

Court File No. _____

FEDERAL COURT OF APPEAL

BETWEEN:

RAINCOAST CONSERVATION FOUNDATION
and
LIVING OCEANS SOCIETY

Applicants

and

ATTORNEY GENERAL OF CANADA
and
TRANS MOUNTAIN PIPELINE ULC

Respondents

APPLICANTS' MOTION RECORD
Motion for leave to apply for judicial review
of Order in Council, P.C. 2019-820 made by the Governor in Council
under subsection 54(1) of the *National Energy Board Act*

VOLUME 2 OF 4

**ANY RESPONDENT WISHING TO FILE A MOTION RECORD IN
RESPONSE TO THIS MOTION FOR LEAVE MUST DO SO WITHIN TEN
(10) DAYS OF BEING SERVED.**

**REFER TO THE PRACTICE DIRECTION INCLUDED
IN THIS MOTION RECORD AT PAGES 75 - 80**

Dyna Tuytel & Margot Venton

Counsel for the Applicants

800, 744 – 4 Avenue SW

Calgary, AB T2P 3T4

Phone: 403 705-0202

Fax: 403-452-6574

TO: FEDERAL COURT OF APPEAL
3rd Floor, 635 – 8 Avenue SW
Calgary, AB T2P 3M3

AND TO: ATTORNEY GENERAL OF CANADA
c/o Department of Justice Canada
Suite 601. 606 – 4 Street SW
Calgary, AB T2P 1T1
Tel: 403 292-6813
Fax: 403 299-3507

TRANS MOUNTAIN PIPELINE ULC
c/o Osler, Haskin & Harcourt LLP
Suite 2500, TransCanada Tower
450 – 1 Street Sw
Calgary, AB T2P 5H1
Tel: (403) 260-7003/7038
Fax: (403) 260-7024

NATIONAL ENERGY BOARD
517 – 10 Avenue SW
Calgary. AB T2R 0A8
Tel: 403 292-4800
Fax: 403 292-5503

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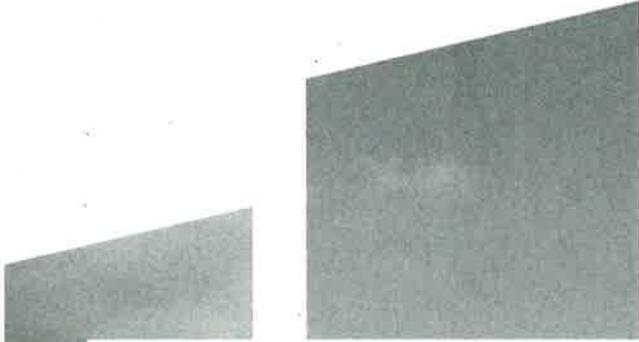


National Energy Board

Office national de l'énergie

000301

Trans Mountain Pipeline ULC Application for the Trans Mountain Expansion Project



National Energy Board reconsideration
of aspects of its OH-001-2014 Report as
directed by Order in Council P.C. 2018-1177

MH-052-2018

February 2019

This is Exhibit "G" referred to in the
Affidavit of Elizabeth Gabel
affirmed before me this 24th day of
July, 2019

Barry Robinson
Barrister & Solicitor


A Commissioner for Oaths
in and for the Province of Alberta

Canada

National Energy Board Report

Application for the Trans Mountain Expansion Project

National Energy Board
reconsideration of aspects of its
OH-001-2014 Report as directed by
Order in Council P.C. 2018-1177

MH-052-2018

February 2019

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This report does not provide any indications of whether or not any application will be approved. The NEB will decide on specific applications based on the material in evidence before it at that time.

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Trans Mountain Pipeline ULC - MH-052-2018

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Introduction and disposition

This introduction contains the National Energy Board's (Board or NEB) overall conclusions and recommendations with respect to the Trans Mountain Expansion Project (Project). It also sets the context for how the Board approached the Reconsideration it was directed to undertake by the Governor in Council (GIC), and contains remarks on some of the multifaceted considerations that informed the Board's conclusions. This includes details regarding the holistic, systemic and precautionary approach that the Board took to examining and addressing effects likely to be caused by the Project on the Salish Sea and its complex and interconnected ecosystem. This introduction should be read together with – and not in isolation from – the detailed reasons that follow in the subsequent chapters of this report.

Disposition

After completing the Reconsideration hearing and having regard to all relevant considerations, the Board is of the view that the Project is and will be required by the present and future public convenience and necessity, and is in the Canadian public interest. Pursuant to the *National Energy Board Act* (NEB Act), the Board confirms the recommendation, and replaces certain conditions, that it provided to the GIC in its OH-001-2014 Report. The Board recommends that the GIC approve the Project by directing the issuance of a certificate of public convenience and necessity (CPCN) to Trans Mountain Pipeline ULC (Trans Mountain), subject to 156 conditions.

Pursuant to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) the Board is of the view that the designated Project is likely to cause significant adverse environmental effects. Specifically, Project-related marine shipping is likely to cause significant adverse environmental effects on the Southern resident killer whale, and on Indigenous cultural use associated with the Southern resident killer whale. This is despite the fact that effects from Project-related marine shipping will be a small fraction of the total cumulative effects, and the level of marine traffic is expected to increase regardless of whether the Project is approved. The Board also finds that greenhouse gas (or GHG) emissions from Project-related marine vessels would result in measureable increases and, taking a precautionary approach, are likely to be significant. While a credible worst-case spill from the Project or a Project-related vessel is not likely, if it were to occur, the environmental effects would be significant. While these effects weighed heavily in the Board's reconsideration of Project-related marine shipping, the Board recommends that, in light of the considerable benefits of the Project and measures to mitigate the effects, the GIC find that they can be justified in the circumstances. The Board has identified a recommended follow-up program to be implemented with respect to the designated Project.

Pursuant to the *Species at Risk Act* (SARA), the Board has identified the adverse effects of the Project and its related marine shipping on each SARA-listed wildlife species and its critical habitat, and has imposed (through conditions) and recommended (to the GIC) measures to avoid or lessen those effects and to monitor them.

Reconsideration background and process

If approved, the Project would expand the existing Trans Mountain Pipeline system between Edmonton, Alberta and Burnaby, British Columbia (B.C.), nearly tripling its capacity to ship oil from 300,000 to 890,000 barrels per day. Almost 90 per cent of the Project route parallels existing disturbance, including the right-of-way for the existing pipeline. The Project includes approximately 987 kilometres of new pipeline, new and modified facilities such as pump stations and tanks, and the reactivation of 193 kilometres of existing pipeline. The Westridge Marine Terminal (WMT) would also be expanded. Oil would be loaded onto tankers at the WMT for transit to Washington State, California, and Asia.

In May 2016, after an approximately two-year regulatory review (the OH-001-2014 hearing), the Board issued its OH-001-2014 Report recommending that the GIC approve the Project. Project-related marine shipping was considered as part of that review and report, but only under the NEB Act – not under the CEAA 2012. On 29 November 2016, the GIC approved the Project, issuing Order in Council (OIC) P.C. 2016-1069. Accordingly, on 1 December 2016, the Board issued CPCN OC-O64 to Trans Mountain, along with amendments to other existing CPCNs. Additional related instruments in respect of the Project also came into effect at that time. These regulatory instruments authorized the construction and operation of the Project, subject to 157 conditions.

On 30 August 2018, the Federal Court of Appeal in *Tsleil-Waututh Nation v. Canada (Attorney General)*¹ set aside OIC P.C. 2016-1069, in part because, in the Court's view, the Board unjustifiably excluded Project-related marine shipping from the scope of the "designated project" reviewed under the CEAA 2012.

On 20 September 2018, the GIC issued OIC P.C. 2018-1177, directing the Board to conduct a Reconsideration taking into account the environmental effects of Project-related marine shipping in view of the requirements of the CEAA 2012, and the adverse effects of Project-related marine shipping on species at risk in view of any requirements of section 79 of the SARA. The OIC instructed the Board to complete the Reconsideration within 155 days.

In carrying out the Reconsideration, the Board held a public hearing (the MH-052-2018 hearing) and has prepared this MH-052-2018 Report as a result. As directed by the OIC and as reflected in the Board's List of Issues (see Appendix 1), this Reconsideration is focused on Project-related marine shipping – a comparatively narrow scope to the OH-001-2014 hearing. The Board's focus was on any necessary changes or additions to its OH-001-2014 Report in light of the inclusion of Project-related marine shipping in the designated Project being assessed under the CEAA 2012.

At the end of this introduction and disposition, there is a roadmap to this MH-052-2018 Report, which explains how it is laid out to incorporate both new information received through the MH-052-2018 hearing, and information received during the OH-001-2014 hearing. The Board has structured this MH-052-2018 Report in this manner to ensure that all pertinent information about the Project and its related marine shipping is captured in a single, consolidated report to the GIC.

Considering the evidence and submissions

While the Reconsideration was a focused hearing, the evidentiary record was nevertheless substantial, and included additional investigative and scientific studies that have been completed since the close of the OH-001-2014 hearing record. The level of participation was also substantial, with a total of 118 intervenors that included 52 Indigenous intervenors, and 8 federal government department intervenors. Any member of the public was able to file a letter of comment, and many took the opportunity to do so.

Prior to issuing a Hearing Order, the Board sought public comments on the scope of the environmental assessment and List of Issues, and the design of the hearing process. Intervenors provided evidence and argument, and were given an opportunity to question the evidence of other intervenors and Trans Mountain. A total of \$4,981,760 in participant funding was offered to 69 recipients, 82 per cent of which was offered to Indigenous intervenors.

Much of the evidence and submissions presented was relevant, informative, and helpful to the Board. The Board appreciates the efforts and diligence of the Parties in preparing their evidence and submissions, including the Indigenous oral traditional evidence that the Board heard over approximately three weeks in Calgary, Alberta, and in Victoria and Nanaimo, B.C.

However, the Board observes that, regrettably, not all Parties and commenters adhered to the Hearing Order and many filed evidence or offered comments on issues canvassed in the OH-001-2014 hearing or that were not within the scope of this

¹ 2018 FCA 153

Reconsideration, adding unnecessarily to the complexity of the hearing process. The Board did not consider evidence or revisit issues that were outside of the scope of the Reconsideration.

In making their submissions, some Parties implored the Board to not only listen, but to hear what they were saying. Elder George Harris from Stz'uminus First Nation said it this way:

You know, in our culture and traditional ways of our people, when we go into our longhouse, my speaker, when he says, "Listen, listen," that's a big part of our culture. We listen. I'm hoping that you, the Panel, are going to listen. I'm hoping our words are heard beyond this room.

The Board has endeavored to do this – to listen, hear, and share the evidence and views of the Parties with the GIC and Canadians.

The Board has carefully considered all of the relevant evidence and submissions it received. The Board is of the view that the MH-052-2018 hearing offered a fair and meaningful opportunity for Parties to participate and to fully present their case and represent their diverse points of view.

The Board's MH-052-2018 hearing also forms part of the overall consultation process with Indigenous peoples with respect to their constitutionally protected rights. In this regard, the GIC has indicated that it will rely on the NEB's process, to the extent possible, to discharge the duty to consult. The Board's MH-052-2018 Report may also inform the additional "Phase III" consultations being carried out separately by the Government of Canada with respect to the Project. Although the GIC has the responsibility of ultimately ensuring that the duty to consult has been fulfilled before a decision is made on the Project, the Board has considered those aspects of consultation which are relevant to the Reconsideration and for which evidence was filed on the record.

Weighing the public interest

The Board has undertaken this Reconsideration in accordance with the requirements of the NEB Act, the CEAA 2012, and the SARA, and with the Canadian public interest as a guide.

Weighing the public interest, as required by the NEB Act, is not a rigid or mechanical task. It is a complex, flexible, and multifaceted inquiry that requires the Board to conduct a thorough and scientific examination of evidence relating to economic, environmental, and social factors; to consider the impacts of the Project on Indigenous rights; to weigh and balance the overall benefits and burdens of the Project; and to draw conclusions. This consideration of benefits and burdens also informs the Board's recommendation under the CEAA 2012 regarding whether any significant adverse environmental effects can be justified in the circumstances. The various factors that the Board considers in this inquiry cannot be understood in isolation from one another, or divorced from the specific context and circumstances surrounding this Project.

In the Board's view, the benefits of the Project are considerable, including increased access to diverse markets for Canadian oil; jobs created across Canada; the development of capacity of local and Indigenous individuals, communities, and businesses; direct spending on pipeline materials in Canada; and considerable revenues to various levels of government.

However, the Board is also of the view that the Project and its related marine shipping carries risks. Its burdens include the significant adverse effects that are likely to be caused by Project-related marine shipping on the Southern resident killer whale and Indigenous cultural use associated with the Southern resident killer whale.

Further, the benefits and burdens of the Project and its related marine shipping are not distributed evenly across the country.

In light of these circumstances, reasonable people can and will disagree on what the best balance and outcome is for Canadians. Sometimes, Parties disagree on the evidence and facts, while other times, Parties agree on the facts but differ in their opinions, perspectives, or values. In carrying out the Reconsideration, the Board has listened carefully and taken into account diverse views. The Board has remained cognizant that the public interest is not regionally based, but is inclusive of all Canadians. It must also be responsive to Canadians' interests and values as they change over time.

It is through this holistic and contextual lens that the Board has carried out its environmental assessment, including the justification analysis; considered and weighed the Project's benefits and burdens; and determined that the Project is in the Canadian public interest.

Taking a precautionary approach

Many Parties in the MH-052-2018 hearing emphasized the application of the precautionary principle, despite the fact that there were different interpretations expressed as to exactly what the principle requires.

The Board recognizes the important role of the precautionary principle under the CEAA 2012. The precautionary principle requires that environmental measures must anticipate and prevent environmental harm. A lack of full scientific certainty should not be used as a reason for not implementing measures to prevent environmental harm. Adaptive management can, in certain circumstances, be an important part of a follow-up program for a project to allow for uncertainties in the environmental assessment process. The Board is of the view that certain activities may be permitted despite a lack of full scientific certainty regarding their effects, provided the activity and its effects can be effectively monitored and adaptively managed. This involves an exercise in balancing interests and weighing risks.

The Board has applied the precautionary principle to its environmental assessment in this case. As examples, the Board has applied the precautionary principle to its significance determinations, and to its consideration of measures to mitigate impacts through design, planning, follow-up, and monitoring. The Board has required that effects or consequences be minimized, even if they are only anticipated or possible and not certain.

The importance of taking a precautionary approach is evident when faced with the Salish Sea and its complex and not necessarily well-understood ecosystem. An approximately 18,000-square-kilometre body of water that includes the Straits of Juan de Fuca and Georgia as well as Puget Sound, the Salish Sea is home to diverse marine life. This includes a number of endangered and threatened species, some of which are of particular importance to Indigenous peoples and intrinsic to Indigenous cultural and spiritual practices.

