L0R8, at page 7.

²⁵⁸ Exhibit C214-18-3, Short 2, Filing ID A4L0R8, at page 5.

the Exxon Valdez spill, fails to consider relevant findings from other spills, and fails to define what it considers “recovery”.²⁵⁹ As a result, it underestimates the potential effects on shoreline ecosystems and the intertidal organisms, birds, and mammals that inhabit them (and their predators). This is an important shortcoming given that a spill could result in considerable shoreline oiling.²⁶⁰

219. In particular, estuarine, marsh and lagoon habitats account for 19% of the Burrard Inlet/Fraser River Estuary shorelines and are the most productive and ecologically important shoreline types. Heavy oiling in these areas can create long term oil exposure hazards for plants and animals, including shorebirds.²⁶¹

5) Implications of the deficiencies in the Marine ERA

220. As a result of the deficiencies outlined above in the Marine ERA, Living Oceans and Raincoast submit that Trans Mountain has not adequately or reliably assessed the effects of a marine oil spill in the Salish Sea or on the west coast of Vancouver Island. Due to these deficiencies, Trans Mountain has failed to consider the implications of spilled diluted bitumen on shorelines and the intertidal zone, including the Fraser River Estuary, and has not adequately considered its impacts on surface waters or submergence in the Salish Sea.

221. Overall, Dr. Short concludes that the Marine ERA violates the basic principles of ecological risk assessment, rendering it “thoroughly unreliable as an assessment of risks for the most serious consequences for a large oil spill in the Salish Sea”. This includes:

- a) Failure to account for variation in oil slick trajectories that depend strongly on the assumed point of origin for a spill in trajectory modelling, including complete absence of consideration for any spill that might occur within Burrard Inlet;
- b) Confounding assessments of oil exposure and the hazards presented by these exposures to habitats and marine-dependent organisms;

²⁵⁹ *Ibid* at pages 6-7.

²⁶⁰ *Ibid* at pages 30-34.

²⁶¹ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at pages 60 and 63.

- c) Presumptive and erroneous characterization of some of the most vulnerable and sensitive habitats and species, namely shorebirds that inhabit the flats along the Fraser River delta, as among the least vulnerable to oil exposure and the least sensitive should exposure occur, when in fact they are highly sensitive;
- d) Use of an arbitrary scheme for assigning sensitivities to habitats and species;
- e) Failure to consider potentially important exposure pathways associated with diluted bitumen that could submerge in the nearly fresh surface waters of the Fraser River freshet during spring and summer;
- f) Failure to consider all the relevant toxicity mechanisms through which exposure to toxic components of diluted bitumen can harm marine organisms; and
- g) Failure to provide quantitative estimates of potential injuries to species and resources most sensitive to injury from exposure to diluted bitumen.²⁶²

222. The shortcomings of the Marine ERA mean that the impacts of oil spills have not been adequately assessed by Trans Mountain. Moreover, the fact that spilled diluted bitumen is prone to submergence, as described by Dr. Short and acknowledged by Trans Mountain, makes this an outstanding issue that must not be dismissed by the Board. Evidence before the Board indicates a high likelihood of submergence when heavy oil spills are spilled in the marine environment, making the oil difficult if not impossible to track, confine and recover. Thus, a precautionary approach should be followed in this instance. Living Oceans and Raincoast submit that the Board should not make any recommendations on this issue until any uncertainties about the fate, behaviour and environmental impact of spilled diluted bitumen in and around the Salish Sea region has been resolved.

223. Trans Mountain does not appear to address potential use of dispersants in its final argument. Chemical dispersants are not suitable for diluted bitumen spills and should not be considered as a viable response to such spills under any circumstances.²⁶³ To be even marginally successful, they would have to be applied to a surface slick of diluted bitumen an hour or two after contact with the water; this is not realistic given either spill response

²⁶² *Ibid* at page 36.

²⁶³ Exhibit C214-18-3, Short 2, Filing ID A4L0R8, at page 12.

times or the danger presented by evaporation of diluents from the diluted bitumen during the first 24 hours after a spill.²⁶⁴ Dispersants and related products are sometimes used as shoreline cleaning agents, but may have harmful side effects on shoreline organisms.²⁶⁵

224. Locating, containing, and removing spilled heavy oil is difficult.²⁶⁶ Spill response options may be severely limited where dealing with submerged dilbit, which is extremely difficult to remove in comparison with oil on the surface of the water. If spilled oil becomes suspended below the water's surface there is no available response technology that can be successfully applied to significantly control the spill.²⁶⁷ Factors impacting this include lack of experience, the need for specialized equipment, the reality of collecting large quantities of water and sediment along with the oil, and cost and safety factors.²⁶⁸ Spill response when dealing with submerged dilbit will be extremely challenging, if not impossible, particularly if, as is currently the case, no specific response capacity is in place to address submerged or sunken dilbit.

225. Living Oceans and Raincoast submit that the deficiencies identified in the Marine ERA are such that the Marine ERA is unreliable and that additional work should be required of Trans Mountain to remedy gaps and deficiencies prior to any determination being made about whether a marine oil spill would be likely to cause significant adverse environmental effects.

D) Human health and air quality impacts from the Project may be significant

226. Living Oceans has submitted two expert peer reviews²⁶⁹ of portions of the Application dealing with human health and air quality. Dr. Isobel Simpson's peer review

²⁶⁴ *Ibid* at pages 12-13.

²⁶⁵ *Ibid* at pages 34-35.

²⁶⁶ Exhibit C214-18-6, Solsberg, Filing ID A4L9S1, at page 14.

²⁶⁷ *Ibid* at page 5.

²⁶⁸ *Ibid* at pages 9, 14; Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 26, para 91.

²⁶⁹ Exhibit C214-18-4, Attachment C to written evidence of Living Oceans – Review of Facilities Application – Focus on Air Quality, Dr. Simpson [Simpson], Filing ID A4L9R9, at page 19; Exhibit C214-18-5, Attachment D to written evidence of Living Oceans, Health Risks, Dr. Batterman [Batterman], Filing ID A4L9S0.

focused on the air quality impacts of application materials, whereas Dr. Stuart Batterman's peer review examined the same studies from a human health perspective.

227. Their review of the materials focused on four categories of impacts: (1) normal operations, (2) a spill on populated areas along the pipeline route, (3) a spill at the Westridge, Sumas, Edmonton or Burnaby Terminals,²⁷⁰ and (4) a tanker spill. Among the documents reviewed by the two experts are the Air Quality and Greenhouse Gas Technical Report (the "Air Report"), the Human Health Risk Assessments ("HHRAs"),²⁷¹ the redacted Emergency Management Plan documents, and relevant information request responses.²⁷²

228. Not only do these reviews reveal that routine Project-related air emissions may cause significant chemical exposure and harm to human health,²⁷³ they show that the flaws and deficiencies throughout Trans Mountain's materials render them unreliable and incomplete.

229. Trans Mountain's evidence does not provide adequate information to reliably assess human health risks. The HHRAs fail entirely to identify human populations that are potential receptors for pollutants generated by the Project and therefore fail to provide the essential information needed to determine whether or not there are impacts to be mitigated.

²⁷⁰ Note that Dr. Simpson was unable to review ambient data from the Sumas and Burnaby terminals as data was not supplied. Exhibit C214-18-4, Simpson, Filing ID A4L9R9 at page 3.

²⁷¹ Exhibit B088, Human Health Risk Assessment of Pipeline Spill Scenarios for the Trans Mountain Pipeline ULC Trans Mountain Expansion Project, [Pipeline HHRA] Filing ID A60834; Exhibit B106, Human Health Risk Assessment of facility and marine spill scenarios, Technical Report for the Trans Mountain Pipeline ULC Trans Mountain Expansion Project, [Marine HHRA] Filing ID A61083; Exhibit B107, Human health risk assessment of Westridge Marine Terminal, Technical report for the Trans Mountain Pipeline ULC Trans Mountain Expansion Project [Terminal HHRA], Filing ID A61084.

²⁷² For a list of materials reviewed by Dr. Batterman, see Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at pages 3-4. A list of materials reviewed by Dr. Simpson is found at Exhibit C214-18-4, Simpson, Filing ID A4L9R9, at page 48.

²⁷³ Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at page 2.

230. Much of the air quality data in the Trans Mountain's evidence is insufficient or imprecise, and Trans Mountain does not account for uncertainties. Trans Mountain's modelling used unrealistically high background values which minimized the apparent contribution of the Project. Further, the materials do not address the wide range of possible spill scenarios, focusing on only two scenarios each for a pipeline, terminal or tanker spill, none of which were credible worst case scenarios.²⁷⁴

1) The air quality studies suffer from methodological deficiencies

231. The two peer reviews, and the Simpson peer review in particular, identified numerous deficiencies in Trans Mountain's air quality evidence. Trans Mountain has not provided the fundamental data needed to assess the quality of its air quality measurements, and specifically the quality of the ambient air quality measurements:

- a) The calibration scale of a measurement must be traceable to a recognized standard for its reliability and accuracy to be understood, but Trans Mountain did not specify the standards used.²⁷⁵
- b) Trans Mountain has not provided the results of any international audits or other comparisons, or any quantitative results of audits. The quality of its measurements remains unknown.²⁷⁶
- c) Trans Mountain's instruments are not sufficiently precise or sensitive to measure background levels of certain pollutants and distinguish them from the instrument noise of Project-related emissions. This would make it impossible to determine whether levels have returned to normal after a spill, or to detect whether the Project's normal operations or any releases increase the levels of sulfur dioxide or carbon monoxide.²⁷⁷

²⁷⁴ *Ibid* at pages 5-6.

²⁷⁵ Exhibit C214-18-4, Simpson, Filing ID A4L9R9, at page 19.

²⁷⁶ *Ibid*.

²⁷⁷ *Ibid* at pages 3, 19-20, 32, 35, 37.

- d) It is unclear whether speciated (disaggregated into individual components) volatile organic compound (VOC) measurements are available, and it appears that the hydrocarbon measurements are not speciated, preventing identification of spikes in any individual pollutant and thereby preventing understanding of air quality and human health impacts in an emergency.²⁷⁸ In particular, spikes in benzene, a known carcinogen, would not be identifiable.²⁷⁹
- e) Ambient data for the Sumas and Burnaby terminals, since 2012 and 2013, respectively, was not available due to ongoing calibration, precluding an assessment of the magnitude and quality of measurements of the concentrations there.²⁸⁰

232. Other problems with Trans Mountain's air quality modelling are that it contains gaps or is incomplete, is not explained, and includes assumptions resulting in large uncertainties:

- a) Trans Mountain has not provided information explaining the appropriateness of applying the model over a smaller area than it was designed for.²⁸¹
- b) Only one station represented overall background in each Air Quality Regional Study Area.²⁸²
- c) Trans Mountain cited unrealistically high background concentrations of pollutants, which makes the impacts from routine Project operations appear smaller than if more realistic, lower, background concentrations had been used, thus making the Project's contribution appear smaller.²⁸³ Unrealistically high

²⁷⁸ *Ibid* at page 3.

²⁷⁹ *Ibid* at pages 21, 22.

²⁸⁰ *Ibid* at page 3.

²⁸¹ *Ibid* at pages 4, 23.

²⁸² *Ibid* at pages 24, 25.

²⁸³ *Ibid* at pages 4, 25, 29-31, 35-37; Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at pages 7-8.

background concentrations also make it impossible to assess air quality impacts of fugitive emissions or spills.²⁸⁴

- d) Background concentrations were cited to an unrealistic number of significant figures, implying a false level of precision, rather than the large uncertainty that these concentrations actually carry.²⁸⁵
- e) The model used a single background concentration for each pollutant instead of time-varying background concentrations, ignoring the normal seasonal and diurnal variations or long-term growth or decline of air pollutants or the possibility that Project emissions may change over time. This may prevent exceedances being assessed correctly.²⁸⁶
- f) Averages were not used consistently. One-hour values and annual values were calculated using different percentiles.²⁸⁷

233. Overall, the reliability and representativeness of Trans Mountain's air quality modelling cannot be assessed because Trans Mountain fails to recognize and quantify the uncertainties of the measurements and model results.²⁸⁸ For example, it uses a single unchanging background concentration for each pollutant, which is not realistic. This prevents an estimation of the accuracy of the models' outputs and a determination of their reliability and credibility.²⁸⁹ The uncertainty of each measurement or calculation that was used in the Application or the Air Report should have been critically evaluated and quantified, to indicate their reliability.²⁹⁰

²⁸⁴ Exhibit C214-18-4, Simpson, Filing ID A4L9R9, at pages 35, 37.

²⁸⁵ *Ibid* at pages 4, 26-28, 30.

²⁸⁶ *Ibid* at pages 4, 26-28.

²⁸⁷ *Ibid* at page 27.

²⁸⁸ *Ibid* at pages 4, 22-27.

²⁸⁹ *Ibid* at pages 4, 22-23.

²⁹⁰ *Ibid* at page 18.

2) The human health risk assessments suffer from methodological deficiencies

234. Deficiencies of the sort found in the air quality components of the Application are also found in the HHRAs, as identified by Dr. Batterman in his peer review. Overall, Trans Mountain underestimates potential impacts. Its studies are inadequate, contain significant omissions, and use flawed methods and analyses. Dr. Batterman states:

... the assessments completed do not provide accurate predictions of the potential health effects that might result from fugitive emissions, ruptures, releases and spills at the terminals, along the pipeline, or on waterways; rather, the completed assessments underestimate the potential risks.²⁹¹

235. Notably, Dr. Batterman reaches a similar conclusion in his review of the HHRAs to the one Dr. Short reached in his review of the Marine ERA – that the HHRA “uses a hazard approach that does not define the likelihood of scenarios that might lead to exposure”, in relation to the risk of pipeline spills through the Fraser Valley and Metro Vancouver.²⁹²

236. Other deficiencies in the HHRAs include:

- a) The pipeline HHRA assesses only two possible scenarios for each of a release from the pipeline, a terminal, or a tanker on the marine shipping route.²⁹³ In each case the volumes considered do not include a credible worst case scenario, the maximum credible release or other credible spill volumes identified in the Application.²⁹⁴
- b) The marine HHRA fails to address the probability of releases, exposure or health risks.²⁹⁵ It assumes efficient detection and rapid valve shut-off for pipeline spills

²⁹¹ Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at page 2.

²⁹² *Ibid* at page 10. See also discussion of the similar conclusions of Dr. Short at Part III.C.2, *infra*.

²⁹³ *Ibid* at page 13 (referencing Pipeline ERA).

²⁹⁴ *Ibid* at pages 10-11 (referencing Pipeline ERA), pages 13-14 (referencing Terminal ERA), and page 16 (referencing Marine ERA).

²⁹⁵ *Ibid* at page 16 (referencing Marine ERA).

and high containment efficiency for terminal spills.²⁹⁶ It does not consider site-specific factors such as location and size of affected populations, sensitive and vulnerable individuals, populations that are difficult to evacuate, evacuation routes, or resources available to manage spills.²⁹⁷

- c) The pipeline HHRA does not use appropriate worst-case meteorological parameters, which would substantially increase concentrations of contaminants and result in larger areas where concentrations exceed exposure limits; contrary to statements in the assessment it does not follow US EPA guidance.²⁹⁸ The study also assumes a 10 cm depth for the spill area, which fails to account for sloping land, impervious surfaces and other variations, and thus is oversimplified and not necessarily conservative.²⁹⁹
- d) The Westridge Marine Terminal HHRA compares the base case against the application case, but adjusts the application case to include anticipated changes in future marine fuel regulations and more stringent NO_x requirements, and fails to specify the expected reduction in emissions or the timeframe for them. As a result the comparison does not actually show the incremental effect of the Project.³⁰⁰

237. With respect to terminal spills, the HHRAs assume that maximum airborne concentrations will occur over water, not land, and fail to map the highest concentrations.³⁰¹ The terminal HHRA does not address terrestrial spills from terminals or the associated contamination of air or creation of multiple exposure pathways (inhalation, direct contact, ingestion).³⁰²

²⁹⁶ *Ibid* at pages 10-11, 13-14.

²⁹⁷ *Ibid* at page 13.

²⁹⁸ *Ibid* at pages 10, 11.

²⁹⁹ *Ibid* at page 12.

³⁰⁰ *Ibid* at page 6 (referencing Terminal ERA). Exhibit B107-1, Trans Mountain Pipeline ULC HHRA Westridge Marine Terminal Part 1, Filing ID A3Y1F4, Section 3.2.2.1: Inhalation Assessment, at page 3-14.

³⁰¹ Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at pages 13, 14, and 16.

³⁰² *Ibid* at page 14.

238. For pipeline and terminal releases, the HHRAs should have considered multi-hour exposure periods, not one hour.³⁰³ For example, benzene exposure can last up to 13 hours.³⁰⁴

239. For the pipeline spill scenarios considered, there were also a number of exceedances. Estimated one-hour concentrations exceeded the health based limits for four groups of compounds, including benzene, at distances up to 1050 metres from the modelled spill site, and estimated concentrations exceeded the one hour limits for three mixtures (eye irritants, respiratory irritants, and neurotoxicants) at distances up to 750 metres. Maximum concentrations greatly exceeded exposure limits; for example, the benzene concentration was 100 times the limit. Xylene may have exceeded limits, but was omitted from a relevant table.³⁰⁵

240. The larger spill scenario considered for the Westridge Terminal resulted in concentrations in excess of acute (one hour) exposure limits for six groups of compounds, including benzene. The maximum concentrations significantly exceeded the exposure limits, including by 20 times for benzene; this would cause moderately dangerous adverse impacts to exposed individuals.³⁰⁶

241. For both marine spill scenarios, the acute inhalation exposure limits were significantly exceeded for six groups of compounds, by factors of 1.3 to 42, including by a factor of 30 for benzene. Exceedances occurred immediately after the spill and within 30 hours (or up to 50 hours for aromatic C9-C16), lasted for multiple hours (including 23 hours for benzene), and occurred throughout large areas (such as a region over 20 kilometres long for benzene), with the possibility of affecting appreciable numbers of people. These scenarios would likely result in moderately dangerous acute exposures with a range of respiratory, cardiovascular, neurological and psychological outcomes.³⁰⁷

³⁰³ *Ibid* at page 12 (referencing Pipeline ERA) and page 15 (referencing Terminal ERA).

³⁰⁴ *Ibid* at page 15.

³⁰⁵ *Ibid* at page 12.

³⁰⁶ *Ibid* at page 15.

³⁰⁷ *Ibid* at page 16.

242. The HHRAs indicate that emissions from normal operations of the Project will degrade ambient air quality and result in concentrations of SO₂, NO₂, PM_{2.5} and the acute respiratory irritant mixture above exposure limits or standards, with the potential to cause adverse health effects.³⁰⁸

243. The Project would emit harmful pollutants. NO₂ and PM_{2.5} are associated with serious cardiovascular and respiratory impacts. Fine particulate matter (PM_{2.5}) is associated with mortality and morbidity even at low concentrations, including below the Metro Vancouver Objectives. Benzene, which was omitted from the air quality modelling, even though other national standards were applied, is associated with several types of cancer.³⁰⁹

244. Among the concerns in the Application materials is:

- a) Urban dwellers already approach and possibly exceed the exposure limit for the acute respiratory irritants mixture, and the Project will exacerbate this.³¹⁰
- b) The acute respiratory irritants mixture will exceed the exposure limit 79 hours per year around the Westridge Terminal, which is considered a frequent and regular occurrence; the Project will lead to regular degradation of air quality that would not otherwise occur.³¹¹
- c) The expected 1-hour NO₂ concentration in the combined Burnaby and Westridge Marine Terminal model exceeds the Metro Vancouver Ambient Air Quality Objective, Alberta Ambient Air Quality Objective, and US EPA National Ambient Air Quality Standard.³¹²

³⁰⁸ *Ibid* at page 6.

³⁰⁹ *Ibid.* at page 7.

³¹⁰ *Ibid.*

³¹¹ *Ibid.*

³¹² *Ibid.*

- d) The expected PM2.5 concentrations for the Burnaby and Westridge Terminal locations are nearly twice the Metro Vancouver Objectives.³¹³
- e) The Application failed to apply the national Ambient Air Quality Objectives for benzene at the Burnaby and Westridge Terminals, but the one-hour concentration objective would also be exceeded.³¹⁴

245. There are already exceedances of certain air quality limits in relevant locations. The Project would contribute additional emissions, and Trans Mountain concedes that the total cumulative effect of air emissions may exceed environmental or regulatory standards, and may be significant.³¹⁵ Trans Mountain focuses on “the Project contribution to total cumulative air emissions”, rating it as low to medium. However, the Board has stated that significance should be determined with reference to cumulative effects, not just to the Project’s contribution to those effects, and, when total cumulative effects are considered, existing exceedances can be important.³¹⁶ Thus, the cumulative effect of air emissions in this instance should be deemed significant by the Board.

246. Furthermore, air emissions in the event of a marine oil spill will be exceedingly difficult to mitigate, if mitigation is possible at all.

247. The HHRA scenarios represent only a small subset of the potential relevant conditions in relation to a marine spill, omitting scenarios that could result in different and worse outcomes: spill volumes could be larger, and different locations, times of year, meteorological conditions, water temperature, or wave action could alter the assessment’s conclusion that exceedances will occur primarily over water.³¹⁷

248. Emissions of nitrogen dioxide and sulphur dioxide from tugs and tankers during normal operations will occur all along the marine shipping route, potentially affecting

³¹³ *Ibid.*

³¹⁴ *Ibid.*

³¹⁵ Exhibit B239-13, Trans Mountain Response to NEB IR No. 2, Filing ID A3Z4T9, at pages 115, 116.

³¹⁶ *Ibid* at pages 109, 110.

³¹⁷ Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at page 18.

long sections of coastline. However, the Application focuses only on a single location, the maximum point of impingement, and does not address concentrations along the coastline or at other potentially affected areas or sensitive receptors, nor identify potentially affected regions and populations.³¹⁸

249. Trans Mountain's estimation of emissions from tankers at anchor is incomplete. Trans Mountain uses an average of 20 hours at anchor to estimate emissions. This does not take into account time spent at anchorages west of the Second Narrows, which should be included.³¹⁹ A more accurate average of 70 hours would increase estimates of Project NO_x emissions by 250 tonnes per year.³²⁰

250. Finally, the HHRA focuses only on direct inhalation as the exposure pathway, omitting direct physical contact, ingestion (for example of seafood) and inhalation of combustion products from spill-related fires or explosions.³²¹ It assumes that people will be willing and able to behave in ways that limit exposure, which is not always the case when an accident has happened.³²²

3) The Project would have significant air quality and human health effects

251. Despite the shortcomings identified above, Trans Mountain's evidence nonetheless shows that both routine operations and releases from the Project are of concern.³²³ Even the normal operations and the limited release scenarios examined in the Application would cause significant chemical exposure and harm public health.³²⁴

³¹⁸ *Ibid* at pages 6, 7.

³¹⁹ Exhibit C365-9-2, Responses to NEB Information Request #1, Filed by Vancouver Fraser Port Authority, Filing ID A4R7L3, at PDF page 6.

³²⁰ Exhibit C121-3-1, EC written evidence, Filed by Environment Canada, Filing ID A4L8Y6, at pages 89, 94. Environment Canada concluded that in total, Trans Mountain has underestimated marine source NO_x emissions by 750 tonnes per year, or 37%, at page 95.

³²¹ Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at pages 11 (referencing Pipeline ERA), and pages 16, 17-18 (referencing Marine ERA).

³²² *Ibid* at page 11 (referencing Pipeline ERA), pages 14-15 (referencing Terminal ERA), page 18 (referencing Marine ERA).

³²³ *Ibid* at pages 2, 5, 6.

³²⁴ *Ibid* at page 7, paras 3.1.7, 3.1.9 and 3.1.10.

252. The results of the peer reviews reveal that information regarding the air quality and human health impacts of the Application are incomplete, unreliable, contain poor methodology and should be of real concern to the Board and the public, both from a normal operations perspective as well as a risk perspective in the event of an accidental release from the Project or a tanker. As a result, the environmental assessment of air quality and human health impacts is incomplete. Moreover, as described above, the cumulative effects of air emissions in relation to this Project are identified as significant in Application materials.

E) The Project would result in a net cost, not an economic benefit, to Canada

253. Trans Mountain states that the Project will generate significant economic benefits. It provides the Muse Market Prospects and Benefits Analysis for TMEP Report (the “Muse Report”), dated October 2015, to support the proposition that the Project will benefit Canadian oil producers by increasing and diversifying market access and thereby avoiding price discounts and enabling producers to receive higher prices.³²⁵

254. Living Oceans commissioned a peer review of the Muse Report in relation to the costs and benefits of the Project, in order to provide perspective relevant to the Board’s determination of whether the Project is in the public interest.

255. This peer review, prepared by Dr. Tom Gunton, Dr. Sean Broadbent, Dr. Chris Joseph and James Hoffele (the “Gunton Report”),³²⁶ identifies important deficiencies in the economic evidence supporting the Project, including:

- a) it overstates the economic benefits of the Project by using gross economic impacts instead of net economic impacts;

³²⁵ Exhibit B431-2, Muse, Market Prospects and Benefits Analysis for TMEP, Final Errata Clean [Muse], Filing ID A4U8F8; See also Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 75-76, 398.