Over 6.5 million people live on or in close proximity to the Salish Sea, and it is home to a population of over 35 types of mammals, 170 species of bird, 240 kinds of fish, and 3,000 species of invertebrates. Not surprisingly, the health of the Salish Sea is of significant importance to all who live in the area.

The evidence in the MH-052-2018 hearing is clear that the Salish Sea is not the healthy environment it once was. It is subject to a number of stressors, including vessel traffic and resulting noise, environmental contaminants, and a decline in salmon. The causes for the current state of the Salish Sea are numerous and diverse, and these effects have accumulated over time. There appears to be no serious controversy among the Parties with regard to these points, nor does there appear to be any serious controversy that Project-related marine shipping is likely to cause significant adverse environmental effects. This is despite the fact that Project-related marine shipping would comprise a relatively small increase in the total vessel traffic in the Salish Sea, and that increased pressure on the Salish Sea and its marine life can be anticipated regardless of whether the Project proceeds.

Taking an holistic approach

Given the cultural, environmental, and commercial importance of the Salish Sea, the Board has adopted an holistic approach to its consideration of the designated Project and how it fits into the wider context of the many current stressors on that body of water, the marine animals and fishes within it, and the people who derive cultural use, livelihood, or pleasure from it. The Board concludes that, while Project-related marine shipping's incremental addition to cumulative effects on the Salish Sea will not be large, it will add to already significant effects.

Addressing effects, and cumulative effects in particular, on the Salish Sea requires a broad, systemic, and multi-faceted approach. To understand the effects of Project-related marine shipping and how best to mitigate those effects, one needs to understand the complex and interconnected system that it would operate within. In order to be most effective in mitigating environmental harm to the Salish Sea and its ecosystem that is likely to be caused by the Project, a broader approach is required; one which extends beyond the NEB's regulatory authorities and one which will benefit the broader system. The Board has conducted its environmental assessment, set Project conditions, and made its broader recommendations to the GIC with this in mind. This includes making recommendations that use an offset-based approach. It is the Board's view that, should the GIC make changes to the operation of all marine traffic, including Project-related traffic, and take action to relieve other stressors within the broader system, it will offset the incremental effects of the designated Project and make material improvements to the health of the Salish Sea.

The Board is also supportive of the role of the Indigenous Advisory and Monitoring Committee (IAMC) for the Project. In the Board's view, the IAMC is well placed to help facilitate effective and ongoing Indigenous consultation and participation in Project-related Salish Sea monitoring and follow-up measures.

While the Board recognizes that scientific work to better understand the Salish Sea is continuing, it has heard a great deal of evidence, including from a variety of experts. The Board is satisfied that the evidence before it is sufficient for it to make the conclusions and recommendations it has reached in this MH-052-2018 Report.

Project conditions and recommendations to the GIC

The Board will impose 156 conditions on the Project if it is approved. It has also made 16 recommendations to the GIC. The conditions and recommendations are made in a manner consistent with the NEB Act, the CEAA 2012, the SARA, and they apply the precautionary principle.

The conditions cover a wide range of matters, including emergency preparedness and response, protection of the environment, consultation with affected Indigenous communities, socio-economic matters, pipeline safety and integrity, commercial support for the Project prior to construction, and financial responsibility on the part of Trans Mountain.

The Board's recommendations to the GIC relate to Project-related marine shipping, including cumulative effects management for the Salish Sea, measures to offset increased underwater noise and increased strike risk posed to SARA-listed marine mammal and fish species, marine oil spill response, marine shipping and small vessel safety, reduction of greenhouse gas emissions from marine vessels, and the IAMC.

In making its recommendations to the GIC, the Board drew guidance from the Federal Court of Appeal's decision in *Tsleil-Waututh Nation*. The Court indicated that the Board should identify mitigation measures within the authority of the federal government, despite the fact that the Board does not regulate marine shipping. The Board is also not limited to identifying measures that are within Trans Mountain's control to implement. With the addition of recommendations about matters beyond the Board's authority but within that of the GIC, the GIC will possess the requisite breadth of information to make the informed decisions required of it with respect to the Project.

Both the conditions and recommendations made by the Board are intended to mitigate, avoid, or lessen potential effects associated with the Project and its related marine shipping. The conditions are regulatory requirements imposed on Trans Mountain, which the Board would oversee and enforce as part of its regulatory mandate. In comparison, the recommendations to the GIC fall outside of the Board's regulatory mandate and are generally beyond the control of Trans Mountain. While the recommendations are sufficiently specific and are evidence-based, they are comparatively less prescriptive than the conditions. This provides a measure of flexibility for the GIC to determine the details of how best to implement them, and the resources required, should it decide to do so. This is appropriate given that the optimization of these mitigation measures may need to be based on a multitude of factors, including the GIC's overall approach for managing cumulative effects in the Salish Sea, multi- and cross-jurisdictional considerations, and the need to employ ongoing adaptive management in light of the complexities and uncertainties of the Salish Sea.

Although the Board's recommendations to the GIC are directly related to its environmental assessment of Project-related marine shipping, the Board is of the view that, if implemented, they may assist in mitigating effects of all marine traffic in the area. This would be a positive outcome that would extend beyond mitigating or offsetting the impacts of the Project and its related marine shipping. The Board encourages the Government of Canada in the direction it has already taken to both deepen the scientific understanding of the Salish Sea and its resident marine life, and to continue to put in place procedures, programs, equipment, and funding to safeguard this important Canadian marine resource.

Roadmap to the MH-052-2018 Report

Given that the Reconsideration focused on Project-related marine shipping, much of the OH-001-2014 Report is outside the scope of the MH-052-2018 hearing. However, the GIC must be informed about all aspects of the Project to make the decisions required of it. It is also important to be clear about what changed from the OH-001-2014 Report as a result of the MH-052-2018 hearing.

For this reason, this MH-052-2018 Report contains the sections that were reconsidered by the Board, as well as sections from the OH-001-2014 Report that were beyond the scope of the Reconsideration. This ensures that all pertinent information is captured in a single consolidated report to the GIC.

This MH-052-2018 Report contains the same chapter numbers and titles of the OH-001-2014 Report. Although sections of the OH-001-2014 Report are included in this MH-052-2018 Report, this does not mean that they were within the scope of the Reconsideration or reconsidered by the Board. The beginning of each chapter contains an explanation of what, if anything, was changed from the OH-001-2014 Report.

Most chapters in this MH-052-2018 Report were reproduced from the OH-001-2014 Report and include the views of the original Panel that undertook the OH-001-2014 hearing. These views remain valid and unchanged, and are labelled as "**Views of the Board.**" Some chapters have undergone substantive changes as a result of the MH-052-2018 hearing and include the views of the Panel that carried out the Reconsideration. These are labelled as "**Views of the Reconsideration Panel.**"

For issues that fall within the scope of the MH-052-2018 hearing, the Reconsideration Panel included views of the Parties from the OH-001-2014 hearing where they were still applicable. These are then followed by new or updated evidence raised by the Parties in the MH-052-2018 hearing. The views of the Reconsideration Panel contain Board views from the OH-001-2014 Report that were found to remain applicable after considering relevant evidence from both the OH-001-2014 and MH-052-2018 hearings. The views of the Reconsideration Panel include additional views to address the new or updated evidence and to explain if it confirms or modifies the Board's previous findings from the OH-001-2014 hearing.

The majority of the issues relevant to the MH-052-2018 hearing are covered in Chapters 5 and 14. An overview of what was considered by the Reconsideration Panel and changed from the OH-001-2014 Report is outlined below. The appendices from the OH-001-2014 Report have been reproduced, with updates to reflect the circumstances and factual underpinnings of the Reconsideration. Appendices 14 and 15 are new to this MH-052-2018 Report.

Chapter	Update
Introduction and disposition	New
Chapter 1 – The Board's review	Updated to reflect both hearing processes
Chapter 2 – Benefits, burdens, and recommendations	Updated to reflect the conclusions arising from the Reconsideration
Chapter 3 – Regulating through the Project lifecycle	Unchanged
Chapter 4 – Public consultation	Unchanged
Chapter 5 – Indigenous matters	Section 5.2 includes new or updated evidence and views with respect to Indigenous matters
Chapter 6 – Pipeline and facility integrity	Unchanged
Chapter 7 – Construction and operations	Unchanged
Chapter 8 – Environmental behavior of spilled oil	Section 8.2 includes new or updated evidence and views with respect to the environmental behavior of spilled oil
Chapter 9 – Emergency prevention, preparedness, and response	Unchanged
Chapter 10 – Environmental assessment	Mostly unchanged except for references about the scope of the environmental assessment completed under the CEAA 2012, and Project-related marine shipping
Chapter 11 – People, communities, and lands	Unchanged
Chapter 12 – Need for the Project and economic feasibility	Unchanged
Chapter 13 – Financial matters	Unchanged
Chapter 14 – Project-related increase in shipping activities	Revised significantly; covers the majority of the issues relevant to the Reconsideration

Conclusion

The Reconsideration has comprised a comprehensive, evidence-based, fair, and meaningful review of Project-related marine shipping. The Reconsideration process and this resulting report discharge the relevant requirements of the Board under the NEB Act, the CEAA 2012, and the SARA. The Board finds, in conclusion, that the Trans Mountain Expansion Project is in the Canadian public interest and recommends to the GIC that it be approved.

The Board thanks the Parties in the MH-052-2018 hearing for their thoughtful and thorough participation, which has resulted in better information, well-informed conclusions, and more effective conditions and recommendations that serve all Canadians.

Should the Project be approved, the NEB will regulate it throughout its full lifecycle. The NEB will oversee Project construction and operation, and will hold Trans Mountain accountable for meeting its commitments and applicable regulatory requirements, keeping its pipelines and facilities safe and secure, and protecting people, property, and the environment.



L. Mercier
Presiding Member



A. Scott
Member



M. Lytle
Member

Calgary, Alberta
February, 2019



The Board's review of the Trans Mountain Expansion Project

The content of this chapter has been updated since the Board's May 2016 OH-001-2014 Report to reflect the Reconsideration. The Reconsideration Panel has added information regarding the MH-052-2018 hearing process and its views on various issues raised in argument.

Section 1.6 contains the views of the Board from the OH-001-2014 Report (formerly Chapter 1.3), but has been included as it provides helpful background information.

Section 1.7 contains the views of the Board from the OH-001-2014 Report (formerly Chapter 1.4). The Reconsideration Panel adopts this approach to assessing risks from spills and has revised the conclusions related to spills from Project-related marine shipping.

In May 2016, after an approximately two-year regulatory review (the OH-001-2014 hearing), the Board issued its OH-001-2014 Report recommending that the GIC approve the Project. Project-related marine shipping was considered as part of that review and report, but only under the NEB Act – not under the CEAA 2012. On 29 November 2016, the GIC approved the Project, issuing Order in Council (OIC) P.C. 2016-1069. Accordingly, on 1 December 2016, the Board issued CPCN OC-064 to Trans Mountain, along with amendments to other existing CPCNs. Additional related instruments in respect of the Project also came into effect at that time. These regulatory instruments authorized the construction and operation of the Project, subject to 157 conditions.

On 30 August 2018, the Federal Court of Appeal in *Tsleil-Waututh Nation v. Canada (Attorney General)*² set aside OIC P.C. 2016-1069, in part because, in the Court's view, the Board unjustifiably excluded Project-related marine shipping from the scope of the "designated project" reviewed under the CEAA 2012.

On 20 September 2018, the GIC issued OIC P.C. 2018-1177, directing the Board to conduct a Reconsideration taking into account the environmental effects of Project-related marine shipping in view of the requirements of the CEAA 2012, and the adverse effects of Project-related marine shipping on species at risk in view of any requirements of section 79 of the SARA. The OIC instructed the Board to complete the Reconsideration within 155 days.

² 2018 FCA 153

In carrying out the Reconsideration, the Board held a public hearing (the MH-052-2018 hearing) and has prepared this MH-052-2018 Report as a result. As directed by the OIC and, as reflected in the Board's List of Issues (see Appendix 1), this Reconsideration is focused on Project-related marine shipping – a comparatively narrow scope to the OH-001-2014 hearing. The Board's focus was on any necessary changes or additions to its OH-001-2014 Report in light of the inclusion of Project-related marine shipping in the designated Project being assessed under the CEAA 2012.

1.1 The Project

On 16 December 2013, Trans Mountain Pipeline ULC (Trans Mountain) submitted an application (Application) to the National Energy Board (NEB or Board) for a Certificate of Public Convenience and Necessity (CPCN) and other requested relief to construct and operate the Trans Mountain Expansion Project (Project).

In its Application, Trans Mountain said that it had received many requests from its shippers over the past few years to increase the capacity of the existing Trans Mountain Pipeline (TMPL) system. This pipeline is currently the only major pipeline route for Western Canadian producers who want to ship oil to the west coast of Canada. The pipeline ships oil from Edmonton, Alberta to Burnaby, B.C. At that point, oil is loaded onto tankers at the Westridge Marine Terminal (WMT) for Pacific Rim destinations, such as Washington State, California, and Asia.

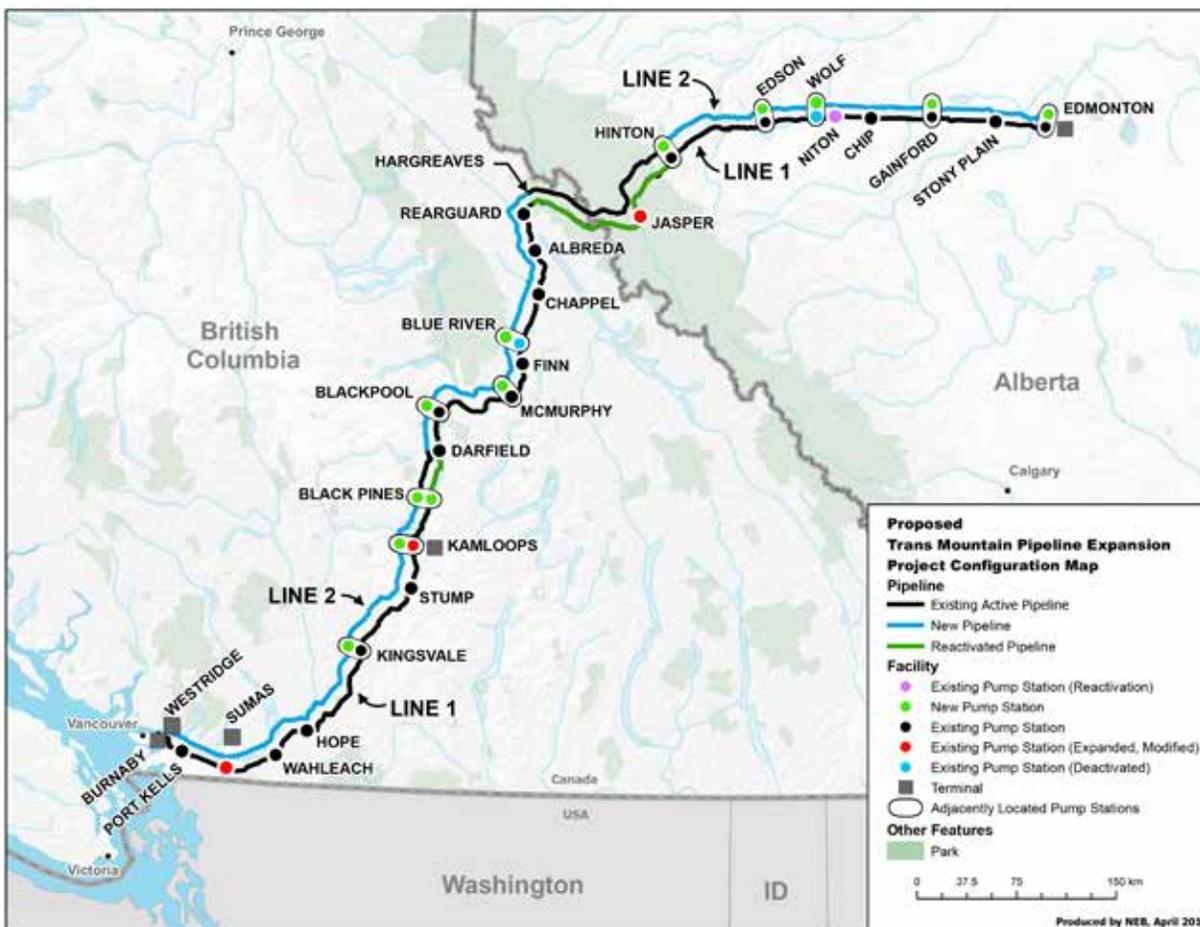
The Project would result in the looping (or twinning) of the existing 1 147 km TMPL system between Edmonton and Burnaby with about 987 km of new buried pipeline. Most of the existing pipeline, along with two reactivated pipeline segments, would become Line 1. The proposed new pipeline segments, along with active pipeline segments, would become Line 2, as shown below in Figure 1.

The Project would increase the capacity of the existing TMPL system from 47 690 m³/d (300,000 bbl/d) to 141 500 m³/d (890,000 bbl/d) of crude petroleum and refined products.

Currently, Panamax tankers (less than 75,000 metric tonnes deadweight tonnage (DWT)) and Aframax tankers (75,000 to 120,000 metric tonnes DWT) call at the WMT. The existing WMT typically loads five tankers per month. The proposed expanded system associated with the Project would increase the WMT's loads to approximately 34 Aframax class vessels per month, with actual demand driven by market conditions.

Additional technical details about the Project can be found in Appendix 4.

Figure 1: Project map



1.2 Definitions of the Project, Project-related marine shipping, and the designated Project

The Project, as defined by Trans Mountain, includes only the facilities described above, which are between Edmonton and the WMT. Following the direction from the GIC in OIC P.C. 2018-1177, the Board concluded that Project-related marine shipping between the WMT and 12-nautical-mile territorial sea limit is “incidental” to the Project and therefore part of the “designated project,” as those terms are defined in the CEAA 2012.

In this MH-052-2018 Report, the Board uses the term “Project” to describe those facilities between Edmonton and the WMT. Project-related marine shipping is identified separately. This terminology enables the Board to clearly distinguish what applies to the pipeline component and WMT and what applies to Project-related marine shipping. Defining “Project” in this way also maintains consistency with the sections from the OH-001-2014 Report that were included as part of this MH-052-2018 Report.

The term “designated Project” is used to describe the entirety of the Project and the Project-related marine shipping.

1.3 OH-001-2014 hearing

1.3.1 The hearing process

Public hearing processes are designed individually and independently by the Board based on the specific circumstances of the application. Each process is designed to provide for a fair hearing. Through the *National Energy Board Rules of Practice and*

Procedure, 1995 and the Filing Manual, the Board provides specific details about what information is required to be filed in regard to any application to build and operate a new pipeline.³ The List of Issues (Appendix 1) provides an outline of the issues that would be considered by the Board during the hearing.

For the Board's review of the Application, the hearing had significant written processes as well as oral components. With the exception of oral traditional evidence described below, evidence was presented in writing, and testing of that evidence was carried out through written questions, known as information requests (IRs). Intervenors submitted over 15,000 questions to Trans Mountain over two major rounds of IRs. Hundreds of other questions were asked in six additional rounds of IRs on specific evidence. If an intervenor believed that Trans Mountain provided inadequate responses to its questions, it could ask the Board to compel Trans Mountain to provide a more complete response. Trans Mountain could do the same in respect of IRs it posed to intervenors on their evidence. There was also written questioning on various additional evidence, including supplemental, replacement, late and Trans Mountain's reply evidence.

The Board decided, in its discretion in determining its hearing procedure, to allow testing of evidence by IRs and determined that there would not be cross-examination in this hearing. The Board decided that, in the circumstances of this hearing where there were 400 intervenors and a legislated time limit, and taking into consideration the technical nature of the information to be examined, it was appropriate to test the evidence through written processes. In the final analysis, the written evidence submitted was subjected to extensive written questioning by up to 400 participants and the Board.⁴ The Board is satisfied that the evidence was appropriately tested in its written process and that its hearing was fair for all parties and met natural justice requirements. Comments about process provided in this hearing will be passed on for the consideration of future Board panels.

With the participation of approximately 400 intervenors and 1,250 commenters, the Board received evidence from those with first-hand knowledge and understanding about the specific circumstances along the corridor. This is why holding the public hearing was so valuable to the Board.

Over 1,600 participants in the hearing, including Indigenous people, businesses, communities, landowners, individuals and non-government and government organizations, had the opportunity to provide evidence about specific considerations that the Board took into account when coming to its recommendation. While not all those who were granted participation status participated in the hearing, many did participate in some or all hearing steps.

The Board's recommendation is founded upon the entire evidentiary record built through the oral and written parts of the hearing that formed the basis for the Board's deliberations.

1.3.2 Public participation

Participation by those members of the public who are either directly affected or have relevant information or expertise is one means of identifying potential and real impacts of a project. The Board required Trans Mountain to contact anyone who lives, works or uses land and resources along the proposed pipeline route. The Board also took a number of steps, beginning before the Application was received, to ensure that those who could be potentially affected by the Project were aware of it and knew how they could get involved in the review (see Appendix 5). Full details of the application to participate notification are contained in the Board's letter to Trans Mountain, dated 31 December 2013.

It is not unusual for hearing participants to be unfamiliar with how the NEB carries out its reviews. For a major project such as this one, the Board assigns a Process Advisory Team to help participants understand the hearing process and decide how best to participate.

The *National Energy Board Act* (NEB Act), section 55.2 states:

On an application for a certificate, the Board shall consider the representations of any person who, in the Board's opinion, is directly affected by the granting or refusing of the application, and it may consider the representations of any person who, in its opinion, has relevant information or expertise.

The Board decides for each hearing whether to grant participation rights to any person and, if granted, the appropriate method of participation. In addition, if it is the Board's opinion that a person has relevant information or expertise about the environmental assessment required under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the Board must provide that person with an opportunity to participate. Full details of the Board's ruling on participation are found in the Board's ruling of 2 April 2014.

³ The term "pipeline" is defined in section 2 of the NEB Act.

⁴ Ruling No. 14 dealt with a notice of motion to include oral cross-examination of witnesses. (Appendix 7 provides an overview of the notices of motions that were filed.)

The Board recognizes that good decisions and recommendations consider the thoughts, views and opinions of directly affected people and those with a broad range of relevant information or expertise. Participants for this Project's hearing could apply to:

- write a letter of comment (commenter); or
- become an intervenor.

A letter of comment gives the writer an opportunity to express his/her knowledge, views or concerns about a project. These letters are considered evidence in the proceeding. People who wrote letters of comment in this hearing could not ask questions about other participants' evidence or make final argument, nor were they asked questions about their letters.

Intervenors could file evidence, submit notices of motion, and ask questions of Trans Mountain and other intervenors. They also had the opportunity to provide final written and oral argument. The Board, Trans Mountain and other intervenors could also ask them questions about their evidence.

Full details about participation in the hearing are set out in the Board's OH-001-2014 Hearing Order, dated 2 April 2014. Additional rules regarding hearing participation are contained in *National Energy Board Rules of Practice and Procedure, 1995*.

More details about the process and participation are provided in the hearing timeline in Appendix 5.

1.3.3 Participant funding

Public participation is an important element of an open and balanced regulatory process. To facilitate public involvement, the NEB is responsible for a Participant Funding Program (PFP), a transfer payment program independent from the regulatory review process. The objective of the PFP is to provide funding to facilitate the participation of Indigenous groups, landowners, individuals and groups, associations and not-for-profit organizations.

On 22 July 2013, the NEB announced it would make \$1.5 million available to eligible intervenors to participate in the Trans Mountain Expansion Project hearing. Some intervenors raised concerns that the PFP process took too long and, given the large number of intervenors requesting funding, the level of funding was not sufficient. While the decisions on who received participant funding, how much, and the timing of those decisions were entirely separate from the regulatory hearing process, the Board notes the funding envelope was increased to \$3 million on 16 July 2014. There was also special participant funding offered in September 2015 for up to \$10,000 per applicant to cover eligible replacement evidence. In total, the PFP offered funding valued at \$3,085,370 to 72 eligible intervenors; 79 per cent of this funding was offered to Indigenous groups.

Awards are announced in the Participant Funding Report on the NEB website. For more information about the PFP or to see the Participant Funding Report, go to <http://www.neb-one.gc.ca/pfp>.

1.3.4 Gathering oral Indigenous traditional evidence

Indigenous people in the Project area have a long relationship and connection with the land, water and resources. The Board recognizes that Indigenous traditional knowledge can help provide relevant information, including historical information, which may otherwise be unavailable. This information can also help identify potential environmental effects, strengthen mitigation measures, and lead to better-informed decision-making.

The Board wants to provide opportunities for Indigenous people to share their traditional knowledge in a way that is both meaningful to them and valuable for the Board's deliberations. The Board recognizes that Indigenous people have an oral tradition for sharing stories, lessons and knowledge from generation to generation. This information cannot always be shared adequately in writing.

In this hearing, the Board asked participating Indigenous groups to let the Board know if they wanted to present oral traditional evidence. The Board received notices of intent from 49 groups and individuals. Originally, the Board intended to hear this oral evidence in August and September 2014. The Board later amended its hearing schedule in response to the input received from a number of Indigenous groups who expressed concerns that the proposed schedule would interfere with the sockeye salmon harvest. As a result, the Board held sessions in Edmonton, Alberta, in September; Chilliwack, B.C., in October; Kamloops and Victoria, B.C., in November 2014; and Calgary, Alberta, in January 2015.

Indigenous intervenors were able to file written evidence in addition to their oral traditional evidence. Other intervenors, Trans Mountain or the Board could ask questions about the oral traditional evidence. Each Indigenous group could then decide whether they would respond to any questions orally, in writing, or both.

1.3.5 Board rulings

As part of the hearing process, the Board provided participants with guidance on how they could ask the Board to do something, such as change or modify a particular deadline. This is known as filing a notice of motion. Depending on the nature of the request and the circumstances surrounding it, the Board had the option of providing an opportunity for Trans Mountain and intervenors to comment on a notice of motion. The Board issued rulings on approximately 291 motions and review applications. The motions focused on, among other things:

- requests to extend deadlines and/or the statutory time limits;
- the release of emergency response plans;
- allegations of apprehension of bias of Panel Members;
- requests to file late evidence;
- calls to include oral cross-examination in the hearing process;
- constitutional questions; and
- challenges to the limitations on public access during the oral hearing.

In the case of each of these notices of motion, the Board provided rulings, including reasons. Appendix 7 provides an overview of the notices of motions throughout the hearing.

As part of closing argument, a number of intervenors made requests for relief other than requests that specifically addressed the intervenors' positions on the recommendation that the Board ought to make to the Governor in Council (GIC).

In some cases, these requests were presented as alternative requests to the intervenor's primary request that the Board recommend denial of the Project application. In other cases, the relief was advanced as the intervenor's primary position. Trans Mountain also made a request for other relief in its reply evidence and in its closing argument.

The Board has addressed other relief requested in Appendix 7.

1.3.6 Modifying the hearing schedule

The NEB Act, subsection 52(4) sets a 15-month time limit starting when the Board decides an application is complete to when the Board submits its report to the GIC. This may be extended under particular circumstances specified in the Act. On 2 April 2014, the Board found the Trans Mountain Expansion Project application complete and issued the OH-001-2014 Hearing Order.

In June 2014, Trans Mountain advised that its preferred corridor for the delivery lines to the WMT would run through Burnaby Mountain instead of around it as described in the original Application.

The new proposed pipeline corridor included two possible construction options through Burnaby Mountain; a horizontal directional drill and a tunnel. Trans Mountain retained the original route around the mountain as an alternative corridor.

In order for the Board and hearing participants to assess the new preferred pipeline corridor, the Board needed more information from the company, and this required more time. The Board, with the approval of the NEB Chair, announced an excluded period that ran from 11 July 2014 until 3 February 2015. The excluded period was not counted in the 15-month time limit that the Board had to make its recommendation to the GIC.

This excluded period provided time for hearing participants and the Board to review the new evidence, once filed, and test it through IRs. The time limit for the Board to issue its Report to the GIC was revised to 25 January 2016, more than six months later than the original date of 2 July 2015.

As Trans Mountain's preferred pipeline corridor through Burnaby had now changed, the Board opened a second "application to participate" process for those who might have been directly affected by, or might have had relevant information or expertise on, the new preferred corridor. This process ran from 8 to 24 September 2014 (as illustrated in the hearing timeline at Appendix 5).

On 21 August 2015, the Board announced, on its own volition, that it was striking Trans Mountain's filed evidence that was prepared by or under the direction of Mr. Steven J. Kelly. This action was taken to ensure the integrity of the hearing. The stricken evidence addressed, among other things, the issue of oil market supply and demand.

On 18 September 2015, the Board, with the approval of the NEB Chair, announced a second excluded period so that it could acquire information from Trans Mountain and intervenors in relation to the issues previously addressed by the stricken

evidence. As a result of this second excluded period, the legislated time limit for the Board to issue its Report to the GIC was extended to 20 May 2016.

The updated hearing timeline is provided in Appendix 5.

1.4 MH-052-2018 hearing

1.4.1 Tsleil-Waututh Nation and OIC P.C. 2018-1177

On May 2016, after an approximately two-year regulatory review (the OH-001-2014 hearing), the Board issued its OH-001-2014 Report recommending that the GIC approve the Project. Project-related marine shipping was considered as part of that review and report, but only under the NEB Act – not under the CEAA 2012. On 29 November 2016, the GIC approved the Project, issuing Order in Council (OIC) P.C. 2016-1069. Accordingly, on 1 December 2016, the Board issued CPCN OC-064 to Trans Mountain, along with amendments to other existing CPCNs. Additional related instruments in respect of the Project also came into effect at that time. These regulatory instruments authorized the construction and operation of the Project, subject to 157 conditions.