³²⁶ Exhibit C214-30-2, Replacement for Attachment F to written evidence of Living Oceans, Public Interest Evaluation, Dr. Gunton et al [Gunton], Filing ID A4W0R4.

- b) it fails to take into account the opportunity cost of labour, capital, and other resources;
- c) it concludes that the Project will increase prices for Canadian oil exports based on a questionable methodology and unrealistic assumptions and contrary to oil market dynamics; and
- d) it considers the need for the Project while underestimating transportation capacity for western Canadian oil, overestimating oil production and prices, and excluding alternative production and transportation capacity scenarios.³²⁷

256. The Application does not estimate the economic costs of the Project, such as losses resulting from potential excess transportation capacity or the costs of social and environmental impacts such as air pollution, greenhouse gas emissions, oil spills or other marine impacts.³²⁸

257. The Gunton Report estimates that, under its base case assumptions, the Project will result in a net cost to Canada of \$7.4 billion.

258. Recognizing that there are many uncertainties in estimating benefits and costs, including those related to oil markets and the future direction of oil prices, the Gunton Report applies various sensitivity analyses using different assumptions and forecasts, all of which conclude a net cost to Canada of the Project, ranging anywhere from \$4.6 billion to \$23 billion.³²⁹ Factors such as fewer new pipelines, higher production, and lower environmental costs tend to reduce the net cost, and more new transportation projects, lower oil production and higher environmental impacts increase the net costs.³³⁰

³²⁷ *Ibid* at page i.

³²⁸ *Ibid* at pages i-ii.

³²⁹ *Ibid* at page 68. See also Table 18, at page 69, describing benefit cost scenario sensitivity results.

³³⁰ *Ibid* at page ii.

259. Notably, despite the many uncertainties, the Muse Report does not undertake sensitivity analyses to test different assumptions, and thus it would be imprudent to rely upon the price benefits of the Project estimated in that Report.³³¹

260. In respect of the costs of environmental impacts of the Project, the Gunton Report does not attempt to include many environmental impacts of the Project which are difficult to quantify in dollar amounts. Inclusion of these impacts would increase the environmental cost estimates and therefore the net cost calculations.³³² The Gunton Report critiques the estimates relied upon by Trans Mountain for calculating environmental costs in conducting its own sensitivity analyses.³³³

261. Trans Mountain submits that environmental impacts need not be quantified or otherwise incorporated into this analysis, because “if the Project adequately addresses the potential negative environmental and safety concerns (externalities, the costs of addressing [them] are internalized”.³³⁴ This assumes that the Project does adequately address all of those concerns. Living Oceans and Raincoast disagree with this assumption. Given that Trans Mountain fails to adequately address several impacts identified elsewhere in this argument, such as impacts of an oil spill from the pipeline near the Lower Fraser River on commercially harvested salmon, the Board cannot assume that Trans Mountain has addressed and internalized all potentially costly environmental and safety concerns. As stated elsewhere in this final argument, Trans Mountain assumptions tend to diminish potential Project impacts. It is therefore unlikely that Trans Mountain has internalized even a portion of the real costs of credible worst case scenario impacts.

262. One of the main reasons that the Project may result in a net cost is that it will create excess pipeline capacity. A supply and demand analysis for Western Canadian Sedimentary Basin transportation services using forecasts from the Canadian Association

³³¹ *Ibid* at page 20.

³³² *Ibid* at page v.

³³³ *Ibid* at pages 50-58.

³³⁴ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 422.

of Petroleum Producers (“CAPP”) shows that the Project will have economic costs because it will create surplus capacity for oil transportation.³³⁵ Both high growth and low growth forecasts from CAPP anticipate surplus capacity in the oil transportation sector.³³⁶

263. Indeed, under the CAPP low growth forecast, the additional capacity the Project would create is not needed at all.³³⁷ Under CAPP’s high growth forecast, the Project would not be needed by the industry until 2029 (if Enbridge Clipper, the Enbridge Line 3 replacement, and Energy East are built) or 2023 (if Energy East is not built). If the Project’s capacity were unused this would impose a large cost on Canada’s oil transportation sector, producers, and the public in the form of reduced tax revenues. The Application does not account for this cost.³³⁸

264. Further, Trans Mountain takes issue with the Gunton Report’s conclusion that the Project will result in excess capacity, critiquing the Report’s reliance on the assumption that 550 kb/d of rail capacity will be used even where the Project and the Trans Canada Energy East Pipeline Project are commissioned, and effectively increases the amount of excess capacity.³³⁹ However, these transportation assumptions were drawn from the same source relied upon by Trans Mountain in their studies – the Canadian Association of Petroleum Producers.³⁴⁰ Furthermore, the Gunton report uses a no growth in rail scenario in one of its sensitivity analyses, and even assumes oil is diverted from rail as well as pipelines in another analysis, and there are still excess capacity costs.³⁴¹

265. Given that the Project would result in surplus capacity, and that the downturn in oil markets has depressed activity,³⁴² Living Oceans and Raincoast submit that that the Project is not required now or in the reasonably foreseeable future and it is not in the public interest.

³³⁵ Exhibit C214-30-2, Gunton, Filing ID A4W0R4, at page ii.

³³⁶ *Ibid* at pages ii, iv.

³³⁷ *Ibid* at pages ii.

³³⁸ *Ibid*.

³³⁹ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 405.

³⁴⁰ Exhibit C214-30-2, Gunton, Filing ID A4W0R4, at page 39.

³⁴¹ *Ibid* at pages 43-45 and 71-73.

³⁴² *Ibid* at pages 21 and 35.

266. Trans Mountain also argues that quantification of the environmental impacts is not needed to evaluate whether the Project is in the public interest, nor is the Benefit-Cost Analysis employed in the Gunton Report required. Living Oceans and Raincoast disagree.

267. Whereas Trans Mountain argues that the wide range of assumptions inputted into a Benefit Cost Analysis can lead to a wide range of results, Living Oceans and Raincoast note that all of the assumptions tested by Gunton et al in their Report result in the Project being a net cost to Canada,³⁴³ and that the Muse Report only uses one set of possible assumptions to reach its conclusions with respect to the Project's benefits.

268. Trans Mountain also states that the environmental costs are internalized to the Project. However, as noted throughout this submission, there are numerous deficiencies and shortcomings with the environmental assessment, which raise questions as to whether Trans Mountain has adequately addressed the potential adverse environmental effects of the Project.³⁴⁴ Whether the Application has fully accounted for the likelihood, impact and environmental effects of a marine oil spill on species and communities in the region is one example of an outstanding concern. If Trans Mountain's environmental effects or proposed mitigation measures are not adequately described and calculated, then the internalized environmental costs will be inaccurate, and applying the Gunton Report conclusion that the project is already a net cost, would only increase its cost to Canada.

269. Trans Mountain argues that the Gunton Report is asking the Board to protect industry from itself. Further, it argues that the market is to decide which projects are built, and that the Board is not to pick winners and losers.³⁴⁵ But the true task of the Board is to do none of those things, rather, its mandate is to consider the factors set out in s. 52(2) of the NEB Act in making its recommendation to the Governor in Council. These factors encompass more than the market, and do not address winners and losers; and include a determination of whether the project is in the public interest.

³⁴³ *Ibid* at page 75.

³⁴⁴ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 422.

³⁴⁵ *Ibid* at page 405-406.

PART IV - Legal requirements of CEAA 2012, SARA and the NEB Act are not met

270. The environmental assessment does not satisfy the requirements of CEAA 2012, particularly in relation to s. 19(1), as Trans Mountain has failed to adequately identify the Project's environmental effects, including the environmental effects of malfunctions, accidents or cumulative effects; it has failed to address, or understated, the significance of the Project's environmental effects; and in certain instances has failed to identify feasible mitigation measures that would mitigate any significant adverse environmental effects. Significant adverse environmental effects that will result from the Project are not justifiable in the circumstances of this Project.

271. Trans Mountain has not addressed the application of SARA. It has not provided information concerning all effects of the Project on Southern Residents or other SARA-listed species, or measures to avoid or lessen those effects, let alone measures consistent with applicable recovery strategies and action plans. Indeed, Trans Mountain submits that in the case of the Southern Residents mitigation is not possible. As such the Board cannot meet its obligations under s. 79(2) of SARA.

272. Finally, the Board should not recommend in favour of the Project because it is not in the public interest. When weighing the Project's benefits and burdens pursuant to the NEB Act, the Board should determine that the Project's temporary economic benefits, which are short-term and overstated, are outweighed by its many lasting environmental burdens and its economic and social burdens.

A) CEAA 2012 requirements not met and significant adverse environmental effects not justified

273. CEAA 2012 ultimately requires the Board to reach a conclusion about whether the Project's significant environmental effects are justified in the circumstances. This task is made difficult by the fact that, as discussed above, Trans Mountain has failed to provide adequate information about Project effects. Further, in some instances Trans Mountain's assessment of the "significance" of environmental effects is not supported by the evidence, or the law. As discussed below the justification analysis requires the Board

conduct a balancing which considers the nature of the effects of the Project and the nature of the benefits. Based on the evidence before the Board, Living Oceans and Raincoast submit that the significant adverse environmental effects of the project cannot be justified in the circumstances.

1) CEAA 2012 must be applied consistently with the precautionary principle

274. Living Oceans and Raincoast submit that, in considering the Project’s environmental effects, the significance of those effects, mitigation measures to address them, and whether significant effects are justified, the Board must take a precautionary approach consistent with the precautionary principle and CEAA 2012. The Board must carry out its CEAA 2012 obligations in a “careful and precautionary manner” that “protects the environment and human health and applies the precautionary principle”, as required by that statute.³⁴⁶

275. The examples addressed herein of concerns about the Project’s effects – notably, the impacts on Southern Residents, the environmental effects of a diluted bitumen spill, and the risks posed by the project to air quality and human health – are all matters of significant public concern. In all of these examples, the impacts are such that the Board must ensure that any uncertainties in relation to these matters are resolved, and thoroughly answered, prior to any project approval. This is relevant to each of the requirements of CEAA s. 19(a), (b) and (d).

2) Trans Mountain has not identified all the environmental effects of the Project

276. CEAA 2012 s. 19(1)(a) requires that an environmental assessment take into account, among other things, the Project’s “environmental effects”; “environmental effects of malfunctions or accidents that may occur” and “cumulative environmental effects”.³⁴⁷

³⁴⁶ CEAA 2012, ss 4(1), (2).

³⁴⁷ CEAA 2012, ss 2, 5, 19(1)(a).

277. Trans Mountain's environmental assessment fails to consider many of the environmental effects of the Project. For example:

- a) It fails to address the effects reduction of prey availability for Southern Residents in the event of an oil spill reducing Chinook numbers.
- b) It fails to address the population-level effects of oil spills on Southern Residents;
- c) It fails to assess the population-level effects of a single mortality for SARA-listed whale populations due to a ship strike or other accident;
- d) It fails to assess the effects on Southern Resident critical habitat of chronic noise or oil spills.
- e) It does not fully consider the potential for spilled diluted bitumen to submerge and sink in the event of an oil spill. Spill response information does not adequately account for submerged or sunken diluted bitumen, meaning that the range of environmental effects of a diluted bitumen spill are not known.
- f) It does not assess the full range of effects on the environment from an oil spill, particularly the shoreline and intertidal environments, and the many species that depend on the Salish Sea ecosystem, including marine mammals, fish and birds.
- g) It underestimates or fails to assess air emissions associated with routine operations, and emissions in the event of a spill on land or water, thereby failing to address the full range of air quality and human health effects associated with the Project.

278. Consequently, Trans Mountain fails to adequately address mitigation for these effects.

279. Further, cumulative effects and environmental effects are separately identified and defined under CEAA 2012, and should be addressed distinctly. While "environmental

effects” are described in s. 5 of the CEEA 2012, cumulative effects are described in s. 19(1)(a) as the combined or total effect of the Project and “other physical activities that have been or will be carried out”. Despite this distinction, Trans Mountain repeatedly refers to the “Project contribution” to cumulative effects or otherwise focuses on the Project’s residual effects, and not the cumulative effects of the Project in combination with other activities, as CEEA 2012 requires.³⁴⁸ This approach does not provide the Board with the information it needs to consider the “cumulative effects” of the Project. For example:

- a) Trans Mountain declines to consider the effects on the Southern Residents of the Project’s effects on Chinook salmon, on the basis that, in its opinion, “residual effects of the Project on [...] Pacific salmon indicators are unlikely and of negligible magnitude.”³⁴⁹
- b) The peer review of Trans Mountain’s human health and air quality assessment materials indicates that estimated background concentrations of air quality indicators in the application are not conservative, thus the Project’s addition to ambient air quality impacts is understated. The Application therefore makes the Project’s contribution to ambient concentrations appear smaller than it actually is.³⁵⁰
- c) Trans Mountain does concede that the Project will have both residual and cumulative effects on Southern Residents due to acoustic impacts of vessels. However, Trans Mountain argues that the Board should consider that the Project will be responsible for “a comparatively small proportion” of marine shipping in Southern Resident critical habitat.³⁵¹

³⁴⁸ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 350.