On 30 August 2018, the Federal Court of Appeal in *Tsleil-Waututh Nation v. Canada (Attorney General)*⁵ set aside OIC P.C. 2016-1069, in part because, in the Court's view, the Board unjustifiably excluded Project-related marine shipping from the scope of the "designated project" reviewed under the CEAA 2012. The Court noted that this exclusion permitted the Board to conclude that section 79 of the *Species at Risk Act* (SARA) did not apply to its consideration of the effects of Project-related marine shipping.⁶ However, the Court noted that the Board had considered Project-related marine shipping under the NEB Act, and that the report was adequate for the purpose of informing the GIC about the effects of Project-related marine shipping on the Southern resident killer whales and their use by Indigenous groups.⁷

The Court stated that the issue of Project approval should be remitted to the GIC for redetermination, and the GIC must refer the Board's recommendations and its terms and conditions back to the Board for reconsideration.⁸ At paragraph 770 of its judgment, the Court stated:

Specifically, the Board ought to reconsider on a principled basis whether Project-related shipping is incidental to the Project, the application of section 79 of the [SARA] to Project-related shipping, the Board's environmental assessment of the Project in the light of the Project's definition, the Board's recommendation under subsection 29(1) of the [CEAA 2012] and any other matter the [GIC] should consider appropriate.

In OIC P.C. 2018-1177 dated 20 September 2018, the GIC, on the recommendation of the Minister of Natural Resources, pursuant to section 53 of the NEB Act and section 30 of the CEAA 2012:

- a) refers back to the National Energy Board for reconsideration the recommendations and all terms or conditions set out in its May 19, 2016 report entitled *Trans Mountain Expansion Project OH-001-2014* that are relevant to addressing the issues specified by the Federal Court of Appeal in paragraph 770 of *Tsleil-Waututh Nation v. Canada (Attorney General)* (2018 FCA 153), including Conditions 91, 131 to 134, 144 and 151;
- b) directs that the Board conduct the reconsideration taking into account the following factors:
 - i. the environmental effects of Project-related marine shipping in view of the requirements of the *Canadian Environmental Assessment Act, 2012*, and
 - ii. the adverse effects of Project-related maritime shipping on species at risk, including the Northeast Pacific southern resident killer whale population, and their critical habitat, in view of any requirements of section 79 of the *Species at Risk Act* that may apply to the Project; and
- c) directs that the Board complete its reconsideration within 155 calendar days after the day on which this Order is made.

⁵ 2018 FCA 153

⁶ *Ibid* at para 469 & 765.

⁷ *Ibid* at para 439.

⁸ *Ibid* at para 768-769.

The Chair of the Board assigned a panel of three Board members (Lyne Mercier – presiding, Alison Scott, and Murray Lytle) to conduct the Reconsideration (the Reconsideration Panel). In carrying out the Reconsideration, the Board held a public hearing (the MH-052-2018 hearing) and has prepared this MH-052-2018 Report as a result.

1.4.2 The hearing process

Prior to issuing a Hearing Order and deciding on the scope of the Board’s Reconsideration, on 26 September 2018, the Board sought public comments on:

- 1) whether, “on a principled basis,”⁹ Project-related marine shipping should be included in the “designated project” to be assessed under the CEAA 2012;
- 2) the draft Amended Factors and Scope of the Factors for the Environmental Assessment pursuant to the CEAA 2012 (Amended Factors Document), and a draft List of Issues to be considered in the MH-052-2018 hearing;
- 3) the design of the hearing process to be used for the Reconsideration; and
- 4) which government departments or bodies the Board should require information from during the hearing.

On 5 October 2018, the Board sought additional, focused comments from the Parties on the following limited issue:

Assuming Project-related marine shipping is included in the “designated project” to be assessed under the CEAA 2012, should the designated project be defined as including:

- a) Project-related marine shipping between the WMT and the territorial sea limit; or
- b) Project-related marine shipping between the WMT and the outer boundary of Canada’s exclusive economic zone?

The comments received are found on the Board’s online public registry. These comments were considered by the Board in reaching the various decisions it communicated in a series of documents on 12 October 2018, which included:

- Hearing Order MH-052-2018, to which the List of Issues and the Amended Factors Document were attached;
- a letter requesting specialist or expert information or knowledge in the possession of each of Fisheries and Oceans Canada, Environment and Climate Change Canada, Transport Canada, Vancouver Fraser Port Authority, Pacific Pilotage Authority, Health Canada, Parks Canada, and Natural Resources Canada (collectively, the Federal Authorities),¹⁰ pursuant to paragraph 20(a) of the CEAA 2012; and
- filing requirements for Trans Mountain.

The Board released reasons for these decisions on 29 October 2018.

The Board’s Hearing Order set out the steps and deadlines to guide all participants in the MH-052-2018 hearing. Via subsequent procedural updates and rulings, the Board revised or introduced certain steps and deadlines.

As described in the Hearing Order, the List of Issues, the Amended Factors Document, and the Reasons issued on 29 October 2018, the scope of the Reconsideration was limited. The Reconsideration Panel carried out an environmental assessment of Project-related marine shipping pursuant to the CEAA 2012. In carrying out this assessment, it considered relevant evidence filed in the OH-001-2014 hearing and the new or updated evidence submitted through the MH-052-2018 hearing. The Reconsideration Panel made its recommendations pursuant to the CEAA 2012, as detailed in this Report, then considered whether the submissions made in the Reconsideration process led to a confirmation or modification of the overall recommendation made in the OH-001-2014 Report.

The time limit set out in OIC P.C. 2018-1177 required the Board to complete the Reconsideration process and issue its Reconsideration Report no later than 22 February 2019. Despite the expedited hearing process, the MH-052-2018 hearing had many steps that were similar to the OH-001-2014 hearing. With the exception of oral traditional evidence described below, evidence was presented in writing and testing of that evidence was carried out through written IRs. Parties had the

⁹ *Supra* note 6 at para 770.

¹⁰ The Board gave all of the Federal Authorities intervenor status, regardless of whether a particular Federal Authority registered for that role or not, meaning that they were required to answer any information requests asked of them by the Board or other Parties regarding the information or knowledge they filed in response to the Board’s letter, or any other evidence they filed.

opportunity to ask the Board to compel other Parties to provide more complete responses to IRs and also to file final argument.

1.4.3 Public participation

Between 26 September and 3 October 2018, the Board held a process through which individuals and groups could apply or register to participate in the MH-052-2018 hearing. Information about the Board's application to participate process was contained in the Board's letter to all Parties to the OH-001-2014 hearing and all Indigenous groups on the Crown list, which was also posted on the Board's website and circulated to the media.

Intervenors in the OH-001-2014 hearing at the time that the Board issued its OH-001-2014 Report were guaranteed intervenor status in the MH-052-2018 hearing, if they chose to participate and register. Any other member of the public was able to apply to participate as an intervenor. For those that were not intervenors in the OH-001-2014 hearing, the Board indicated the following:

Intervenor status will be granted to those who, in the Board's opinion, are directly affected or have relevant information or expertise. Applicants must demonstrate how they meet this criteria as they relate to the draft List of Issues for the MH-052-2018 hearing.

Anyone not granted intervenor status, as well as any other member of the public, was able to file a letter of comment on the hearing record by 20 November 2018. The Board received various letters after this deadline that did not include justification for lateness. These were not considered as part of the record.

In the Board's 5 October 2018 Ruling No. 1, it announced the List of Parties,¹¹ based on the applications to participate received by the deadline. The Board's reasons for its participation decisions were issued separately on 11 October 2018.

Throughout the hearing, the Board received and ruled on additional late applications to participate as intervenors. Some intervenors also withdrew from the hearing. At the time that the Board finalized its MH-052-2018 Report, there were 118 intervenors, the majority of which were intervenors during the OH-001-2014 hearing. The list of intervenors is found in Appendix 6.

1.4.4 Participant funding

On 26 September 2018, the Participant Funding Program announced a simplified funding process for this hearing to reduce administrative burden. Eligible groups could request up to \$80,000, and individuals up to \$12,000, to participate in the MH-052-2018 hearing. The Participant Funding Program offered a total of \$4,981,760 to 69 recipients; of which 82 per cent was offered to Indigenous intervenors. The Participant Funding Program is a reimbursement-based program, therefore actual payments to groups and individuals depended on eligible costs claimed by recipients and approved for payment by the NEB.

1.4.5 Gathering oral Indigenous traditional evidence

The Board heard comments that Indigenous intervenors wanted the opportunity to provide traditional evidence orally for the MH-052-2018 hearing. The Board was honoured that Elders, Chiefs and community members chose to share their ceremonies, songs, prayers and stories. Throughout this MH-052-2018 Report the Board includes evidence heard through oral traditional evidence. This evidence was valuable to the Board as it undertook its deliberations.

Between 20 November and 6 December 2018, the Board heard oral traditional evidence from 25 Indigenous intervenors. Oral traditional evidence sessions were held in:

- Calgary, Alberta from 20-22 November;
- Victoria, B.C. from 26-29 November; and
- Nanaimo, B.C. from 3-6 December.

The Board described the process it would use to hear oral traditional evidence in Procedural Direction No. 1 and Procedural Direction No. 2.

The Board offered to hear oral traditional evidence in person at any of the announced locations, or remotely while it sat in Calgary. Two Indigenous intervenors that could not appear before the Panel provided their oral traditional evidence

¹¹ The Parties included Trans Mountain and all intervenors.

remotely by teleconference, one of which took place while the Board was in Nanaimo. Indigenous intervenors could also supplement their oral traditional evidence presentation – for example, if they felt they required more time – with an audio or video recording. Some indigenous intervenors provided the Board with a video recording of oral traditional evidence presentations.

Parties had an opportunity to respectfully ask questions about oral traditional evidence. The Board also asked questions of clarification. Indigenous groups could decide to answer questions orally, in writing, or both.

The Board broadcasted live audio of each day's oral traditional evidence presentations, made media files available for download, and produced written daily transcripts that can be found on the online public registry. The exception to this involved a portion of Tsleil-Waututh Nation's presentation, which, through Ruling No. 17, the Board decided to hear confidentially.

1.4.6 Board rulings

The Board received several process-related requests and notices of motion throughout the MH-052-2018 hearing. In response to these, the Board issued 30 rulings, some of which resulted in process changes, including to deadlines.

Following the issuance of the Hearing Order and Appendices, the Board issued its Reasons for the rulings contained in those documents, by letter dated 29 October 2018. The letter attached two appendices: Appendix 1 provided the reasons for including Project-related marine shipping between the WMT and the 12-nautical-mile territorial sea limit in the "designated project;" Appendix 2 provided the reasons for the remainder of the decisions made in relation to the Hearing Order and its attachments. Those reasons are referred to in this MH-052-2018 Report as the 29 October 2018 Reasons (Appendix 1 or 2).

The Board was also asked to review various decisions it made, including the spatial limit for its assessment of Project-related marine shipping under the CEAA 2012. Ruling 22 provided the Board's reasons related to these review requests.

A summary of the requests and notices of motions received, and the decisions the Board made with respect to them, is found in Appendix 7.

1.5 Issues raised in argument

During written argument-in-chief for the MH-052-2018 hearing, participants raised a numerous issues related to the hearing process, scope of the hearing, and other legal arguments. The Board's views on many of these issues are discussed in this section. However, the Board views regarding other legal issues related to mitigation under the CEAA 2012, and the SARA requirements are covered in Chapter 14.

1.5.1 Procedural fairness

Some parties argued that the Board's Reconsideration process breached requirements for procedural fairness. Their arguments included the following points:

- That significant procedural fairness was owed and the timelines in the Reconsideration were unreasonable. An extension under subsection 52(7) of the NEB Act should have been sought by the Board.
- More time was required because intervenors had to review approximately 8,000 pages of direct evidence from Government departments and Trans Mountain.
- Large quantities of evidence were provided in response to written information requests that were filed on 31 December 2018 and motions to compel better responses that were granted were only filed shortly before final argument was due.
- Participant funding was limited.
- Oral cross-examination was not offered and unsatisfactory responses were received to questions asked in the form of written information requests.
- Only written final argument and not oral final argument was provided.
- The locations for oral traditional evidence were too far away from the Lower Mainland.

Trans Mountain countered that in its view procedural fairness was satisfied. Its arguments included the following points:

- Procedural fairness varies with the context and interests at stake and here the Reconsideration was narrow in scope, which should inform procedural fairness.

- Having a fair but expedited hearing was consistent with the NEB Act and the direction from both the Federal Court of Appeal and the OIC for a prompt redetermination.
- All parties had an opportunity to fully and fairly present their case.
- In response to a notice of motion from Squamish Nation and supported by other intervenors the Board granted the request for an additional 15 days for filing intervenor evidence. In contrast Trans Mountain had a very limited time to file its reply evidence

Views of the Reconsideration Panel

Summary

The Board has determined that parties raising concerns about the fairness of the hearing process have not demonstrated that the Board breached any duty of procedural fairness. In considering individual issues raised as well as considering procedural fairness in the context of the entire hearing process, all parties had a meaningful opportunity to present their case fully and fairly. This included an opportunity to comment on the MH-052-2018 hearing process, file evidence, present Indigenous oral traditional evidence, ask written questions and receive responses and present final written argument. Parties had an opportunity to challenge evidence they did not agree with. The Board considers that hearing deadlines, as amended, were fair.

The Law: Was the Board's Reconsideration Process Procedurally Fair?

The Board as a public authority that makes decisions and recommendations that affects the rights, privileges or interests of individuals and groups, including Indigenous people, owes a duty of procedural fairness to the parties before it.¹²

In describing the variable nature of procedural fairness which depends on the context and circumstances in each case, the Court in *Tsleil-Waututh Nation* went on to list and apply the non-exhaustive factors from *Baker v. Canada (Minister of Citizenship & Immigration)* which are used in determining what procedural fairness requires in a particular circumstance.¹³

In discussing whether procedural fairness has been satisfied in a particular case it is useful to keep in mind that a variety of procedural options are available to meet the duty to be fair. While it is important to keep in mind individual claims specific to procedural fairness, it is also important to assess them in the context of the process for the Reconsideration as a whole. There is generally no right to the most advantageous procedure¹⁴ but parties can expect a decision or recommendation pursuant to statutory authority will be made fairly.

Taking into consideration a number of factors, the Court in *Tsleil-Waututh Nation* determined that the procedural fairness owed in the OH-001-2014 hearing was "significant" and that parties were entitled "to a meaningful opportunity to present their cases fully and fairly." The Court stated that this "included in the right to present a case fully is the right to effectively challenge evidence that contradicts the case."¹⁵

Taking into consideration the importance of the Board's recommendations and the ultimate GIC decision on the rights of parties, and other factors discussed in *Tsleil-Waututh Nation*, the Board accepts that procedural fairness owed in the Reconsideration is significant. The main difference between the Reconsideration and OH-001-2014 is that the Reconsideration was more narrowly focused and the Reconsideration also had shorter time limit for completion. These differences were considered as part of the overall context of the Reconsideration.

Hearing timelines

At issue is whether when taking into account the new evidence filed by Trans Mountain and Federal Departments and Agencies, that the overall timelines for the Reconsideration were so tight that intervenors did not have an opportunity

¹² *Tsleil-Waututh Nation*, para. 230

¹³ [1999] 2 S.C.R. 817, 174 D.L.R. (4th) 193 (S.C.C.). The factors being the nature of the decision being made and the process followed in making it; the nature of the statutory scheme, including the existence of an appeal procedure; the importance of the decision to the lives of those affected; the legitimate expectations of the person challenging the decision; and, the choice of procedures made by the decision-maker.

¹⁴ *Ironside v. Alberta (Securities Commission)*, [2009] A.J. 376 at para 107 (Alta C.A.).

¹⁵ *Tsleil-Waututh Nation* at para 235.

to fully and fairly make their case. Related to this point was whether there was a breach of procedural fairness that the Board did not make a request of the Minister under subsection 52(7) of the NEB Act to extend the time limit by an additional period.

The Board is of the view that its previous findings regarding the timeline still apply to assertions made about timing during final argument:

The Board received comments stating that the timeline for the hearing, including the time allotted for the initial comment process, is too short. Others commented that the Board should extend the timeline or seek an extension from the GIC.

The Board acknowledges that the timeline is not lengthy. This requires an expedited process and the need for Parties to stay focused on the hearing steps and to work diligently. Section 53 of the NEB Act authorizes the GIC to direct the Board to undertake a reconsideration based on any factor specified, and to specify a time limit for the Board to complete its reconsideration. In this focused Reconsideration, it is not necessary that the Board have the same timelines as a new application. There is already significant evidence on the record on numerous topics being examined. Many of the Parties will also be familiar with the record from the OH-001-2014 hearing. Consistent with subsection 11(4) of the NEB Act, there is a need for proceedings to be conducted expeditiously and fairly and, in any case, within the time limit set by the GIC.¹⁶

Consistent with both the Court's direction for a prompt redetermination¹⁷ and the OIC, while the Reconsideration time line was expedited, the Board is satisfied that parties had a fulsome opportunity in the Reconsideration to make their case and challenge evidence from Trans Mountain and Federal Departments and Agencies. If there were particular circumstances requiring additional time, the Board explicitly stated that it was open to considering such requests.¹⁸ Both Squamish Nation and Tsleil-Waututh Nation did file a request on 5 November 2018 requesting that intervenor evidence be moved from 20 November to 5 December 2018 (Trans Mountain and Federal Departments and Agencies had filed direct evidence on 31 October 2018).

Squamish, for example, said it had been diligently working since the Board's letter of 26 September 2018 to retain experts. A number of intervenors wrote in support of the extension request. The Board fully granted the 15 day extension request. In doing so the Board recognized the fundamental importance of parties being able to full present their case with evidence. The Board also took into account the volume of evidence that Federal Departments and Agencies, in particular, had filed. This all factored into the extension request being granted in full. The Board stated that, in order to accommodate the 15-day extension, it had to shorten some other deadlines and compress the Board's own time for writing the MH-052-2018 Report.

On the revised deadline for intervenor evidence to be filed, the Board received dozens of reports and studies. This included those prepared by asserted experts from intervenors. There were a very limited number of parties that made requests to file late evidence, and those requests were considered on a case by case basis. In the Board's view, taking into consideration the limited scope of the Reconsideration, that parties had notice of the need to start preparing evidence since 26 September 2016 and that as requested a 15 day extension to the deadline of filing intervenor evidence was granted, the Board considers that parties had an adequate opportunity to fully and fairly present their case and procedural fairness was not breached.

With respect to the time lines to complete the balance on the Reconsideration process, while at times comment processes occurred on an expedited basis, parties appeared to have provided detailed comments within established time lines. Particularly for intervenors, in the Board's view there was a reasonable amount of time to ask written questions regarding other parties' evidence.¹⁹ While responses to questions resulted in additional evidence being filed on 31 December 2018, intervenors had over 3 weeks from this time to file written argument-in-chief. Where motions to compel were granted, the responses were filed closer to written argument, although these additional responses added limited new materials.

¹⁶ 29 October 2018 NEB Appendix 2 – Trans Mountain Expansion – Reconsideration – reasons to the List of Issues and Hearing Process, pages 18 and 19.

¹⁷ *Tsleil-Waututh Nation* at paras 768 and 774.

¹⁸ *Supra* note 16 at pg 19. Hearing Order MH-52-2018 at pg 13.

¹⁹ Information requests were due on 17 December 2018, which was more than 6 weeks after Trans Mountain and Federal Departments filed their direct evidence.

Taking all these facts and circumstances into consideration, the Board is of the view that hearing process deadlines, as amended, allowed parties to fully and fairly present their case and challenge evidence, and resulted in a procedurally fair hearing.

With regard to subsection 52(7) of the NEB Act, this extension provision arises in the context of the time limit that applies in a section 52 certificate hearing; its application to the time limit of a Reconsideration is questionable. Even if this subsection has application to a Reconsideration, the Board is not persuaded that a convincing case was made for the Board to make such a request of the Minister. Consistent with subsection 53(2) of the NEB Act which authorizes the Minister to impose a time limit for the Board to complete its Reconsideration, a 22 February 2019 time limit was imposed in the OIC, which is binding on the Board. The Board is not persuaded that such a time limit breached the requirement for a fair hearing. When a large number of parties made a specific request for more time, the request was granted. No party made a compelling case during the hearing process as to why the Board was required to request more time from the Minister in the context of a focused Reconsideration.

Participant funding

Limited comments were received that participant funding was insufficient to allow meaningful participation.

The Board provided information, forms and contact information regarding participant funding early in the hearing process. The Board's letter of 26 September 2018 stated:

Participant funding is available to facilitate eligible intervenors' participation in this hearing. A simplified funding process will be used for this hearing to reduce administrative burden. Eligible groups may request up to \$80,000, and individuals up to \$12,000.

For information about participant funding and eligible costs, visit www.neb-one.gc.ca/pfp or contact a Participant Funding Program Coordinator at 1-800-899-1265.

The Participant Funding Request Form is found at the link above, and also attached to this letter as Appendix 3.

In the few instances that parties raised participant funding as an issue, there were no detailed comments filed explaining why the funding amounts were insufficient or could not be accessed on a timely basis. It is worth noting that parties were advised that intervenors from the OH-001-2014 hearing were guaranteed intervenor status in the Reconsideration. As a result, there should not have been a concern about whether intervenor standing would be granted. Also parties had the opportunity to work with other parties and divide up issues or jointly tackle issues. For example, Tsleil Waututh Nation, Squamish Nation, Stzuminus First Nation, Snuneymuxw First Nation, and the City of Vancouver filed joint evidence from Dr. Gunton and Dr. Joseph.

For all these reasons, in the circumstances of the Reconsideration the Board is not persuaded that concerns raised about participant funding established there was a breach of procedural merit.

Lack of cross-examination and oral final argument

The issue raised about having only written questioning, and not oral cross-examination, was covered in detail in Ruling No. 14 in OH-001-2014 and in *Tsleil-Waututh Nation* and the Board adopts those reasons. In the context of this multi-party public hearing that is a reconsideration of a past hearing resulting in recommendations to GIC, the Board is of the view that the duty of fairness does not necessarily require cross-examination. Parties had an opportunity to challenge evidence both by filing their own evidence in response and by asking written questions and receiving responses. Parties unsatisfied with answers received had an opportunity to file motions to compel a better answer. For parties now claiming that responses received were inadequate, such a concern should have been appropriately detailed and raised ahead of final argument.

With respect to a concern raised about not having final oral argument the issue is whether, in looking at the hearing process as a whole, the lack of oral final argument was unfair. Largely the main process difference from the OH-001-2014 hearing to the MH-052-2018 hearing is that the Reconsideration added a step of providing parties the option of filing an opening statement with their evidence but the Reconsideration did not have oral summary argument. Parties were advised early in the Reconsideration to include all pertinent argument in their written argument-in-chief. The Hearing Order clearly stated that oral summary argument or oral summary argument on specific issues only "may be

held if needed and time permits.”²⁰ Later in Procedural Direction No. 4 the Board advised parties that it decided that oral argument was not necessary. The Board stated:²¹

The Board is not persuaded that such argument is necessary. This takes into consideration that the Board provided additional time for intervenors to prepare their evidence and an opportunity for Indigenous groups to provide oral traditional evidence at two locations on Vancouver Island. There is not sufficient time to also have oral summary argument, nor is oral argument considered necessary given the specific focus in the MH-052-2018 hearing and the List of Issues.

It is up to the Board’s discretion whether it considers written versus oral argument to be the most helpful in making its decision or recommendation. As stated in the Hearing Order, “[t]he Parties should include all pertinent argument in their written argument-in-chief, as [oral summary argument] may not be held.” The Board looks forward to considering written final argument from the Parties.

Consistent with the case law cited above, the Board is of the view that there is no one process that is necessary to satisfy procedural fairness in the circumstances of this Reconsideration. While some hearings at the Board have an oral final argument or summary argument component, in some instances the Board has had only written final argument so there is no legitimate expectation²² of oral final argument.²³ Such an approach is consistent with section 22 of the *National Energy Board Rules of Practice and Procedure, 1995*.

In the case of this Reconsideration, the Board invited submissions on the process the Board should follow and considered those comments in designing a process. Necessarily, process steps may involve some compromise. Here the Board determined it was important to provide an opportunity for Indigenous oral traditional evidence, and many Indigenous intervenors participated by providing oral evidence. Additionally, part way through the hearing process, the Board was persuaded by a number of requests to provide additional time for the foundational step of preparing intervenor evidence. This limited the time available to hear a large group of parties provide oral final argument. In any event, parties had an opportunity to provide full final argument in written form and the Board determined in its discretion that it did not also require oral final argument. The Board does not dispute that there can be utility in the Board having oral final argument; however, it was not required in the circumstances of the Reconsideration. For all these reasons, in considering the Reconsideration process as a whole, the Board is not persuaded oral final argument was required for the hearing to be fair.

Concern that locations for Indigenous oral traditional evidence on Vancouver Island required too much travel

The Board previously ruled on this issue in Ruling No. 7 and found that the overall design of the hearing process was procedurally fair for Indigenous intervenors including those from the Lower Mainland. Those reasons continue to be relied upon by the Board and no basis has been provided to overturn this ruling.

Procedural fairness as a whole

The Board has responded to specific concerns raised which allege the Reconsideration process was procedurally unfair. However, as reflected in the views above, the whole of the Board’s process must be considered in order to determine whether the Board’s overall process for the Reconsideration was procedurally fair. Such a determination must take into consideration the circumstances that this was a focused Reconsideration with a specific time limit applying. Many of the parties would have been familiar with at least elements of the subject matter of the Reconsideration as they participated in the OH-001-2014 hearing. While the process was expedited, there were a number of steps, which when considered as a whole, allowed for meaningful participation. These process steps included opportunities to:

1. Comment on several aspects of the Reconsideration including the design of the hearing process.
2. File and respond to notices of motion and review applications as considered appropriate.

²⁰ Hearing Order MH-52-2018 page 8.

²¹ 10 January 2019, Procedural Direction No. 4, pages 1 to 2.

²² Legitimate expectations as contemplated by *Baker, supra* note 12.

²³ As stated above, parties were advised early on that oral summary argument, or oral summary argument on specific issues would only be held if needed and time permits. Comparable although not identical participation opportunities were offered in the GH-002-2015 hearing regarding the 2017 Nova Gas Transmission Ltd. System Expansion Project (where the GIC decision and NEB recommendation were considered and affirmed in *Bigstone Cree Nation v. NGTL*, 2018 FCA 89). Hearing steps in GH-002-2015 included an opportunity to provide oral traditional evidence, written evidence, written information requests and written final argument.

3. File written evidence in response to the evidence of Trans Mountain and Federal Departments and Agencies, and to address the List of Issues for the Reconsideration. This included being granted a 15 day extension as many of the intervenors requested.
4. Present oral Indigenous evidence, either in person or remotely, on Vancouver Island or in Calgary, or through an audio or video recording.
5. Ask information requests of other Parties' written evidence, and to file motions to compel full and adequate answers if the responses are not considered adequate; and
6. Filing written-argument-in-chief, including replying to the argument of Trans Mountain, the Federal Departments and Agencies and the advice provided by Marine technical advisor John A. Clarkson²⁴. Parties could also comment on draft conditions and recommendations.

Participant funding was also available for hearing steps undertaken and travel costs. For all the above reasons, the Board is not persuaded that there was a breach in procedural fairness in the Reconsideration process.

1.5.2 Reliance on the OH-001-2014 hearing

In final argument, parties submitted diverging views regarding the extent to which the Reconsideration panel should rely on the assessment of Project-related marine shipping from the OH-001-2014 hearing. Some intervenors supported less reliance on the assessment from the OH-001-2014 hearing. For example, TWN argued that the extent to which the OH-001-2014 Report failed to meet the statutory requirements of the CEAA 2012 was not narrow in scope nor minor or technical in nature. TWN said that the FCA did not hold that the Board was permitted to simply re-use the findings it made on matters that were erroneously considered under the NEB Act. The Province of B.C. also said that the Board is not precluded from reconsidering evidence from the OH-001-2014 hearing and reaching different conclusions, so long as it limits its review to the scope of matters the GIC identified for reconsideration. Tsartlip First Nation argued that the Board's environmental assessment in this reconsideration under the CEAA 2012 is not functionally or legally the same as its environmental assessment conducted in the OH-001-2014 hearing. The Board is not bound to its past assessments in the OH-001-2014 hearing.

In contrast, Trans Mountain argued that the scope of the reconsideration was limited and nothing in the FCA's decision requires the Board to re-assess effects of Project-related marine shipping that were already assessed in OH-001-2014. Similarly, the Government of Alberta said that the scope of this reconsideration is targeted and narrow. The Board's original public interest inquiry was thorough and substantially complied with the requirements of the CEAA 2012. The "successive deficiencies" the Court identified in *Tsleil-Waututh Nation* flow not from the Board's approach to its public interest review of the environmental effects of Project-related marine shipping, but from its failure to "justify" its decision to exclude Project-related marine shipping from the "designated project." The underlying review itself was *not* deficient. In light of this, the primary focus of the Reconsideration is building upon the Board's original assessment of Project-related marine shipping by considering and evaluating mitigation or alternative measures.