³⁴⁹ Exhibit B18-29, V8A 4.2.12.2 to T5.2.2 Mar Trans Assess, Filing ID A3S4Y3, at page 8A-304.

³⁵⁰ Exhibit C214-18-4, Simpson, Filing ID A4L9R9, at page 4.; Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at page 9, paragraph 3.1.14.2.

³⁵¹ See, for example, Trans Mountain’s written argument at Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 65.

280. CEAA 2012 s. 19(1)(a) also requires that the Board take into consideration the environmental effects of malfunctions or accidents that “may occur”. Living Oceans and Raincoast submit that whether a malfunction or accident “may occur” is a lower threshold than whether something is “likely” to occur. However, in respect of its assessment of environmental effects, Trans Mountain avoids addressing the effects of accidents and malfunctions on the basis that they are not “likely.” For example:

- a) Trans Mountain declines to consider the effects of oil spills at various sensitive or ecologically significant locations on the basis that spills at those locations are less likely than the ones it has modelled, despite the fact that spills may occur at these locations.³⁵²
- b) Trans Mountain acknowledges that the loss of a single endangered marine mammal from an accidental ship strike could have “long-term or permanent population-level impacts”, but declines to consider what those effects would be for Southern Residents or any other whales, on the basis that a ship strike would be “a rare incident” and “the overall probability” of a strike that kills or injures a marine mammal is “low”, and this effect is “not significant”.³⁵³ Trans Mountain also identifies the threat of an oil spill as not being likely, and does not model the population-level impacts of mortalities of one or more Southern Residents in the event of an oil spill.
- c) Trans Mountain identifies “accidental release of contaminated bilge water” as a potential Project effect on fish of fish habitat.³⁵⁴ However, Trans Mountain states that “[t]he only way in which contaminated bilge water could be released in Canadian waters is through an accident or malfunction”, and that the existence of regulations and its Tanker Acceptance Standards “will ensure that a release [...] will not occur in Canadian waters.”³⁵⁵ In other words, it assumes that

³⁵² Trans Mountain’s final argument Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 336, lines 6044-6045.

³⁵³ Trans Mountain’s final argument Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 319-320.

³⁵⁴ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 303.

³⁵⁵ *Ibid* at page 305.

an accident that may occur will not occur. On this basis it declines to address the environmental effects of such an accident, namely, the effects of contaminated bilge water on fish and fish habitat.

3) Mitigation measures for significant adverse environmental effects are lacking, and future plans to identify mitigation do not meet the mitigation requirement

281. Subsection 19(1)(d) of CEAA 2012 requires the consideration of mitigation measures that are technically and economically feasible. Mitigation measures are defined in s. 2 as, “measures for the elimination, reduction or control of a project’s adverse environmental effects, and includes restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means.”

282. Mitigation measures are intended to be actual identifiable measures which will either eliminate, reduce or control adverse effects of a project. The Federal Court has held, with reference to the identical mitigation requirement in the 1992 version of the *Canadian Environmental Assessment Act* (“CEAA 1992) that “vague hopes for future technology” to address effects are not sufficient to determine that effects can be mitigated, and that further studies (for example, of a SARA-listed species) and the possibilities of future technology do not constitute mitigation measures.³⁵⁶

283. While follow-up programs and further study may increase an understanding of the adverse effects and help to assess ongoing mitigation or identify other mitigation, they are not mitigation and cannot substitute for mitigation. The clear intent of CEAA 2012 is that follow-up programs will determine the effectiveness of mitigation that has actually been implemented. Subsection 19(1)(e) requires environmental assessments to take into account “the requirements of the follow-up program”, which is defined in s. 2 as “a program for (a) verifying the accuracy of the environmental assessment and (b) determining the effectiveness of any mitigation measures.”

³⁵⁶ *Pembina Institute for Appropriate Development v Canada (Attorney General)*, 2008 FC 302 at paras 25, 69.

284. Nonetheless Trans Mountain relies on “measures” in its Final Argument that are not actual mitigation measures. This is particularly evident in the case of acoustic impacts on the Southern Residents. Trans Mountain concedes it was not able to “identify any technically and economically feasible mitigation or compensation measures” for these impacts and states that “there is no clear solution that has been identified”, and instead of mitigation it proposes plans related to future study.³⁵⁷ For example:

- a) The ECHO Program described by Trans Mountain in written and oral argument as a measure to address the impact of vessel noise on the Southern Residents does not constitute mitigation. It is a proposed research program coordinated by Port Metro Vancouver, to which Trans Mountain has pledged funding. Its long term goal is to develop mitigation measures that will lead to a quantifiable reduction in potential threats to whales as a result of shipping activities³⁵⁸
- b) Trans Mountain has “committed to developing” a Marine Mammal Protection Program, which will focus on “strategies” to contribute to others’ ongoing recovery efforts relevant to the three main threats (prey, contamination, and acoustic impacts), and Trans Mountain and states that it will “review” the results of the ECHO Program “with a view to” incorporating them into the MMPP.³⁵⁹ It describes the MMPP as a “living document” that “will be adapted to manage and monitor Project effects.”³⁶⁰ The MMPP does not require Trans Mountain to avoid or lessen the Project’s adverse effects on Southern Residents. It does not contain any mitigation measures, specific obligations, or timelines. It need only be provided to the Board 60 days before operations begin.
- c) Trans Mountain also emphasizes its commitment to support Western Canada Marine Response Corporation in implementing enhancements to improve

³⁵⁷ *Ibid* at pages 310, 311.

³⁵⁸ *Ibid* at pages 131, 322-334.

³⁵⁹ *Ibid* at page 67, 312.

³⁶⁰ *Ibid* at page 314.

marine spill response capacity in the region.³⁶¹ Living Oceans and Raincoast submit that these vague future commitments do not adequately meet the requirement of technically and economically feasible mitigation measures. They are not, and cannot substitute for, mitigation.

285. Section 19(1)(d) requires identification of mitigation measures that would mitigate any significant environmental effects, but Trans Mountain confuses risks and effects in the context of mitigation. In its final argument it states that “[w]ith mitigation measures in place ... the probability of a credible worst-case oil cargo spill from a Project tanker is forecast to have a potential return period of once in 2841 years.”³⁶² Living Oceans and Raincoast note that these mitigation measures are not adequate to meet the CEEA 2012 obligation to eliminate, reduce or control the adverse environmental effects of the Project, as these measures only address the risk of a spill, not mitigation in response to a spill.

286. This omission includes a lack of mitigation in response to a spill that results in submerged diluted bitumen. Although Trans Mountain acknowledges that this could occur under certain conditions,³⁶³ it nonetheless takes the position that this is unlikely,³⁶⁴ and fails to specifically outline mitigation for spills involving submerged diluted bitumen or to address the fact that technology to recover submerged diluted bitumen is not available.³⁶⁵

³⁶¹ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 91.

³⁶² *Ibid* at page 68. A credible worst-case spills is defined in Exhibit B18-29, V8A 4.2.12.2 TO T5.2.2 MAR TRANS ASSESS, Filing ID A3S4Y3, at page 8A-523.

³⁶³ Exhibit B418-8, Trans Mountain Reply Evidence, Attachment 1.09 – reply to City of Vancouver, Tsleil-Waututh Nation, Living Oceans Society “Fate and Effects of Oil Spills from the Trans Mountain Expansion project in the Gulf Islands, Strait of Juan de Fuca, and Fraser River”, Filing ID A4S7K6, at page 12; Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 343.

³⁶⁴ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8 at page 343.

³⁶⁵ Exhibit C214-18-6, Solsberg, Filing ID A4L9S1 at page 14.

287. Clarity about what constitutes mitigation for the purposes of CEAA 2012, is important because only technically and economically feasible mitigation measures should be used to determine whether significant adverse environmental effects are justified.

4) Significance determinations should reflect nature of the risks and effects associated with the Project

288. The evidence before the Board shows that the Project will have numerous significant adverse environmental effects. However, the only adverse environmental effect that Trans Mountain concedes will be significant is the effect of vessel noise on the Southern Residents.³⁶⁶

a) Factors that should inform the determination of significance

289. The determination of significance in CEAA is core to the Board’s final recommendation. Understating the significance of the adverse effects can have the effect of avoiding or skewing a justification analysis.

290. Although it is pivotal in CEAA 2012, “significance” is not defined in that statute.

291. The Board’s Filing Manual³⁶⁷ identifies three factors to be “assess[ed]” when determining significance: 1) whether the effects are adverse, 2) whether the adverse effects are significant, and 3) whether the significant adverse effects are likely.³⁶⁸ The Filing Manual is a policy document which guides the Board. It is not intended to be applied as a formula.

³⁶⁶ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8 at page 358.

³⁶⁷ Canadian Environmental Assessment Agency (“CEAA Agency”) policy states that in the case of an environmental assessment in which the Board is the responsible authority it should rely on the Board Filing Manual as guidance for determining whether a project is likely to cause significant adverse environmental effects. See: CEA Agency, “Operational Policy Statement: Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the *Canadian Environmental Assessment Act, 2012*”, (November 2015) at page 1.

³⁶⁸ National Energy Board, *Filing Manual*, (Calgary: National Energy Board, 2004), Release 2015-01 at page 4A-38.

292. These three factors should not always be equally weighted in a significance analysis. Living Oceans and Raincoast caution that the Board must not dismiss potentially catastrophic effects on the basis that they are unlikely alone, as certain risks, such as a major oil spill, extremely adverse or catastrophic effects.

293. As Dr. Short's evidence explains, "oil spill accidents usually involve combinations of events that appear highly unlikely in retrospect. This is why these accidents are both rare and difficult to anticipate."³⁶⁹

294. Because environmental assessment is a planning tool to identify, address and mitigate adverse impacts, it would make a mockery of the environmental assessment process to allow conclusions that potentially catastrophic effects such as an oil spill in critical habitat on Southern Residents are "not significant". In instances where effects could be highly adverse, the likelihood of the event occurring should be given less consideration. Living Oceans and Raincoast submit that this interpretation is consistent with the purposes of CEAA 2012.

295. Additionally, in the case of assessing the "significance" of Project effects on Southern Residents, the Board should also be guided by SARA policy interpreting the additional requirements for review of projects affecting SARA listed species at risk. SARA policy adds that "the status of a species at risk should be taken into consideration when determining the significance of adverse effects of a proposed project"³⁷⁰

296. Trans Mountain takes a different approach, and deems several potentially significant environmental effects not significant, including the potentially catastrophic effect of a large or medium oil spill on Southern Residents.

³⁶⁹ Exhibit C214-18-2, Short 1, Filing ID A4L9R7, at page 4.

³⁷⁰ Environment Canada and Parks Canada, *Addressing Species at Risk Act Considerations under the Canadian Environmental Assessment Act for Species under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada*, (Ottawa: Government of Canada, 2010) at page 47

297. Trans Mountain uses a definition of a “significant residual effect” as an effect that 1) has a high probability of occurrence, 2) is permanent or irreversible in the long-term, and 3) is of a high magnitude and cannot be technically or economically mitigated.³⁷¹

Trans Mountain claims that its definition is consistent with “the conjunctive test for determining significance under the CEAA 2012.”³⁷² This is incorrect, because the CEAA 2012 “test”, as set out in the Board Filing Manual, and discussed above, is not a “conjunctive test” but rather a set of considerations and of relevant factors to assess. As stated above, Living Oceans and Raincoast submit that these factors should not be applied in a formulaic way that requires each to be weighted equally in every case.

298. Trans Mountain’s approach to determining significance is also inconsistent with other factors identified in the Board’s Filing Manual as relevant to the consideration of “whether adverse effects are significant”: the magnitude or severity of the effect, the geographic extent, the duration and frequency of the effect, the degree to which it is reversible or irreversible, and the ecological context.³⁷³

299. Trans Mountain’s definition of a “significant residual effect” omits and ignores “geographic extent” and “ecological context”, and is unduly limited to residual effects alone. Trans Mountain argument regarding the significance of Project-related effects does not recognize or reflect that “magnitude and geographic extent” includes the extent to which a project could contribute to cumulative effects, nor that “ecological context” means that effects “may be significant if they occur in areas or regions that have already been adversely affected by human activities; and/or are ecologically fragile and have little resilience to imposed stresses.”³⁷⁴ This is reflected in the numerous significant adverse environmental effects of the Project, set out in paragraph 301 below, that Trans Mountain

³⁷¹ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 228.