Views of the Reconsideration Panel

As directed by the OIC and, as reflected in the Board's List of Issues, this Reconsideration is focused on Project-related marine shipping – a comparatively narrow scope to the OH-001-2014 hearing. The Board did not consider evidence or revisit issues that were outside of the scope of the Reconsideration. To understand the scope of the Reconsideration with respect to matters that fall within the List of Issues for the Reconsideration, it is important to look at what was assessed in the OH-001-2014 hearing. Although the Board did not include Project-related marine shipping under its CEAA 2012 environmental assessment during the OH-001-2014 hearing, the Board did consider Project-related marine shipping under the NEB Act. Issue #5 from the OH-001-2014 hearing List of Issues was "the potential environmental and socio-economic effects of marine shipping activities that would result from the proposed Project, including the potential effects of accidents or malfunctions that may occur." The Board also issued filing requirements specific to the issue of the potential effects of Project-related marine shipping activities.

The Board's reasons for its decision related to the List of Issues, Factors for the environmental assessment, and hearing process design outlines what was examined in the OH-001-2014 hearing:

²⁴ Mr. Clarkson was appointed by the federal government pursuant to section 10 of the NEB Act. Mr. Clarkson provided advice to the Board in the form of written argument-in-chief about evidence and draft conditions and recommendations filed on the record. At least one party raised a concern in final argument that Mr. Clarkson's participation was unfair. However, the Board is of the view that since all parties had an opportunity to comment on Mr. Clarkson's advice, there was no breach of procedural fairness. Rules of evidence concerning experts that may apply in a Court process, do not strictly apply in the Board's hearing process.

When carrying out its analysis under the NEB Act, the Board followed an approach similar to the [environmental assessment] conducted for the pipeline component under the CEAA 2012. As a result of this approach, the Board collected extensive evidence relevant to Project-related marine shipping. For example, Chapter 14 of the Board's OH-001-2014 Report extensively considered the effects of Project-related marine shipping, and the significance of those effects. Chapter 8 considered the environmental behaviour of spilled oil, and related environmental effects. This is reflected in the Federal Court of Appeal's decision in *Tsleil-Waututh*, when it stated that the Board, among other things, considered the effects of Project-related marine shipping on Southern resident killer whales (SRKW) and the significance of those effects,²⁵ and that the OH-001-2014 Report was adequate for the purposes of informing the GIC about the effects of Project-related marine shipping on SRKW and their use by Indigenous groups, and of the significance of these effects.²⁶

The Board has indicated that the entirety of the evidence filed in the OH-001-2014 hearing will be included as part of its record for this MH-052-2018 hearing, and will be considered by the Board to the extent it is relevant to the List of Issues for the MH-052-2018 hearing.

Accordingly, the Reconsideration List of Issues stated:

Parties are expected to limit their evidence filings to **new or updated** evidence (including comments from the public, community knowledge, and Indigenous traditional knowledge) relevant to the above issues. Parties are not required to re-file or re-test evidence on the record of the OH-001-2014 hearing. It is recommended that Parties focus their evidence on aspects of the above issues that were not fully canvassed in the OH-001-2014 hearing.

The Board recognized that a couple of issues in the Reconsideration List of Issues had not been thoroughly canvassed in the OH-001-2014 hearing and ensured that these were addressed in the MH-052-2018 Report. For example, mitigation of significant adverse environmental effects of Project-related marine shipping (Issue #2) and measures to avoid or lessen the adverse effects of Project-related marine shipping on SARA-listed wildlife species and their critical habitat (Issue 5).

The Board also accounted for the fact that many aspects of Project-related marine shipping were thoroughly canvassed in the OH-001-2014 hearing, particularly the environmental effects of Project-related marine shipping. However, this did not mean that the Reconsideration Panel blindly adopted the Board's findings on these aspects of Project-related marine shipping from the OH-001-2014 hearing. For matters that fall within the List of Issues for the Reconsideration, the Reconsideration Panel was open to the possibility of altering the Board's previous findings based on new or updated evidence. In the Reconsideration, the onus remained on Trans Mountain to make the case for its Project.

The Board carried out a full environmental assessment of Project-related marine shipping in accordance with the requirements of the CEAA 2012, SARA, OIC and paragraph 770 of *Tsleil-Waututh Nation* in this MH-052-2018 hearing. This included a comprehensive assessment of the factors and environmental effects set out in sections 19 and 5 of the CEAA 2012, respectively. As a result of its EA, the Board made its recommendations under subsection 30(4) of the CEAA 2012. The Board also considered whether its recommendation under the CEAA 2012 resulted in changes or additions to the recommendations (including recommended terms or conditions) from the OH-001-2014 hearing.

The interplay between Project-related marine shipping matters canvassed in the OH-001-2014 hearing and Reconsideration is reflected in the layout of the MH-052-2018 Report. For issues that fell within the scope of the MH-052-2018 hearing, the Reconsideration Panel included views of the parties from the OH-001-2014 hearing where they were still applicable. These were then followed by new or updated evidence raised by the parties in the MH-052-2018 hearing. The views of the Reconsideration Panel contain Board views from the OH-001-2014 Report that they found to remain applicable after considering relevant evidence from both the OH-001-2014 and MH-052-2018 hearings. The views of the Reconsideration Panel also include additional views to address the new or updated evidence and explain if it confirms or modifies the Board's previous findings from the OH-001-2014 hearing.

²⁵ *Tsleil-Waututh Nation* at para 438.

²⁶ *Ibid* at para 439.

1.5.3 Changed circumstances regarding need, economic feasibility, and financial matters

A number of parties filed evidence regarding the changed circumstances related to the need for and the economic feasibility of the Project since the OH-001-2014 hearing, including evidence on changes to supply and markets. Parties also argued that the Board should reconsider financial matters arising from Canada's purchase of the Project and associated changes to Trans Mountain's corporate structure.

Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, and Snuneymuxw First Nation submitted a report by Mr. David Hughes entitled "Report on the Need For, and Economics Of, the Trans Mountain Expansion Project." In this report, Mr. Hughes evaluated if any significant developments have occurred since the OH-001-2014 Report that materially affect the conclusions regarding the need for and the benefits of the Project. Based on the developments, Mr. Hughes evaluated the need for the Project and if the Project will increase the price per barrel of oil that Canadian producers obtain.

Some intervenors, including Stz'uminus First Nation, Snuneymuxw First Nation and City of Burnaby, argued that the Board must consider new information, including economics of the Project, when reweighing the Project's benefits and burdens.

In its Argument-in-Chief, Trans Mountain asked the Board to take judicial notice of recent events that support the need for increasing Canadian pipeline export capacity to tidewater and, therefore, support the conclusion in the OH-001-2014 Report that the economic benefit of the Project is significant.

Views of the Reconsideration Panel

In the MH-052-2018 hearing, the Board did not consider any new evidence filed on need for the project, economic feasibility, or financial matters.

The scope of the MH-052-2018 hearing was defined by the List of Issues, released by the Board on 12 October 2018, and did not include need for the project, economic feasibility, or financial matters. The Board developed the List of Issues following comments from parties. The Board addressed this matter in the 29 October 2018 Reasons (Appendix 2)²⁷ and Ruling No.22²⁸.

Therefore, Chapter 12: Need for the Project and economic feasibility and Chapter 13: Financial Matters in this MH-052-2018 Report are the same as they were in the OH-001-2014 Report, as they fall beyond the scope of the MH-052-2018 hearing. These chapters contain the views of the original panel from the OH-001-2014 hearing, including the requirement for Trans Mountain to comply with Conditions 57 and 121, which remain unchanged.

As economic feasibility and the need for the Project fall outside of the List of Issues, the Board did not consider or give any weight to Mr. Hughes' report or any other evidence filed by parties with respect to these issues. The Board also rejects Trans Mountain's request for the Board to take judicial notice of recent events that support the need for increasing Canadian pipeline export capacity to tidewater. Furthermore, the Board is not persuaded that it should consider new information on the economics of the Project when reweighing the Project's benefits and burdens for its public interest recommendation. This would essentially circumvent the List of Issues and open the MH-052-2018 hearing up to other issues indirectly, rendering the purpose of section 53 of the NEB Act and narrow scope of the OIC meaningless.

Consistent with section 53 of the NEB Act, both the Federal Court of Appeal and the OIC prescribed a limited scope for the Reconsideration. The Board went out for comment early on regarding the scope of the Reconsideration and after considering the comments made determinations about hearing scope. It is not appropriate for the parties to then file whatever evidence they wish on out-of-scope issues or, in the case of Trans Mountain, to ask the Board to take judicial notice of something that is out of scope. To include any evidence filed during the MH-052-2018 hearing on need for the project, economic feasibility, or financial matters would be inappropriate in light of the scoping decision made with respect to the List of Issues.

²⁷ 29 October 2018 NEB Appendix 2 – Trans Mountain Expansion – Reconsideration – reasons to the List of Issues and Hearing Process at pg 11-12.

²⁸ NEB, Ruling No. 22 Applications for Review from Living Oceans, Raincoast and TWN (27 December 2018) at pg 22-23.

1.5.4 Issues dealt with in prior Board rulings

In final argument, some parties raised arguments related to issues which the Board had decided in earlier rulings. In particular:

- Some parties disagreed with the decision to include Project-related marine shipping between the WMT and the 12-nautical-mile territorial sea limit in the designated Project under the CEEA 2012 (the Spatial Limit Decision). They argued that the Board ought to also include shipping in the Exclusive Economic Zone. The Board first sought comments on this issue in its 5 October 2018 letter. In the 29 October 2018 Reasons (Appendix 1) the Board thoroughly explained the Spatial Limit Decision. On 16 November 2018, the Board received applications to review the Spatial Limit Decision. The Board established a comment process, considered all submissions on the merits, and denied the review of the Spatial Limit Decision on its merits, with reasons in Ruling No. 22 issued 27 December 2018.
- Some parties argued that a *de novo* hearing was required because the Reconsideration Panel did not hear the evidence and submissions of the parties in the OH-001-2014 hearing. The Board explained why it did not agree with this argument in the 29 October 2018 Reasons (Appendix 2), Section 4.3. On 16 November 2018, the Board received an application to review this decision. The Board established a comment process, considered all submissions, and denied the review of the decision not to conduct a *de novo* hearing, with reasons in Ruling 22 issued 27 December 2018.
- Some parties argued that Trans Mountain should have been required to conduct species-specific risk assessments. The Board established a comment process, considered all submissions and denied the motion to require Trans Mountain to conduct a new risk assessment of Project-related marine shipping, with reasons in Ruling no. 24 issued 4 January 2019. Additional Board views regarding the adequacy of Trans Mountain's risk assessment of Project-related marine shipping are contained in Chapter 14.
- Some parties argued that Canada's purchase of the Project created a conflict of interest for the federal agencies providing expert information and for the Board's assessment of the Project. The Board found that there is no conflict of interest in its 29 October 2018 Reasons (Appendix 2), Section 4.2. The Board addresses the alleged conflict of interest between the Crown's fiduciary role in respect of Indigenous peoples and its role as the owner of the Project in Chapter 5, finding that the Crown's fiduciary obligations toward Indigenous peoples can be balanced with its broader obligations with respect to the public interest.
- Some parties argued that the Board ought to have assessed the environmental effects of upstream and downstream activities, including greenhouse gas emissions. The Board decided not to include these effects in the List of Issues, and explained this in the 29 October 2018 Reasons (Appendix 2), Section 2.8. On 21 January 2019, the Board received an application to review this decision along with Ruling No. 25 from the OH-001-2014 hearing. The Board established a comment process, considered all submissions, and denied the review of the decision to exclude the effects of upstream and downstream greenhouse gas emissions from the List of Issues for the Reconsideration, with reasons in Ruling 30 issued 19 February 2019.

1.5.5 Request to strike Trans Mountain's reply evidence

Some parties, including Tsleil-Waututh Nation, BC Nature and Nature Canada argued that Trans Mountain's reply evidence ought to be inadmissible or given no weight, because it was not prepared by properly qualified experts and Trans Mountain has not demonstrated that it is fair, objective and non-partisan evidence.

In reply, Trans Mountain said that it has significant expertise within its organization, including internal subject matter experts and a long history of corporate experience with the issues raised by intervenors. Trans Mountain also said that parties could have asked more information about the experts through information requests, but that they did not do so.

Views of the Reconsideration Panel

Under the *National Energy Board Rules of Practice and Procedure, 1995*, the Board requires that filed written evidence be prepared by the party filing it, or under their direction and control, and that the party be able to answer questions about it. In this case, the evidence being challenged was prepared by Trans Mountain, or under their direction and control. No party demonstrated that Trans Mountain was unable to answer their questions related to that evidence.

As an administrative tribunal, the Board is not bound by strict rules of evidence including those regarding the admissibility of expert opinion and qualification of experts. The Board is an expert tribunal and has the ability to evaluate the evidence submitted in each hearing. The Board decides what weight, if any, to give evidence once the

record is closed and all submissions are made. The Board is of the view that Trans Mountain's reply evidence is admissible. With respect to weight, the views of the Reconsideration Panel are described throughout this Report.

1.5.6 Precautionary principle and adaptive management

Many parties in the MH-052-2018 hearing emphasized the application of the precautionary principle. Intervenors relied on the precautionary principle in relation to the mitigation measures that should be put in place. For example, PIPE UP said that consistent with the precautionary principle, the Board should require Trans Mountain to use a trenchless construction method for salmon watercourses, despite residual areas of uncertainty regarding SRKW diet.

A number of intervenors also interpreted the precautionary principle to mean that the Project should not be approved until there is a better understanding of the Project's effects and effectiveness of mitigation measures. Tsleil-Waututh argued that the precautionary principle leads to the conclusion that justification of significant adverse environmental effects cannot occur in these circumstances, given the environmental degradation marine shipping will visit upon Burrard Inlet and the Salish Sea, and the lack of any salutary benefits associated with the Project-related marine shipping.

Other parties interpreted the precautionary principle differently. Trans Mountain said that the precautionary principle should not be used or interpreted to the point of effectively paralyzing development, and that decision-makers should rely on the principle of adaptive management to address uncertainties in environmental assessment. The Government of Alberta argued that while the precautionary principle must inform the Board's review, its implications should not be overemphasized - particularly when the Project proponent and responsible agencies have demonstrated a willingness to develop and implement additional harm reduction and management strategies.

Views of the Reconsideration Panel

The Board recognizes the important role of the precautionary principle under the CEAA 2012. The mandate of the CEAA 2012 explicitly references the precautionary principle in subsection 4(2): The Government of Canada, the Minister, the Agency, federal authorities and responsible authorities, in the administration of this Act, must exercise their powers in a manner that protects the environment and human health and applies the precautionary principle. The purposes of the CEAA 2012 also include ensuring that designated projects that require the exercise of a power or performance of a duty or function by a federal authority under any Act of Parliament other than this Act to be carried out, are considered in a careful and precautionary manner to avoid significant adverse environmental effects (subsection 4(1)).