³⁷² Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 228

³⁷³ National Energy Board, *National Energy Board Filing Manual*, (Calgary: National Energy Board, 2004), Release 2015-01 at page 4A-38.

³⁷⁴ National Energy Board, *National Energy Board Filing Manual*, Release 2015-01 at page A4-38.

has failed to identify, including effects in already-degraded Fraser River salmon habitat or in already-degraded critical habitat, where ecological context is an important factor.

300. Finally, Trans Mountain incorrectly argues that “[s]ignificance determinations [...] may also involve questions of relativity”, attempting to introduce a balancing exercise into the significance analysis.³⁷⁵ Trans Mountain argues that the Board should determine the significance of adverse environmental effects “relative to the overall positive and negative impacts of the Project” and “in the context of the Project and the benefits and opportunities that the Project brings to all Canadians.”³⁷⁶ This is not the nature of a significance determination.

301. Trans Mountain is attempting to import a justification analysis or even an overall public interest analysis into a significance determination. Determining the significance of an effect is not about balancing the effect against a project’s benefits. It is not a question of relativity. Rather, significance is about the factors set out in the Filing Manual, described above, such as the magnitude and severity of the effect. By introducing a balancing exercise into the significance determination, Trans Mountain is conflating two separate steps under s. 31(1)(a) of CEAA 2012. Significant adverse environmental effects must first all be identified, and then they must be justified or deemed not to be justified; these two separate and important tasks should not be conflated.

b) When assessed according to the relevant factors, several Project effects are significant

302. Living Oceans and Raincoast submit that the many of the Project’s adverse environmental effects, described in detail in Part II above, will be significant. Potentially significant adverse environmental effects and cumulative effects of the Project, as identified by Living Oceans and Raincoast and relating only to the issues on which they have filed evidence, include:

³⁷⁵ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 57.

³⁷⁶ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8 at pages 57, 58.

- a) the effects and cumulative effects of vessel noise on the Southern Residents and on their critical habitat;
- b) the effects and cumulative effects of an oil spill in critical habitat (which Trans Mountain predicts to have a return period of as little as 284 years, for a spill of any size)³⁷⁷ on the Southern Residents and on their critical habitat;
- c) the effects and cumulative effects of an oil spill in or near the Fraser River or Salish Sea on Chinook salmon;
- d) the effects and cumulative effects of reduced prey availability resulting oil spill affecting Chinook salmon prey on Southern Residents;
- e) the effects and cumulative effects of an oil spill in or near the Fraser River or Salish Sea on other Fraser River salmon species, which are both commercially and culturally important;
- f) the effects and cumulative effects of an oil spill in or near the Fraser River on SARA-listed fish species whose habitat is in the Fraser River; and
- g) the cumulative effects of air emissions from each of the pipeline, terminals and tankers, and particularly emissions in excess of air quality standards, on human health.

303. Living Oceans and Raincoast’s identification of these effects as significant adverse environmental effects is informed by application of the Filing Manual factors to the evidence described in Part III:

- a) Geographic extent: The geographic extent of effects of acoustic impacts, oil spill risk and prey reduction on Southern Residents and their critical habitat extends throughout critical habitat, and acoustic and oil spill risks extend through the same area for other marine species. The geographic extent of pipeline spill

³⁷⁷ Exhibit B300-2, Trans Mountain Response to NEB IR TERMPOL Rpt and Outstanding Filings, A4G3U5, at page 21.

risks includes the Lower Fraser, its tributaries, and its estuary. The geographic extent of air quality impacts is concentrated near Project facilities.

b) Ecological context: These are effects that would take place in ecological contexts which already adversely affected by human activities, and as a result are ecologically fragile, with little resilience to imposed stresses, such as the Fraser River which continues to be subject to high levels of harmful human activity; the increasingly noisy and polluted critical habitat of the Southern Residents with its diminished supply of Chinook salmon; and the polluted air shed in B.C.'s Lower Mainland.

c) Magnitude or severity: Depending on its size, an marine oil spill would be a medium or high magnitude event in terms of its implications for the Southern Residents or their habitat; its magnitude would depend on the size and location of the spill, as well as whether one or more whales were directly exposed. Depending on its size, location, and timing, a Fraser River spill or even a spill from a tanker could have medium or high magnitude on Fraser River salmon, or other fish species. The extent to which whales would be disrupted and lose communication space in Southern Resident critical habitat makes acoustic disturbance a high magnitude effect.

d) Duration and frequency: Acoustic impacts would endure throughout the Project's life and acoustic disturbance would be near-constant.

e) Irreversibility: Population level effects on a species could, if they reached a certain level from which recovery is unlikely, be irreversible. Specifically, in the case of the Southern Residents, the evidence clearly shows that the Project's effects may result in gradual decline, quasi extinction (at which point extinction would be inevitable), or extinction.

5) The significant adverse environmental effects are not justified

304. Trans Mountain concludes that the effects of underwater noise from Project-related marine vessel traffic on Southern Residents will be adverse and significant,

cannot be mitigated, and are justified.³⁷⁸ In its justification analysis, Trans Mountain proposes several factors which should not be part of a justification analysis under CEAA 2012.

305. Justification is determined in light of countervailing benefits, not excuses for why a proponent is unable to address an anticipated impact. In case law interpreting the equivalent provision in the previous *Canadian Environmental Assessment Act* (“CEAA 1992”), the Federal Court defines justification as a balancing of adverse environmental effects against social, economic and other non-environmental benefits.³⁷⁹ These costs and benefits are the “circumstances” referred to in s. 31(1)(a)(ii) and (iii) of CEAA 2012.

306. The justification analysis for the Project’s significant adverse impacts to the Southern Residents, which will not be mitigated, must therefore balance benefits of the Project against the destruction of acoustic critical habitat and the consequent loss (i.e. extinction or quasi extinction) of the Southern Residents (as discussed in Part III-B above).

307. Trans Mountain incorrectly argues that the Board’s justification analysis should take the following considerations into account:

- a) Trans Mountain and the NEB lack “direct control over marine vessel activity” within Southern Resident critical habitat;
- b) the relative contribution of Project-related tankers to the problem of ocean noise in critical habitat is small;
- c) Project-related tankers will use established shipping lanes which will be used by other vessels regardless, and the impact of marine shipping will be significant regardless;

³⁷⁸ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 308-310.

³⁷⁹ *Prairie Acid Rain Coalition v Canada (Minister of Fisheries and Oceans)*, 2004 FC 1265 at paras 93-94; upheld *Prairie Acid Rain Coalition v Canada (Minister of Fisheries and Oceans)*, 2006 FCA 31.

d) “there is no clear solution that has been identified” to address these effects – that is, the effects will take place in an ecological context in which the environment is already compromised by human activities; and

e) “[a]ny justification decision should consider Trans Mountain’s commitment to work collaboratively with all interested parties and stakeholders, including existing shippers, to find solutions to adverse effects on the southern resident killer whale”³⁸⁰.

308. These considerations put forward by Trans Mountain are not about balancing the benefits of the Project against the harm to the Southern Residents, and are thus inconsistent with case law interpreting the justification analysis required under s. 31(1)(a) of CEAA 2012.

309. In addition, the “ecological context in which the Project will occur” is, as discussed above, a factor indicative of the significance of the Project’s effects; this is not a relevant consideration in favour of justification.

310. Furthermore, the inability to solve a problem is not an indication that it is justifiable. Rather, the fact that an effect cannot be technically or economically mitigated is an indication of the impact’s significance, and means that there is no mitigation to be taken into account when making a recommendation on justification. The fact that there are no technically and economically feasible mitigation measures for a significant adverse environmental effect is an indication that the environmental effect *cannot* be justified. Such an effect should weigh heavily against any benefits of the Project in the justification analysis.

311. Additionally, it is important to remember that CEAA 2012 anticipates that in some circumstances significant adverse effects cannot be justified.³⁸¹

³⁸⁰ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 310-311.

³⁸¹ CEAA s. 31(1)(iii).

312. The Board is presented with a proposed Project that that will have significant adverse environmental effects impact a SARA listed species at risk. Those effects are deemed by Trans Mountain to be both unavoidable and immitigable.

313. Living Oceans and Raincoast submit that the Project's significant adverse environmental effects and the cumulative effects of vessel noise on the Southern Residents are not justified in the circumstances. Nor can the other significant adverse effects on the Southern Residents – the effects of oil spills or reduced prey – be justified. The Project's benefits cannot justify significant adverse effects or cumulative effects on a SARA-listed endangered species which will not be mitigated and which the evidence shows will, individually and cumulatively, lead to a decline in the population or extinction.

314. An addition to its effects on the Southern Residents, Living Oceans and Raincoast also submit that the Project will result in other significant adverse environmental effects which cannot be justified in the circumstances. For example, the Project's benefits do not outweigh the significant adverse effects and cumulative effects of:

- a) an oil spill on commercially and culturally important fish (Fraser River salmon) or SARA-listed fish species; or
- b) Project-related air emissions, including emissions in exceedance of health standards and guidelines, on human health.

315. Moreover, as the Gunton Report has found, the Project will result in a net cost to Canada. In this light, there can be no justification for significant adverse environmental effects where the overarching impact of the Project will be negative, not positive.

B) The Board cannot meet its SARA obligations

316. Assessment of projects affecting SARA-listed species require more rigorous treatment of potential adverse effects on those species.³⁸² This is because, in the words of

³⁸² SARA, s 79(2).

the Board Filing Manual, SARA-listed species “have crossed a threshold” such that any additional effect has the potential to cause harm.³⁸³ This heightened standard for project review reflects the fragility of species at risk such as the Southern Residents, and reality that they are already struggling with the effects of past stressors.

317. The evidence before the Board concerning the Southern Residents confirms that this population is teetering on the brink of precipitous decline. To avoid this unacceptable outcome the Board must ensure that this project review thoroughly and honestly assess Project-related effects on Southern Residents.

318. In its final argument, Trans Mountain assures the Board that it is going “well beyond any requirements of the CEAA 2012, NEB or DFO to ensure the southern resident killer whale population continues to recover and thrive through the implementation of proper mitigation measures.”³⁸⁴ In reality, its assessment of Project-related effects on Southern Residents falls far short of the more rigorous review required by SARA. Indeed, it ignores the application of SARA altogether.

319. As discussed above at Part II, SARA, and in particular s. 79, raises the bar for environmental assessments of projects that are “likely to affect” a listed species or its critical habitat such as the Southern Residents. Section 79(2) of SARA provides that:

(2) [The Board³⁸⁵] must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. Mitigation measures must be taken in a way that is consistent with any applicable recovery strategy and action plans.

320. According to SARA policy and the Board Filing Manual, s. 79 requires that in reviewing this Project the Board must pay particular attention to the impacts on Southern

³⁸³ National Energy Board, *National Energy Board Filing Manual*, National Energy Board, *Filing Manual*, (Calgary: National Energy Board, 2004), Release 2015-01, at page 4A-52.

³⁸⁴ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 315-316.

³⁸⁵ CEAA 2012 s 15(b) confirms the Board is the “responsible authority” for the purposes of this project review.

Residents, and identify all adverse effects of the Project on Southern Residents and their critical habitat.³⁸⁶ Further, the Board should ensure that all adverse effects – regardless of significance – are avoided or mitigated.³⁸⁷ Finally, the Board should consider the Southern Residents’ endangered status when determining the significance of the Project’s environmental effects on them.³⁸⁸

321. These heightened standards are intended to ensure that development does not undermine the purposes of SARA – in this case, to prevent the Southern Residents from becoming extinct and provide for their recovery.³⁸⁹

322. The important role that environmental assessment plays in protecting species at risk is reflected in the Southern Resident Recovery Strategy, which states that CEAA assessments are “essential mechanisms for protecting critical habitat.”³⁹⁰

323. SARA policies are clear that s. 79 obligations are in addition to the requirements set out for an assessment of the environmental effects of a project, and meeting the requirements of the relevant environmental assessment legislation does not necessarily meet the obligations under SARA.³⁹¹

324. As discussed below, Trans Mountain’s submissions on impacts to Southern Residents indicate that it has failed to understand the distinction between CEAA factors and the additional rigour imposed by s. 79 of SARA. For the Board’s Project Review to conform to the law, these additional mandatory legal requirements must be met.

³⁸⁶ Environment Canada and Parks Canada, *Addressing Species at Risk Act Considerations*, at pages 13-16.; National Energy Board, *National Energy Board Filing Manual*, (Calgary: National Energy Board, 2004), Release 2015-01 at page 4A-52.

³⁸⁷ Environment Canada and Parks Canada, *Addressing Species at Risk Act Considerations*, at pages 40-43.

³⁸⁸ *Ibid* at page 53.

³⁸⁹ SARA, s 6.

³⁹⁰ Exhibit C291-1-4, Southern Resident Recovery Strategy, Filing ID A4L9F4, at page 42.

³⁹¹ Environment Canada and Parks Canada, *Addressing Species at Risk Act Considerations*, at pages 13 and 16.

1) Failure to identify all adverse Project-related effects on Southern Residents

325. CEEA policy is clear that the Project Review must consider all potential effects of the Project on Southern Residents.³⁹² SARA policy is explicit that this includes effects on Southern Resident critical habitat and on cumulative effects.³⁹³ The need to be mindful of cumulative effects stems from the “very nature of species at risk” which have “already been adversely affected by a combination of threats to the extent that their very survival is in question”.³⁹⁴

326. Despite the requirements of s. 79, and Trans Mountain’s acknowledgement of the core threats to Southern Residents (i.e. reduced prey availability, contamination, and acoustic and physical disturbance from vessels) the Trans Mountain’s environmental assessment did not consider:

- a) how the Project will exacerbate the whales’ nutritional stress by affecting availability of Chinook salmon, and the population-level effects of prey shortage;
- b) how vessel-related pollution or small oil spills will contribute to the existing contaminant load in Southern Residents; or
- c) the effects of reduced prey availability, marine pollution, or chronic noise pollution on critical habitat.

327. Further, Trans Mountain urges the Board to ignore cumulative effects and instead consider the “proportionately small” contribution that the Project is making to the problem of noise pollution in critical habitat.³⁹⁵ The Board should resist this invitation, and instead consider the evidence about how the Project will exacerbate existing problems for the Southern Residents.

³⁹² *Ibid* at page 34.

³⁹³ *Ibid* at pages 34-35 and 39-40.

³⁹⁴ *Ibid* at page 45.

³⁹⁵ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, pages 309 and 311.

2) Failure to identify mitigation measures for all adverse impacts on Southern Residents

328. SARA also imposes additional requirements on the Board for its consideration of mitigation under s. 19(1)(d) of CEAA 2012. The Board's Filing Manual clearly states that "proposed projects must preferably avoid, or fully mitigate or compensate for any residual project contribution to cumulative effects".³⁹⁶ SARA policy explains that s. 79(2) requires the Board to consider mitigation for all adverse effects "regardless of significance."³⁹⁷ Section 79(2) of SARA requires measures to address all adverse effects.

329. By contrast, Trans Mountain suggests that environmental assessments "are [not] intended to completely eliminate the environmental effects of a project."³⁹⁸ This is not true in the specific case of SARA-listed species such as the Southern Residents.

(i) No mitigation identified for effects of tanker noise

330. Trans Mountain's evidence indicates that the effect of vessel noise on Southern Residents, will be "significant".³⁹⁹ Trans Mountain acknowledges that both its contribution to the problem of vessel noise and total disturbance (or cumulative effects) should be considered significant.⁴⁰⁰

331. Trans Mountain states that it "was not able to identify technically and economically feasible mitigation or compensation measures that would offset Project-specific residual effects" of vessel noise.⁴⁰¹ Thus, Trans Mountain has proposed no mitigation for effects related to vessel noise.⁴⁰²

³⁹⁶ National Energy Board, *National Energy Board Filing Manual*, (Calgary: National Energy Board, 2004), Release 2015-01, Table A-2 at page 4A-52.

³⁹⁷ Environment Canada and Parks Canada, *Addressing Species at Risk Act Considerations*, at pages 14; see also pages 42-43.

³⁹⁸ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 221.

³⁹⁹ *Ibid* at page 9.

⁴⁰⁰ *Ibid* at pages 309 and 310.

⁴⁰¹ *Ibid* at page 310.

⁴⁰² *Ibid*.

332. Similarly, with respect to the adverse effects of vessel strikes, Trans Mountain states that “[t]he only known potential mitigation measures” to reduce to risk of vessel strikes are altered shipping lanes or speed restrictions – which it does not recommend.⁴⁰³

333. Instead, the Trans Mountain identifies “integrated, multi-party solutions” in its Marine Mammal Protection Program (“MMPP”) as the most appropriate approach to manage effects on southern resident killer whale critical habitat⁴⁰⁴, as well as funding for the Port Metro Vancouver-coordinated ECHO Program.

334. As discussed above in the context of mitigation pursuant to CEAA 2012, the MMPP does not require Trans Mountain to avoid or mitigate (*i.e.* eliminate, reduce or control) the adverse effects of the Project on Southern Residents. The MMPP only requires Trans Mountain to summarize its plans and progress.

335. In the vaguely described MMPP, Trans Mountain commits to “follow the law”, “work with others to protect salmon habitat”, “consult” with DFO, and work with industry and “others studying Salish Sea marine mammals” to “develop measures to reduce or eliminate physical and acoustic disturbance.”⁴⁰⁵ There are no specific mitigation measures proposed, no specific obligations to avoid or mitigate specific adverse effects, and no timelines for developing measures. As discussed further below, the current Draft Condition respecting the MMPP requires that it be filed with the Board 60 days before Project operations commence. Thus, the MMPP will be provided to the Board only after it makes its recommendation. This makes it impossible for the Board to consider, as part of its review of the Project, the effectiveness of any mitigation measures that the MMPP might identify.

336. Trans Mountain has also proposed to provide money to support a collaborative new initiative called the ECHO Program.⁴⁰⁶ According to Port Metro Vancouver, the objective of the ECHO Program is to provide a collaborative mechanism that coordinates

⁴⁰³ Trans Mountain Response to NEB IR No. 2 (2.065 c), B239-13, Filing ID A3Z4T9, at page 254.

⁴⁰⁴ Trans Mountain Response to NEB IR No. 2 (2.041 b.1), B239-13, Filing ID A3Z4T9, at page 154.

⁴⁰⁵ Response to NEB IR No. 1.56, Filing ID A3W9H8, at pages 322-330.

⁴⁰⁶ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 313.

the research efforts and resources of multiple stakeholders. The purpose of the ECHO Program is to “enable participants to better understand and manage the potential threats to at-risk cetacean species [...] that may arise from commercial vessel activities [...] The findings from the targeted ECHO Program will generally inform potential prevention, mitigation and management actions.”⁴⁰⁷ According to Trans Mountain, ECHO projects relating to underwater noise and vessel strikes are “under consideration”.⁴⁰⁸

337. Trans Mountain argues that the Board can be “confident” that Trans Mountain’s Southern Resident recovery strategies “will ensure impacts to the whale population are being studied so that any Project related effects can be mitigated.”⁴⁰⁹ However, the ECHO Program has not identified actual mitigation measure to eliminate, reduce or control the effects of Project-related noise pollution on the Southern Residents or their critical habitat.

338. Furthermore, the ECHO Program it is not being run by Trans Mountain. It is a program of Port Metro Vancouver. The timelines, goals, and ultimate success of the ECHO Program are not within Trans Mountain’s control. Further, it is only funded in part by Trans Mountain. Reaching its full potential will require financial and technical support of other groups and individuals. Finally, the ECHO Program is not tied to the Project in any way. If the Project were approved tomorrow and the ECHO Program folded the next day, it would have no impact on the development and operation of the Project.

339. The MMPP and ECHO Program fall far short of the definition of mitigation in CEAA 2012, and from meeting the requirements of s. 79 of SARA and the directives in the Board’s Filing Manual to avoid or mitigate all adverse effects of vessel traffic on the Southern Residents.

⁴⁰⁷ Port Metro Vancouver (PMV) Response to NEB IR No. 1, Filing ID A63362, at pages 2-3.

⁴⁰⁸ Exhibit B417-4, Trans Mountain Pipeline ULC Reply Evidence Part 3, Filing ID A4S7F1 at pages 55-10 - 55-11; Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 313.

⁴⁰⁹ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 314.

(ii) No mitigation for effects of an oil spill affecting Southern Residents or their critical habitat

340. The evidence indicates that the Project increases the risk of an oil spill and that such a spill could occur in critical habitat.

341. Trans Mountain does discuss measures it will take to try and reduce the chance of an oil spill. However, Trans Mountain offers no measures to mitigate the effects on an oil spill on the Southern Residents and Southern Resident critical habitat should a spill actually take place.

342. Given the potentially catastrophic impact of an oil spill on the Southern Residents and their critical habitat⁴¹⁰, and the evidence showing that the Project increases the chance of an oil spill occurring⁴¹¹, the Board must, as part of its review of the Project, consider whether actual measures really exist to protect the Southern Residents from exposure from an oil spill, or to clean up critical habitat after a spill.

3) If the Project will jeopardize Southern Resident survival and recovery it should not be approved

343. While Living Oceans and Raincoast submit that Trans Mountain's assessment with respect to effects on the Southern Residents is deficient pursuant to CEAA s. 19(1), the weight of existing evidence indicates that adverse effects on the Southern Residents and their critical habitat will be significant and immitigable, and will jeopardize their survival and recovery. Thus, the Project should not be approved.

344. As stated above, the purpose of SARA includes preventing wildlife species from becoming extinct and recovering listed wildlife populations such as the Southern Residents back to healthy levels.⁴¹²

⁴¹⁰ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at pages 34, 41; Exhibit C291-1-1, Raincoast Statement, Filing ID A4L9F2, at pages 28-33.

⁴¹¹ Exhibit B300-2, Trans Mountain Response to NEB IR TERMPOL Rpt and Outstanding Filings, Filing ID A4G3U5, at page 21.

⁴¹² SARA, s. 6.

345. SARA recognizes and reflects various Canadian values and commitments including: the Southern Resident’ inherent value; their aesthetic, cultural, spiritual, educational, economic, ecological and scientific value to Canadians; and the Government of Canada’s commitment to conserving biological diversity. SARA also fulfils Canada’s commitments to the world under the United Nations Convention on Biological Diversity, and recognizes that wildlife species such as the Southern Residents “are also part of the world’s heritage.”⁴¹³

346. The evidence before the NEB, summarized in detail in Part III, clearly shows that the Project will increase all existing threats to the whales.

347. Trans Mountain has made no effort to identify a plan for mitigating the effects of an oil spill on Southern Residents, their Chinook salmon prey, or their critical habitat in the event of an accidental oil spill. Further, Trans Mountain says it cannot mitigate the impacts of vessel noise on Southern Residents.

348. The Board’s legal obligation in this Project Review is to ensure that measures exist that can “avoid or lessen” Project-related effects on the Southern Residents. The Board’s Filing Manual says this legal obligation means Trans Mountain must show how they can “fully mitigate or compensate for any residual project contribution to cumulative effects” on Southern Residents.

349. Where this burden cannot be met, and where, as in the case of the Project’s effects on Southern Residents, the evidence before the Board indicates that the immitigable adverse effects on a SARA-listed species could jeopardize recovery and even lead to extinction, the Board cannot recommend approval of the Project.

350. Finally, Southern Residents are supposed to be protected under SARA from harm that could jeopardize survival and recovery. No one can authorize, under CEAA 2012 or the NEB Act, harm to Southern Residents or destruction of critical habitat that would otherwise be prohibited under SARA. As discussed below, it is not open to the NEB or

⁴¹³ SARA, Preamble.

anyone else to approve a project that will jeopardize the survival and recovery of a listed SARA species.

C) The Project is not in the public interest

351. As noted above, the Board has previously interpreted the “public interest” as “inclusive of all Canadians” and referring to “a balance of economic, environmental and social interests that changes as society’s values and preferences evolve over time.” When making a public interest determination pursuant to s. 52 of the NEB Act, the Board must balance the total benefits and burdens of the Project.⁴¹⁴

1) Trans Mountain overstates the Project’s benefits

352. The Gunton Report demonstrates that Trans Mountain has overstated the Project’s economic benefits, and that the Project poses unquantified economic burdens through environmental costs. Its conclusions are important for the Board’s considerations and because of the scenario analyses, provide a broader perspective on the public interest than is presented in the Muse Report. The contrasting conclusions of the Gunton Report, the questionable methodology in the Muse Report, and the many omissions, particularly of environmental, economic and social impacts, indicate that the Project is not in the public interest. The Gunton Report should be considered carefully by the Board as an important critical perspective on this key determination.

353. Trans Mountain cites improvements in two provincial parks and a protected area “in close proximity to the Project” as environmental benefits.⁴¹⁵ Living Oceans and Raincoast note that these benefits are strikingly small in scale, local, and specific in contrast to the scale of the Project and the nature and extent of its negative environmental effects.