The Supreme Court of Canada used the definition of precautionary approach from the Bergen Ministerial Declaration on Sustainable Development (1990) in *114957 Canada Ltée (Spraytech, Société d'arrosage) v. Hudson (Town)*:

In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.²⁹

This definition of precautionary principle was subsequently cited and expanded upon by the Supreme Court of Canada in *Castonguay Blasting Ltd. v. Ontario (Environment)*:

This emerging international law principle recognizes that since there are inherent limits in being able to determine and predict environmental impacts with scientific certainty, environmental policies must anticipate and prevent environmental degradation.³⁰

Trans Mountain relies on *Blaney et al v. British Columbia (The Minister of Agriculture Food and Fisheries) et al* to support its views on the precautionary principle:

[T]he precautionary principle does not require governments to halt all activity which may pose some risk to the environment until that can be proven otherwise. The decisions on what activity to allow and how to control it often require a balancing of interests and concerns and a weighing of risks.³¹

²⁹ 2001 SCC 40 at para 31 [*Spraytech*].

³⁰ 2013 SCC 52 at para. 20 [*Castonguay*]. Both *Spraytech* and *Castonguay* were also followed by the Federal Court of Canada in *Morton v. Canada (Fisheries and Oceans)* 2015 FC 575.

³¹ 2005 BCSC 283 at para 45 [*Blaney*].

The Board notes Tsleil-Waututh Nation's argument that aspects of *Blaney* can be distinguished from these circumstances. However, the Board finds it informative for supporting the notion that recommendations and decisions regarding project approval do require a balancing of interests and concerns and a weighing of risks.

The Board applies the precautionary principle in conducting its environmental assessments. The precautionary principle is applied in the Board's consideration of measures to mitigate impacts through design, planning, follow-up and monitoring, particularly where scientific uncertainty exists on the prediction of effects or effectiveness of mitigation. The Board requires proponents to minimize the effects or consequences that are *anticipated or possible* even if not certain. The Board also requires proponents to make considerable efforts to prevent or avoid environmental impact and, if impacts are unavoidable, to minimize and reduce them.

The Board also applies the precautionary principle in its significance determinations. The Canadian Environmental Assessment Agency guidance on "Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012" notes that all project environmental assessments involve some level of uncertainty, and observed results will often deviate, to some degree, from predictions made in an environmental assessment.³² Uncertainty could be related to a number of factors such as: project design and components, baseline environmental conditions, overall scope of effects, accuracy of environmental effects prediction, risk assessment methodologies, assumptions around the effectiveness of mitigation, significance determination, follow-up programs, and adaptive management. Uncertainty also triggers the need for additional monitoring, additional consultation, validation of the predictions of models, etc. The Reconsideration Panel confirms the views regarding adaptive management from the OH-001-2014 hearing as discussed in Section 10.1.6:

[In] appropriate circumstances adaptive management can be an important part of the follow-up program for a project to allow for uncertainties. The Board's conditions also incorporate adaptive management, requiring the implementation of new or modified mitigation measures over the life of the Project in response to mitigation measures that do not achieve full success and to address unanticipated environmental effects.

The Board adds that the appropriate circumstances for relying on adaptive management include consideration of whether there is sufficient confidence that: (i) monitoring would detect an ineffective mitigation or unforeseen environmental impact, and (ii) responses would be available and have a reasonable chance of success.

The Board, consistent with the case law and statutory scheme of the CEAA 2012, does not interpret the precautionary principle to mean that approval of a project cannot be recommended if uncertainties remain about its effects or mitigation measures. The Board notes that environmental assessment is a planning and decision-making tool. The environmental assessment identifies potential adverse environmental effects, and proposes measures to reduce those effects, which the Board imposes through conditions or recommendations to the GIC. The precautionary principle cannot be applied in isolation; it must be applied in a manner consistent with the entire statutory scheme.

1.5.7 Justification pursuant to the CEAA 2012 and the SARA

Living Oceans and Raincoast argue that the effects of Project-related marine shipping cannot be justified under the CEAA 2012 because approving the Project would harm the SRKW and destroy critical habitat in contravention of section 32 and subsection 58(1) of the SARA, respectively. Living Oceans and Raincoast rely on *Alberta Wilderness Assn v. Cardinal River Coals Ltd.*³³ for the proposition that it is not lawful to issue an authorization under one federal law that will violate the provisions of another. Similarly, Tsleil-Waututh Nation said that justifying significant adverse environmental effects on SRKWs would defeat the purpose of the SARA and the protections it provides to endangered species.

In reply, Trans Mountain submits that the obligations under the SARA must be interpreted in the context of the entire statutory scheme, including CEAA 2012, which expressly contemplates that projects may proceed in the face of significant adverse environmental effects if those effects are justified in the circumstances.

Views of the Reconsideration Panel

The Board is of the view that these circumstances are distinguishable from *Cardinal River*, where the Federal Court in obiter found that the granting of a *Fisheries Act* authorization would permit the deposition of millions of tonnes of waste rock and materials in areas frequented by migratory birds. This was contrary to law because the *Migratory Birds*

³² Canadian Environmental Assessment Agency, *Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012* (November 2015).

³³ [1999] 3 FC 425 at paras 104-105 [*Cardinal River*].

Convention Act prohibited a person from depositing or permitting the deposit of any substance harmful to migratory birds in any waters or areas frequented by migratory birds. The facts are not so clear in this case.

Pursuant to CEAA 2012, the Board has found that Project-related marine shipping is likely to cause significant adverse environmental effects on SRKW, a SARA-listed wildlife species. However, the Board is not persuaded that these effects necessarily result in harm to the SRKW or destruction of critical habitat that would contravene section 32 and subsection 58(1) of the SARA.³⁴ The Board found that while the effects from Project-related marine shipping will be a small fraction of the total cumulative effects, and the level of traffic is expected to increase with or without the Project, the increase in marine vessels associated with the Project would further contribute to cumulative effects that are already jeopardizing the recovery of SRKW. Furthermore, environmental effects on SRKW from underwater noise, as well as potential vessel strikes and spills from Project-related marine shipping, will be reduced by measures and monitoring under the CEAA 2012 and subsection 79(2) of the SARA; in some cases via Board conditions and in other cases if GIC implements the Board's recommendations.

The Board finds that the guidance on *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* provides additional clarification:

There is no direct link between the SARA subsection 79(2) requirement to identify adverse effects on listed wildlife species and their critical habitat, and the prohibitions set out in the Act. In other words, determining that an activity will lead to an adverse effect does not necessarily mean that the activity itself is prohibited. Prohibitions are set out in sections 32 to 36 and 58 to 61 of the SARA and their applicability depends on a variety of circumstances.

...

In addition, the potential significance of an adverse environmental effect under CEAA is not necessarily an indication of whether an activity is prohibited under the SARA...³⁵

Furthermore, such an expansive interpretation of the prohibitions in SARA would mean that existing vessels calling at Westridge Marine Terminal and a great proportion of marine shipping currently occurring (i.e., ferries, whale watching boats, commercial vessels) are all in violation of the SARA since they also increase underwater noise, and the risk of vessel strikes and spills (from fuel if not cargo). It is unclear if the SARA prohibitions were intended to be used to manage these types of cumulative effects.

The Board agrees that CEAA 2012 and SARA are related legislation, and the principles of statutory interpretation require each to be read in the context of the other in a coherent manner.³⁶ The prohibitions in section 32 and subsection 58(1) cannot be read in isolation from subsection 79 of the SARA or the overall statutory scheme of the CEAA 2012. In the context of a "designated project" as defined by CEAA 2012, SARA requires that adverse effects on listed species be identified, and that measures are taken to avoid or lessen those effects and to monitor them. There is no explicit requirement in section 79 for there to be no residual effects on SARA-listed species, only that measures are taken in a way that is consistent with applicable recovery strategies and action plans. CEAA 2012 also expressly contemplates the possibility that a finding of likely significant adverse environmental effects can be justified. The potential significance of an adverse environmental effect under the CEAA 2012 or adverse effect under section 79 of the SARA, does not necessarily mean an activity is prohibited under the SARA; the facts need to be carefully examined. If a project is likely to hinder the recovery of endangered or threatened wildlife species, contrary to the purpose of the SARA, this will weigh heavily in the justification analysis. However, the analysis of whether significant adverse environmental effects can be justified will ultimately involve the balancing of many factors.

³⁴ Subsection 32(1) of the SARA states: No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species.

Subsection 58(1) of the SARA states: ... no person shall destroy any part of the critical habitat of any listed endangered species or of any listed threatened species...

³⁵ 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* (2010) at 51-52.

³⁶ Ruth Sullivan, *Sullivan on the Construction of Statutes*, 6th ed. (Markham, Ontario: LexisNexis Canada, 2014) at para 13.26.

1.6 The Project application stage – codes, commitments, and conditions

This section contains the views of the Board from the OH-001-2014 Report (formerly Chapter 1.3). Some of the general concepts are relevant to the Reconsideration, but much of the content relates to conditions that are outside the scope of the Reconsideration. However, the Reconsideration Panel has included this section of the MH-052-2018 Report as it provides helpful background information. A more detailed discussion about the conditions relevant to Project-related marine shipping examined in the MH-052-2018 hearing is in Chapter 2, Section 2.4.

Trans Mountain's Application was filed while the Project was at an initial phase of the regulatory lifecycle, as is typical of applications under section 52 of the NEB Act. As set out in the Board's Filing Manual, the Board requires a broad range of information when a section 52 application is filed. At the end of the hearing, the level of information available to the Board must be sufficient to allow it to make a recommendation to the GIC that the Project is or is not in the public interest. There also must be sufficient information to allow the Board to draft conditions that would attach to any new and amended CPCNs, and other associated regulatory instruments (Instruments), should the Project be approved by the GIC.

The Board does not require final information about every technical detail during the application stage of the regulatory process. For example, much of the information filed with respect to the engineering design would be at the conceptual or preliminary level.³⁷ Site-specific engineering information would not be filed with the Board until after the detailed routing is confirmed, which would be one of the next steps in the regulatory process should the Project be approved. Completion of the detailed design of the project, as well as subsequent construction and operations, would have to comply with:

- the NEB Act, regulations, including the *National Energy Board Onshore Pipeline Regulations* (OPR), referenced standards and applicable codes;
- the company's conceptual design presented, and commitments made in the Application and hearing proceedings; and
- conditions which the Board considers necessary.

The Board may impose conditions requiring a company to submit detailed information for review (and in some cases, for approval) by the Board before the company is permitted to begin construction. Further information, such as pressure testing results, could be required in future leave to open applications before a company would be permitted to begin pipeline operations. In compliance with the OPR, a company is also required to fully develop an emergency response plan prior to beginning operations. In some cases, the Board has imposed conditions with specific requirements for the development, content and filing of the emergency response plan (see Table 1). This would be filed and fully assessed at a condition compliance stage once detailed routing is known. Because the detailed routing information is necessary to perform this assessment, it would be premature to require a fully detailed emergency response plan to be filed at the time of the project application.

While the project application stage is important, as set out in Chapter 3, there are further detailed plans, studies and specifications that are required before the project can proceed. Some of these are subject to future Board approval, and others are filed with the Board for information, disclosure, and/or future compliance enforcement purposes. The Board's recommendation on the project application is not a final determination of all issues. While some hearing participants requested the final detailed engineering or emergency response plans, the Board does not require further detailed information and final plans at this stage of the regulatory lifecycle.

To set the context for its reasons for recommendation, the Board finds it helpful to identify the fundamental consideration used in reaching any section 52 determination. The overarching consideration for the Board's public interest determination at the application stage is: can this pipeline be constructed, operated and maintained in a safe manner. The Board found this to be the case. While this initial consideration is fundamental, a finding that a pipeline could be constructed, operated and maintained in a safe manner does not mean a pipeline is necessarily in the public interest as there are other considerations that the Board must weigh, as discussed below. However, the analysis would go no further if the answer to this fundamental question were answered in the negative, as an unsafe pipeline can never be in the public interest.

³⁷ Pipeline projects generally follow a three phase design process consisting of a conceptual phase, a preliminary engineering phase, and a detailed engineering phase leading to final design.

1.6.1 Safety

The Board's regulations focus on results and there are NEB requirements that companies must follow in order to design, construct and operate their pipelines safely. These requirements cover everything from the selection of materials used to build a pipeline to the processes, controls, manuals and programs designed to manage risk and mitigate potential consequences during construction and operation. The Board requires NEB-regulated pipeline companies to consider thoroughly all of the hazards and potential hazards that are associated with their pipeline systems, and demonstrate to the Board that the appropriate safety and risk management plans and measures are in place. The Board provides considerable regulatory oversight throughout the pipeline lifecycle to verify that companies comply with regulatory requirement, and adequately and effectively anticipate, prevent, manage and mitigate risks to people and the environment.

1.6.2 Project-specific commitments and conditions

The Board considered the Project and associated risks in the context of the Board's stringent regulatory requirements, Trans Mountain's Application and the commitments Trans Mountain made during the hearing. The Board also considered the information from participants in the proceeding, including information about community-specific and environment-specific circumstances along the corridor.

The Board found that in addition to existing regulations, codes and standards, and Trans Mountain's commitments, Project-specific conditions would be required to mitigate residual effects posed by the Project and to make sure the Project is designed, constructed and operated safely, and in a manner that protects the environment (see conditions in Appendix 3). For example, evidence provided by the Grasslands Conservation Council of British Columbia led to the inclusion of conditions about grassland protection and management, and evidence submitted by municipalities of the lower mainland of B.C. led to the inclusion of conditions for the creation and operation of technical working groups.

The Board issued draft conditions throughout the hearing and gave participants the chance to consider and provide comments on them, and to propose other potential conditions. The Board used these suggestions and its own analysis of the evidence to create a final, comprehensive list of conditions that address a wide range of issues identified through this hearing process.

The Board concluded that the Project could be constructed and operated safely if designed, constructed, and operated in compliance with this list of conditions, which would mitigate risks posed by the Project.

1.6.3 Conditions

Should the GIC approve the Project, the Board would issue the CPCNs and Instruments, and impose 156 conditions to address the identified, outstanding issues.

In addition to conditions addressing specific technical issues, the Board would impose overarching Conditions 1, 2, 3, 4 and 5. The effect would be to make all commitments, plans or programs included, referenced or agreed to on the hearing record, regulatory requirements of the Board. Furthermore, to assist the Board and all stakeholders in tracking construction progress and compliance, and to assist the Board in planning appropriate compliance verification activities, the Board would impose conditions requiring Trans Mountain to file commitments tracking tables, phased filing information, a list of temporary infrastructure sites, construction schedules, construction progress reports, and a signed confirmation of Project completion and compliance (Conditions 6, 10, 61, 62, 106, 139).

The 156 conditions listed in Appendix 3 are arranged in approximate chronological order of the required filings. While the Board encourages those with an interest to review all of the conditions, we are aware it is a long list. In order to assist readers with specific areas of concern, Table 1 is provided, as a guide only.

It will be clear that there is overlap between conditions and categories, and a condition may apply to more than one category. For example, air emissions conditions may fall within the *Air quality and greenhouse gases* category, as well as within the Terminal categories. Conditions of interest to Indigenous people may appear under the Specific effects on Indigenous interests category, as well as various Environment and People categories.