⁴¹⁴ *Emera Brunswick Pipeline Company Ltd.* (31 May 2007), NEB Decision GH-1-2006 at para 307. National Energy Board, “Pipeline Regulation in Canada: A Guide for Landowners and the Public” (revised September 2010) at page 1.

⁴¹⁵ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 60.

2) The Project is not in the public interest as its harms outweigh its benefits

354. As the foregoing evidence indicates, the Project will have numerous detrimental effects – economic, social, and especially environmental – and many of those effects are significant, cannot be mitigated, and are not justified. As such, Living Oceans and Raincoast submit that the Project’s burdens outweigh its benefits, such that it is not in the public interest. Further, given that Living Oceans and Raincoast submit that the Project will have significant adverse environmental effects that are not justified, it follows that the Project cannot be in the public interest.

355. The Board has previously stated that, “[s]ince the public interest is dynamic, varying from one situation to another (if only because the values ascribed to the conflicting interests alter), it follows that the criteria by which the public interest is served may also change according to the circumstances.”⁴¹⁶ One relevant circumstance in the case of the Project is the acknowledged threat to the Southern Residents from residual and cumulative effects of ocean noise from vessels.

356. The Board should give particular consideration to the public interest in protecting the Southern Residents and other SARA-listed species from the effects of the Project. There is a public interest in preservation of at-risk species in Canada, evidenced by the fact of species at risk legislation, and the important ecological components that it protects.

357. SARA was enacted in 2004 with the purpose of “prevent[ing] wildlife species from becoming extirpated or extinct, [and] to provide for the recovery of species that are extirpated, endangered, or threatened as a result of human activity”.⁴¹⁷ Its Preamble demonstrates the connection between preservation of species and the interests of all Canadians by recognizing that “Canada’s natural heritage is an integral part of our national identity and history” and that “wildlife [...] has value in and of itself and is

⁴¹⁶ *Emera Brunswick Pipeline Company Ltd.* (31 May 2007), NEB Decision GH-1-2006 at pages 10-11.

⁴¹⁷ SARA, s. 6.

valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons”. As noted in Part II above, the Board has previously interpreted the public interest as reflecting Canadians’ evolving values.⁴¹⁸

358. Another relevant circumstance is that the public interest does not allow for oil spills in the areas at risk of Project-related spills. The Fraser River and particularly the southern coast of B.C. and communities on and near it, from major urban centres to small communities, depend culturally, economically, recreationally and otherwise on a functioning river or coastal environment. This environment has already experienced extensive human activity and related detrimental impacts, as described above. Some areas are comparatively intact and biologically diverse, others are greatly altered and home to extensive human activity, and others fall in between; all are used and appreciated by residents of the coast, and recognized and appreciated by other Canadians as a unique part of this country. A major oil spill would put these diverse interests in the southern B.C. coast in its present state at risk.

359. Living Oceans and Raincoast further submit that there is a crucial difference between the nature of the adverse Project effects cited by Living Oceans and Raincoast and the Project benefits cited by Trans Mountain in the context of a public interest assessment. Many of the negative effects cited by concerned intervenors will be long lasting or irreversible, such as population-level effects that could impact the viability of SARA-listed or other vulnerable Fraser River or marine species or destroy Southern Resident critical habitat. The most striking example – the extinction of the Southern Resident Killer Whales – is forever. These whales are irreplaceable.

360. In contrast, the Project would only operate for a few decades. Its benefits are short-term, limited, and, in Living Oceans and Raincoast’s submission, over-stated.

⁴¹⁸ *Emera Brunswick Pipeline Company Ltd* (31 May 2007), NEB Decision GH-1-2006 at para 307. National Energy Board, “Pipeline Regulation in Canada: A Guide for Landowners and the Public” (revised September 2010) at page 1.

361. Living Oceans and Raincoast submit that the Project is not in the public interest, and that the Board should recommend against approval.

PART V - Procedural issues during the Project Review

362. As the Board is aware, concerns about the review process have been raised by various intervenors. Intervenors have withdrawn out of frustration that the review is not being conducted on a “level playing field”, and that the NEB is not an “impartial referee”.⁴¹⁹ Other intervenors – both individuals and organizations – have withdrawn for similar reasons.⁴²⁰

363. Living Oceans and Raincoast remain committed intervenors in the review. However, they have also raised a number of procedural concerns. In various instances, Living Oceans and Raincoast expressed their concerns through motions, letters in support of other intervenors’ motions, and a request for reconsideration of one of the Board’s rulings. These outlined Living Oceans and Raincoast’s concerns about the manner in which the Board was conducting the review, and, on one occasion, whether it was being done in accordance with the Board’s own Filing Manual.⁴²¹

364. Key issues for Living Oceans and Raincoast, which were the subjects of the motions, letters of support, and the request for reconsideration, have been:

- a) the short time limits imposed for various deadlines throughout the review, including deadlines for information requests and responses to information requests;

⁴¹⁹ Exhibit C9-31-1, Robyn Allan letter of withdrawal, May 19, 2015, Filing ID A4L3S6.

⁴²⁰ Exhibit C118-6-1, Marc Eliesen letter of withdrawal, October 30, 2014, Filing ID A4E1Q6.; Exhibit C387-2-1, Wilderness Committee and Others letter of withdrawal, August 12, 2015, Filing ID A4S1L8.

⁴²¹ Exhibit C214-12-1, LT NEB re NEB letter of Oct 2 2014, Filing ID A4C7R5.

- b) the Board's reluctance to adequately extend those time limits despite the size of the Application and ongoing additional information submitted by Trans Mountain after the application had been filed;
- c) the Board's refusal to consider the greenhouse gas emission implications, both upstream and downstream, of the products shipped by the Project;
- d) the Board's refusal to require Trans Mountain to answer questions in relation to spill response technology available at the Westridge Terminal;
- e) the Board's refusal to allow for oral cross-examination on the evidence filed by Trans Mountain and intervenors; and
- f) the ability to file late evidence that is directly relevant to the issues before the Board.

365. In the majority of these instances, the Board ruled in favour of Trans Mountain, raising concern on the part of Living Oceans and Raincoast about whether the review process has struck the appropriate balance to date.

PART VI - The Board should recommend additional and more stringent conditions

366. Regardless of its overall recommendation in relation to the Project, the Board is required, pursuant to s. 52(1)(b) of the NEB Act, to submit to the Minister "all the terms and conditions that it considers necessary or desirable in the public interest to which the certificate will be subject" in the event that the Governor in Council directs it to issue a certificate.

367. Thus, despite the fact that Living Oceans and Raincoast ask the Board to *recommend against* approval of the Project, they make the following submissions with respect to the conditions that should be included in the Board's final report.

368. The Board has provided 148 draft conditions for comment (the “Draft Conditions”).⁴²² Living Oceans and Raincoast are concerned that the Draft Conditions are insufficient to address, among other things, environmental impacts of marine shipping, impacts on marine species at risk and air quality impacts. They are also concerned that certain Draft Conditions appear to postpone work that should be done as part of the environmental assessment.

369. Further, Living Oceans and Raincoast submit that conditions attached to any certificate that may be issued for the Project should be at least as stringent as those established for the Enbridge Northern Gateway Project.⁴²³ In some cases, as noted below, the Draft Conditions are not.

370. Proposed amendments and additional conditions relate to four areas: (A) marine shipping, (B) marine species at risk, (C) human health, and (D) the Scientific Advisory Committee.

A) Conditions relevant to marine shipping

371. Trans Mountain should be required to take more measures to reduce the effects of marine shipping associated with the Project.

372. Only one Draft Condition⁴²⁴ refers directly to marine mammals; two relate to protecting the general marine environment;⁴²⁵ and two Draft Conditions⁴²⁶ address marine shipping. These five conditions are far fewer, and far less comprehensive, than the approximately 14 conditions set by the Joint Review Panel for the Enbridge Northern Gateway Project.

⁴²² Exhibit A199-3, Appendix A: Draft conditions for comment, Filing ID A4S1G2. Each Draft Condition cited below is found in this document.

⁴²³ National Energy Board and CEA Agency, *Report of the Joint Review Panel for the Enbridge Northern Gateway Project, Volume 2: Considerations* (2013), Appendix 1.

⁴²⁴ Condition 128 – Marine Mammal Protection Program.

⁴²⁵ Condition 65 – Marine Sediment Management Plan and 126 – Marine Public Outreach Program

⁴²⁶ Condition 114 – Marine Shipping-related commitments and Condition 115 – Updated Tanker Acceptance Standard

1) Proposed amendments to Conditions 114(c) and 115 re: Vessel noise

373. Condition 114 requires Trans Mountain to ensure implementation of specified commitments it has made in three areas: (a) escort tugs; (b) marine oil spill response; and (c) reducing ocean noise.

374. Condition 115 requires Trans Mountain to update its Tanker Acceptance Standard and provide summary of any revisions made to it 90 days prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and annually for five years after commencing operations.

375. Conditions 114(c) and 115 are intended to address noise pollution from Project-related tankers. However, they are limited to “future guidelines, standards, or best management practices designed to reduce underwater noise from commercial vessels within Trans Mountain’s Tanker Acceptance Standard”. Thus, as currently worded, they are inadequate to ensure mitigation of effects of vessel noise, and should be amended to clearly specify actions that must be taken to address noise pollution.

376. As discussed above in Part III-B, the evidence respecting the adverse effects of chronic noise pollution in Southern Resident critical habitat indicates that noise pollution in the vicinity of the shipping lane is already at a threshold detrimental to many marine mammals including the endangered Southern Residents. Conditions intended to reduce underwater noise from commercial vessels must require Trans Mountain to ensure that measures be in place before any Project-related tankers are loaded at the Westridge Marine Terminal. Measures developed at an unspecified time in the future will likely be too late for the Southern Residents.

377. Furthermore, Condition 114(c) as drafted does not require that standards or best management practices ever be developed, only that they be included in the Tanker Acceptance Standards if developed.

378. Condition 114(c) should be amended to address these shortcomings and more thoroughly capture the commitments Trans Mountain has made during the Project Review, as follows:

114 (c) Inclusion of guidelines, standards or best management practices that are adequate to avoid adverse acoustic impacts to sensitive marine species such as the Southern Resident Killer Whales by reducing underwater noise from commercial vessels within Trans Mountain's Tanker Acceptance Standard prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and inclusion of any additional future guidelines, standards or best management practices within Trans Mountain's Tanker Acceptance Standard, as amended pursuant to Condition 115, and as described in Trans Mountain's response to NEB Information Request No. 2.065(a) (Filing A3Z4T9). This includes amending the Tanker Acceptance Standards to meet applicable international and local rules and regulations and to reflect any regional initiatives by industry promoting best operational practices that assist in reducing underwater noise from commercial vessels.

379. Condition 115 only requires that the Tanker Acceptance Standard be updated annually for the first five years after commencing operations. This is not acceptable, as research and technology might yield improvements at any time during the life of the Project. Living Oceans and Raincoast submit that Condition 115 should be amended to require Trans Mountain to file an updated version of the Tanker Acceptance Standard with the NEB “at least 90 days prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and on or before 31 January each year for the life of the Project.”

2) Proposed conditions respecting shipping

a) Recommended Condition 1: Speed restrictions on vessels in critical habitat

380. Living Oceans and Raincoast's evidence establishes that “speed restrictions are known to reduce the likelihood of fatal collisions and vessel noise level, so implementation of a vessel speed restriction would most likely provide significant benefits to marine mammal populations in the Salish Sea”.⁴²⁷ Trans Mountain suggests that the Board cannot recommend conditions concerning speed limits because neither the

⁴²⁷ Exhibit C291-1-5, Clark, Filing ID A4L9G0, at pages 10-11.

Board nor Trans Mountain has “direct control” over vessel owners and operators.⁴²⁸ However, such conditions can, and should, be required of Trans Mountain.

381. Trans Mountain states that it “has committed to continuing to enforce its tanker acceptance criteria”.⁴²⁹ The Tanker Acceptance Standard, contained in the Westridge Terminal Marine Operations Manual, sets out requirements for accepting a vessel for berth at Westridge.⁴³⁰ Trans Mountain has the right to reject any vessel that does not meet these standards.⁴³¹ Thus, Trans Mountain does have some control over vessel owners and operators, and more can be required of it.

382. Further, the Joint Review Panel for the Enbridge Northern Gateway Project included a condition (Condition 18) requiring Northern Gateway to implement certain voluntary commitments it had made related to marine tanker traffic and spill response before loading or unloading tankers.⁴³² These included “identifying safe transit speeds for tankers in the Terminal Regulations and Port Information Book” and “requiring tankers to modify their speed to reduce the risk of marine mammal strikes”. If these actions could be required of Northern Gateway, their equivalent should be required of Trans Mountain.

383. Trans Mountain should be required to establish a transit speed for Project-related tankers that will minimize acoustic impacts in Southern Resident critical habitat and minimize the risk of whale strikes in Southern Resident critical habitat and humpback whale habitat, and to implement it before any Project-related tankers are loaded at the Westridge Marine Terminal. Trans Mountain should also be required to guarantee that Project-related tankers will travel at that speed while in those areas.

⁴²⁸ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 62 and 310-311.

⁴²⁹ *Ibid* at page 60.

⁴³⁰ Exhibit B32-22, Trans Mountain Response to NEB IR No. 1.59a Attachment 1, Filing ID A3W9J8.

⁴³¹ *Ibid*.

⁴³² National Energy Board and Canadian Environmental Assessment Agency, *Report of the Joint Review Panel for the Enbridge Northern Gateway Project, Volume 2: Considerations* (Calgary: National Energy Board, 2013), Appendix 1: Conditions. Each Northern Gateway condition cited below is found in this document.

b) Recommended Condition 2: Use of best available technology to reduce vessel noise

384. Trans Mountain should be required to identify the best available vessel technology, and the nature and frequency of hull and propeller maintenance required, to reduce vessel noise. It should also be required to amend the Tanker Acceptance Standard to require vessels calling at Westridge Marine Terminal to use the best available technology and meet these maintenance requirements prior to Project-related tankers being loaded at the Westridge Marine Terminal. This condition should also stipulate that as new technology becomes available Trans Mountain must update the Tanker Acceptance Standard accordingly.

c) Recommended Condition 3: Oil spill response plans for submerged oil

385. The Board should recommend a condition that requires Trans Mountain to develop oil spill response plans that include measures specific to diluted bitumen, taking into the potential need to recover submerged oil, and to demonstrate that submerged oil can be recovered. These plans should be provided to the Board before any Project-related tankers are loaded at the Westridge Marine Terminal. Living Oceans and Raincoast submit that this is a precautionary approach.

d) Recommended Conditions 4-9: Shipping-related commitments made by Trans Mountain that should be formal conditions

386. Trans Mountain states that it has “voluntarily agreed to support and adopt each of the 17 recommendations and 31 findings proposed by the TERMPOL Review Committee” concerning the technical aspects of Project-related marine shipping.⁴³³ This commitment should be formalized as a condition (**Recommended Condition 4**). More specifically, the condition should require Trans Mountain to file a plan with the Board 30 days before construction begins describing how it will implement, monitor, and ensure compliance with the TERMPOL recommendations. It should require Trans Mountain to

⁴³³ Exhibit B444-2, Trans Mountain Revised Final Argument (clean), Filing ID A4W6L8, at PDF page 88.

file with the Board a twice-yearly report signed by an officer of the company which documents implementation, any non-compliances, and actions taken to remedy non-compliances. This would be as stringent as the equivalent conditions imposed by the Joint Review Panel for the Enbridge Northern Gateway Project (Conditions 116 and 200).

387. Trans Mountain has committed to modify, for clarity, the regulatory compliance section of its Tanker Acceptance Standard, item 4.5.1, to state: “The vessel will be built to industry standards and operated in accordance with industry best practices, always compliant with relevant local and international laws and regulations. The vessel will carry ALL required and customary certificates of compliance.”⁴³⁴ This commitment should be formalized as a condition (**Recommended Condition 5**).

388. Trans Mountain has stated that international laws and regulations include a requirement to report marine mammal distress incidents.⁴³⁵ Trans Mountain has committed to “include guidance for reporting marine mammal vessel strikes and sightings of marine mammals in distress in its Port Information and Terminal Operations Manual, which will be supplied to all vessels in advance of their call at Westridge”.⁴³⁶ This commitment should be formalized as a condition (**Recommended Condition 6**).

389. Trans Mountain has committed to including a section on marine birds in its future Port and Terminal Book, which will request that all vessel operators report any bird strikes or collisions to Marine Communication and Traffic Services.⁴³⁷ This should be formalized as a condition (**Recommended Condition 7**).

390. Trans Mountain has also committed to implementing mitigation measures to reduce potential effects from Project-related vessel traffic on birds. Specifically, it states that a) during migratory bird periods and/or during extreme weather events, bird strike warnings will be issued to berthed vessels with a request to reduce deck lighting; and b) it will inform all operators of Project-related vessels of the hazards regarding bird strikes at

⁴³⁴ Exhibit B371-2, Trans Mountain Response to NEB IR No. 4, Filing ID A4K4W3, at page 50.

⁴³⁵ *Ibid.*

⁴³⁶ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at page 324.

⁴³⁷ *Ibid* at page 326.

night because of deck lighting.⁴³⁸ These commitments should be formalized as conditions (**Recommended Condition 8** and **Recommended Condition 9**).

B) Conditions relevant to marine species at risk

391. None of the Draft Conditions specifically relate to specific marine species at risk. This is in contrast to several conditions which require species specific management plans to address potential impacts individual SARA-listed species or their critical habitat, such as Grizzly bear, caribou and Nooksack Dace, affected by the construction and operation of the pipeline and expansion of terminal facilities. This is not acceptable as the evidence is clear that Project-related tankers will have adverse effects on SARA-listed marine species such as the Southern Residents. Specific conditions addressing these impacts should be required of Trans Mountain.

1) Proposed amendments to conditions respecting species at risk

392. It is unclear whether conditions 44 and 78, which refer generally to “species at risk”, apply to marine species at risk. These conditions should be amended to clarify that they do apply to marine species at risk affected by Project-related tankers. These conditions would ensure that some of the purposes of SARA are achieved. For example, Condition 44 requires specific and individual mitigation and habitat restoration plans for each species at risk whose draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project. Condition 78 requires Trans Mountain to update the Board about any relevant changes under the SARA for species that have the potential to be affected by the Project. These should apply to marine species.

393. If Conditions 44 and 78 do not apply to marine species at risk, the only remaining condition that would apply is Condition 128. Condition 128 requires Trans Mountain to file a Marine Mammal Protection Program (“MMPP”) to explain in a summary way how it plans to address impacts on marine mammal species – it does not require that this

⁴³⁸ Exhibit B444-2, Trans Mountain Revised Final Argument, Filing ID A4W6L8, at pages 325-6

summary include specific measures for each SARA listed species. Condition 128 is less rigorous than measures proposed in Condition 44 or 78.

394. As drafted, Condition 128 does not require this “plan” to substantively address the issues related to marine mammal from Project-related tankers. It simply requires Trans Mountain to summarize its plans and progress.

395. This is in contrast to other Conditions, such as Condition 114, which require Trans Mountain to implement specific commitments to address specific issues before any Project-related tankers are loaded at the Westridge Marine Terminal.

396. As proposed Condition 128 appears to postpone work that is necessary for the Board to conduct its review – specifically the identification of specific mitigation measures to address adverse effects of Project-related tankers. The MMPP will not be filed with the Board until after the review is completed and the Board makes its recommendation - too late to assist the Board in satisfying the legal requirement set out in s. 79 of SARA.

397. Condition 128 should therefore be amended to require Trans Mountain to ensure a plan is in place to mitigate impacts to marine mammals before any Project-related tankers are loaded at the Westridge Marine Terminal, and to require annual reporting by Trans Mountain in relation to how it has incorporated the outcomes of initiatives into the Marine Mammal Protection Plan. A similar requirement was recommended by the Joint Review Panel for Northern Gateway in relation to its Operations Marine Mammal Protection Plan (Northern Gateway Condition 199).

2) Proposed Conditions respecting marine species at risk

a) Recommended Condition 10: Oil spill response plans for Southern Residents

398. Condition 114(b) requires “[a]n enhanced marine oil spill response regime capable of delivering 20,000 tonnes of capacity within 36 hours of notification, with dedicated resources staged within the study area”. Living Oceans and Raincoast note that

there is no requirement in that Condition that the oil spill response regime incorporate measures specific to the Southern Residents.

399. As detailed above, the Southern Residents are vulnerable to contamination, including from small oil spills. A large oil spill in critical habitat could have catastrophic consequences for the Southern Residents and could destroy critical habitat.

400. Further, the Recovery Strategy for the Southern Residents recommends the development and inclusion into existing oil spill response plans of “measures specific to killer whales”.⁴³⁹ None of the Draft Conditions meets the requirements of SARA s. 79(2) to ensure mitigation consistent with this aspect of the Recovery Strategy.

401. Trans Mountain should be required to develop oil spill response measures specific to the Southern Residents before any Project-related tankers are loaded at the Westridge Marine Terminal.

C) Conditions relevant to air quality and human health

402. To address concerns in the Application about Project impacts on human health and air quality, additional conditions should be established to ensure protection to from Project-related emissions.

1) Proposed conditions respecting air quality and human health

a) Recommended Condition 11: Air quality monitors

403. Trans Mountain should be required to establish air quality monitors for PM_{2.5}, NO_x, SO₂ and other pollutants at hotspot locations, particularly near the Edmonton, Sumas, Burnaby and Westridge Terminals.⁴⁴⁰

⁴³⁹ Exhibit C291-1-4, Recovery Strategy, Filing ID A4L9F9, at page 45.

⁴⁴⁰ Exhibit C214-18-5, Batterman, Filing ID A4L9S0, at page 6, paragraph 3.1.3.

b) Recommended Condition 12: Background concentrations

404. Trans Mountain should be required to provide time-varying background concentrations for each pollutant the Project will emit, in place of the single background concentration for each that it has provided, before operations commence, so that exceedances can be accurately assessed.

c) Recommended Condition 13: Background concentrations

405. Trans Mountain should be required to provide a new independent report on background levels before project operations commence so that the Project's air quality impacts can be accurately monitored (as background level measurements of pollutants in the application are implausibly high).⁴⁴¹

d) Recommended Condition 14: Sensitive and vulnerable populations

406. Trans Mountain should be required to identify sensitive and vulnerable populations living in proximity to Project facilities, in detail, and identify appropriate mitigation measures. This should be done before Project construction begins in order to enable mitigation measures.

e) Recommended Condition 15: Air quality monitoring during oil spill response

407. Trans Mountain should be required to file and implement adequate plans for air quality monitoring in the event of a spill from the pipeline or tanker, so that when peak exposures occur, credible and timely responses can be mobilized to protect community health and air quality post-spill.⁴⁴² The specific requirements of these plans should include the following things before operations commence:

- a) Trans Mountain must establish in its plans that its spill monitoring response capacity has the analytical capability to measure VOC (volatile organic compound) concentrations ranging from parts per trillion to tens or hundreds of

⁴⁴¹ Exhibit C214-18-4, Simpson, Filing ID A4L9R9, at pages 28-29, paragraphs 3.3.6.1-3.3.6.4.

⁴⁴² *Ibid* at pages 36, 37.

parts per billion and ensure that speciated or disaggregated VOCs are measurable. Sensitive measurements will be required to fully characterize the air quality effects in the event of a spill.⁴⁴³ (**Recommended Condition 15(a)**).

b) Trans Mountain's spill response plans must require that air quality monitoring following a spill will include both primary emissions from the oil slick (e.g. hydrocarbons) and secondary products resulting from chemical transformations of the primary emissions (e.g. secondary organic aerosol, ozone, organic nitrates).⁴⁴⁴ (**Recommendation 15(b)**).

c) Trans Mountain's spill response plans must allow independent scientists to have access to spill sites and in order to provide credible, comprehensive, transparent monitoring and analysis and to provide air quality information for the public. Access should not be limited to those involved in the response effort. This was done following the Deepwater Horizon oil spill.⁴⁴⁵ (**Recommendation 15(c)**)

D) Proposed Condition respecting to the Scientific Advisory Board

a) Recommended Condition 16: Expansion of Scientific Advisory Board

408. The Scientific Advisory Committee should be expanded to include community and First Nations representation in setting its research agenda. Its role should be expanded so that research, monitoring, and compliance are accessible and transparent. An appropriate model would be the Advisory Board set up for the Exxon Valdez Oil Spill.

⁴⁴³ *Ibid* at page 7.

⁴⁴⁴ *Ibid*.

⁴⁴⁵ Exhibit C214-18-4, Simpson, Filing ID A4L9R9, at pages 7, 33.

PART VII - Conclusion

409. For all of the reasons above, Living Oceans and Raincoast submit that the requirements to consider environmental effects, their significance, and mitigation have not been met; that the Project will have significant adverse environmental effects which are not justified in the circumstances, and that the additional obligations of SARA have not been met; and that the Project is, overall, not in the public interest. Therefore, the Board should recommend against approval of the Project.

All of which is respectfully submitted.

January 12, 2016



Dyna Tuysel



Karen Campbell



Margot Venton

Representatives for Living Oceans Society and Raincoast Conservation Foundation