Table 1 also illustrates that conditions would require fulfillment at the appropriate stage of the regulatory lifecycle.

Table 1: Conditions by subject matter and regulatory lifecycle stage

		Pipeline Lifecycle Stage			
		Over-arching	Prior to construction	Prior to operation	During operation
Regulatory Oversight		1, 2, 5	6, 10, 61, 62	6, 10, 62, 106	6, 139
Economics and Financial Responsibility			57	121	121
Emergency Preparedness and Response			89, 90	117, 118, 119, 120, 123, 124, 125, 126, 127, 136, 138	120, 145, 153
Environment	General	3	7, 60, 72, 78, 81		145, 151
	Air quality and greenhouse gases		52, 53, 54, 55, 79, 85	137	140, 142
	Water quality		35, 39, 47, 71, 87	113, 130	151, 154
	Soil, vegetation and wetlands		40, 41, 42, 45, 46, 47, 71, 76, 92		151, 154, 155, 156, 157
	Wildlife and wildlife habitat		36, 37, 38, 44, 47, 56, 71, 92	128	37, 128, 149, 150, 151, 154
	Fish and fish habitat		43, 47, 71, 75, 92	75, 108, 109, 110	108, 109, 110, 151, 154
	Marine mammals		92	132	151
People, communities and lands	Effects on communities (including Indigenous)		7, 13, 14, 48, 49, 59, 60, 72, 73, 74, 78, 80, 81, 82, 86, 93, 94, 95, 99, 100, 102, 103	49, 94, 99, 131	94, 99, 141, 145
	Specific effects on Indigenous interests		7, 39, 77, 96, 97, 98	96	146
	Training, skills and employment		11, 12, 58	58, 107	
	Lands and routing		7, 60		
Engineering and Safety	Project	4	9, 50, 51, 63, 64, 66, 69, 88	63, 66, 105, 111, 112, 114, 116	147, 148
	Line 1 (existing pipeline and reactivated segments)		18, 19	115, 135	152
	Line 2 (new pipeline & segments transferred from Line 1)		15, 16, 17, 65, 67, 68, 70	104, 115, 122, 135	143
	Pump Stations		8, 30, 31, 101	30	
Multidisciplinary	Westridge Delivery Pipelines and Burnaby Mountain Tunnel		15, 16, 20, 21, 26, 27, 28, 29, 72, 85, 86, 87	104, 125	143
	Westridge Marine Terminal		8, 21, 30, 33, 34, 35, 52, 53, 80, 81, 82, 83, 84, 97, 101	30, 109, 118, 119, 123, 126, 127, 129, 130, 136, 138	109, 141
	Edmonton, Sumas and Burnaby Terminals		8, 22, 23, 24, 25, 30, 32, 54, 78, 79, 80, 101	30, 118, 123, 125, 127, 129, 130, 136, 137, 138	141, 153
	Watercourses (freshwater)		43, 47, 48, 65, 67, 71, 72, 74, 75, 87, 92, 94	75, 94, 108, 110, 113	94, 108, 110, 151, 154
	Project-related marine shipping		91	131, 132, 133, 134	134, 144

1.7 Risk overview

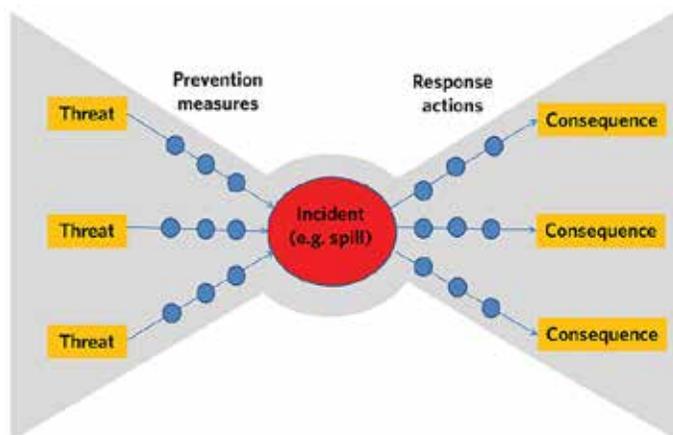
This section contains the views of the Board from the OH-001-2014 Report (formerly Section 1.4). The Reconsideration Panel adopts this approach to assessing risks from spills. The only change it has made is to revise the conclusions related to spills from Project-related marine shipping to reflect the Reconsideration.

It is important to carefully analyze the risks created by the Project and Project-related marine shipping. This includes considering the probability of incidents occurring and the severity of the consequences that could result from such incidents, even if such incidents are unlikely to occur. It also includes considering the acceptability of such risks in the context of the benefits and burdens of the proposed Project and Project-related marine shipping as part of the Board's public interest determination.

A bowtie diagram (Figure 2), as exemplified below, is a useful and common aid in illustrating:

- the various threats that could lead to an incident (such as a spill);
- prevention measures that reduce the probability of such threats leading to an incident;
- the various consequences that could result from an incident; and
- response actions that reduce the severity of such consequences.

Figure 2: Bowtie diagram for assessing risk



In addition, risk tables, such as that shown in Figure 3, can be useful to illustrate the combination of the probability (P) of an incident occurring and the anticipated consequences (C) if such an incident does occur, and the magnitude of the resulting risk (R). The Board notes, however, that the labels used for probability, consequences and risk (e.g., Very low to Very high) and the placement of risk labels in such tables can vary widely according to use and author, and can contain considerable subjectivity. Nevertheless, such tables are conceptually useful to illustrate the relationship that $R = P \times C$, that both probability and consequences need to be considered in fully understanding the risk of a spill, and to assist in prioritizing risk mitigation efforts.

Figure 3: Risk as combination of probability and consequence

Probability (P)	Very high P	Medium R	High R	High R	Very high R	Very high R
	High P	Medium R	Medium R	High R	High R	Very high R
	Medium P	Low R	Medium R	Medium R	High R	High R
	Low P	Very low R	Low R	Medium R	Medium R	High R
	Very low P	Very low R	Very low R	Low R	Medium R	Medium R
		Very low C	Low C	Medium C	High C	Very high C
	Consequences (C)					

1.7.1 Consideration of spill risks

Throughout this Report, the Board has considered the risks associated with spills. For example, Chapter 6 discusses pipeline and facility integrity, which includes the assessment of risk-based design methods proposed by the company to identify, prevent or reduce the frequency of potential releases from the pipelines and terminals, as well as consequence reduction measures, such as leak detection, containment and valve placement. Chapter 8 discusses the environmental behaviour of spilled oil, which is relevant when considering spill response and the consequences of a spill. Chapter 9 discusses prevention, preparedness and response, and considers the likelihood of accidents and malfunctions. Chapter 10 includes a discussion of the potential environmental effects of a spill that might result from such an incident, while Chapter 11 discusses potential socio-economic effects. Chapter 14 discusses spills from Project-related marine shipping.

The Board acknowledges that achieving zero risk is impossible for most developments. The Board finds that there is very low probability of a Project spill (i.e., from the pipelines, tank terminals, pump stations or the WMT) that may result in a significant effect (high consequence). In regard to spills from the Project-related marine shipping, the Board finds that there is a very low probability of a marine spill from a Project-related tanker that may result in a significant effect (high consequence).

Having considered all of the evidence and in light of the spill prevention, preparedness and response measures discussed in Chapter 9, and the regulatory framework for marine oil spill preparedness and response discussed in Chapter 14, the Board finds that the risks associated with potential spills from the Project and Project-related marine vessels are acceptable.

Views of the Reconsideration Panel

The Board considered the risks associated with potential spills from Project-related marine shipping in the MH-052-2018 hearing. For example, Sections 14.9 and 14.10 of Chapter 14 includes a discussion of potential environmental and socio-economic effects of malfunctions and accidents. Chapter 8 discusses the environmental behaviour of spilled oil, which is relevant when considering spill response and the consequences of a spill. Section 14.11 of Chapter 14 discusses spill prevention, risk analysis, preparedness and response, and considers the likelihood of accidents and malfunctions.

Having considered all of the evidence and in light of the spill prevention, preparedness and response measures, the Board finds that there is a very low probability of a large marine spill from a Project-related tanker that may result in a significant effect (high consequence).



Benefits, burdens, and the National Energy Board recommendation

The content of this chapter has been updated since the Board's May 2016 OH-001-2014 Report to reflect the Reconsideration.

This chapter provides the Board's reconsideration of the overall benefits and burdens of the Trans Mountain Expansion Project (Project) in relation to its mandate under section 53, Part III of the *National Energy Board Act* (NEB Act). This chapter also summarizes the Board's reconsidered findings and recommendations in relation to the Project under section 30 of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and the *Species at Risk Act* (SARA).

2.1 The Board's mandate

With respect to the Project application, the Board's original role was to determine if the Project is in the public interest, pursuant to section 52 of the NEB Act (as further described below). In the OH-001-2014 Report, the Board concluded that the Project is in the present and future convenience and necessity, and in the Canadian public interest. The Board recommended that a CPCN be issued under section 52 of the NEB Act along with 157 conditions.

The Board also has a mandate to conduct an environmental assessment under the CEAA 2012. In the OH-001-2014 hearing, Project-related marine shipping was not included within the scope of the Board's environmental assessment under the CEAA 2012. Rather, Project-related marine shipping was assessed under the NEB Act. Accordingly, in the OH-001-2014 Report, the Board recommended that the GIC decide that the Project is not likely to cause significant adverse environmental effects under the CEAA 2012.

As a result of the *Tsleil-Waututh Nation* decision by the Federal Court of Appeal, the Board was directed by the Governor in Council (GIC) in OIC P.C. 2018-1177 to conduct a reconsideration of aspects of its recommendations and terms or conditions for the Project relevant to Project-related marine shipping, pursuant to section 53 of the NEB Act and section 30 of the CEAA 2012 (Section 1.4 of this report contains complete details regarding the OIC).

The Reconsideration Panel conducted the Reconsideration in accordance with OIC P.C. 2018-1177. The Reconsideration Panel decided to include Project-related marine shipping between the Westridge Marine Terminal (WMT) and the 12-nautical-mile territorial sea limit in the "designated project" to be assessed under the *Canadian Environmental Assessment Act, 2012*. As a result, the Reconsideration Panel carried out an environmental assessment of Project-related marine shipping under the CEAA 2012. The entirety of the evidence filed in the OH-001-2014 hearing was included as part of the record for the MH-052-2018 hearing. In making its findings, the Reconsideration Panel considered new or updated evidence submitted during the MH-052-2018 hearing, as well as relevant evidence from the OH-001-2014 hearing.

The Board's environmental assessment of the Project can be found in Chapter 10, with the socio-economic components assessed in Chapter 11. The Reconsideration Panel's assessment of Project-related marine shipping is in Chapter 14. The Reconsideration Panel necessarily relies on Chapter 10 and 11 views and findings of the Board from the OH-001-2014 hearing in order to make the required recommendation to GIC under subsection 30(4) of the CEAA 2012 for the designated Project.

Under paragraph 30(4)(a) of the CEAA 2012, in its Reconsideration Report, the Board must:

- (i) confirm the recommendation or set out a different one with respect to the decision that may be made under paragraph 31(1)(a) in relation to the designated project, and
- (ii) confirm, modify or replace the mitigation measures set out in the report with respect to the environmental assessment.

Specifically, the Board must confirm or set out a different recommendation regarding whether the designated Project is likely, or is not likely, to cause significant adverse environmental effects after taking into account the implementation of mitigation measures, including the Board's recommended conditions.

Under paragraph 30(4)(b) of the CEAA 2012, in its Reconsideration Report, the Board must also confirm the recommendation or set out a different one with respect to the follow-up program that is to be implemented in respect of the designated project.

The Board then considered whether its recommendation under the CEAA 2012 resulted in changes or additions to the recommendations (including recommended terms or conditions) under the NEB Act from its OH-001-2014 Report. Under subsection 53(6) of the NEB Act, in its Reconsideration Report, the Board must:

- (a) if its recommendation was referred back, either confirm the recommendation or set out a different recommendation; and
- (b) if a term or condition was referred back, confirm the term or condition, state that it no longer supports it or replace it with another one.

Specifically, the Board must confirm or set out a different recommendation as to whether or not the certificate should be issued for the Project, taking into account whether the pipeline is and will be required by the present and future public convenience and necessity.

2.1.1 Public interest test

The NEB Act provides the Board with flexibility and broad powers, but the Board must interpret and implement the Act in ways that serve the Canadian public interest.

Part III of the NEB Act provides a test for the Board to apply when making its assessment of a project and providing its recommendation to the GIC. When applying the "present and future public convenience and necessity" test under Part III of the NEB Act, the Board makes a recommendation in the overall Canadian "public interest." In its consideration of an application, the Board is required to weigh all relevant evidence on the record and come to a recommendation whether, overall, the project is in the public interest. This is referred to in the NEB Act as the present and future public convenience and necessity.

The Board has described the public interest in the following terms:

The public interest is inclusive of all Canadians and refers to a balance of economic, environmental and social interests that change as society's values and preferences evolve over time. As a regulator, the Board must estimate the overall public good a project may create and its potential negative aspects, weigh its various impacts, and make a decision.³⁸

In section 52 of the NEB Act, under which the Board's original recommendation was made, Parliament has given direction about the factors relevant to the Board's consideration in reaching a public interest determination.

52(2) In making its recommendation, 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 the following:

- a) the availability of oil, gas or any other commodity to the pipeline;

³⁸ NEB Reasons for Decision, Emera Brunswick Pipeline Company Ltd., GH-1-2006.

- b) the existence of markets, actual or potential;
- c) the economic feasibility of the pipeline;
- d) the financial responsibility and financial structure of the applicant, the methods of financing the pipeline and the extent to which Canadians will have an opportunity to participate in the financing, engineering and construction of the pipeline; and
- e) any public interest that in the Board's opinion may be affected by the issuance of the certificate or the dismissal of the application.

52(3) If the application relates to a designated project within the meaning of section 2 of the CEEA 2012, the report must also set out the Board's environmental assessment prepared under that Act in respect of that project.

52(4) The report must be submitted to the Minister within the time limit specified by the Chairperson. The specified time limit must be no longer than 15 months after the day on which the applicant has provided, in the Board's opinion, a complete application. The Board shall make the time limit public.

With respect to the Project application, the Board's role is to determine if the Project is in the public interest, pursuant to section 52 of the NEB Act.

The Board also has a mandate to conduct an environmental assessment of the Project under the CEEA 2012. As a responsible authority under the CEEA 2012, the Board must, in its report to the GIC, set out its recommendation regarding the environmental effects of the Project. Specifically, the Board must provide a recommendation that the Project is likely, or is not likely, to cause significant adverse environmental effects after taking into account the implementation of mitigation measures, including the Board's recommended conditions. The Board's environmental assessment of the Project can be found in Chapters 10, 11 and 14.

2.2 Benefits and burdens of the Project

As directed by the OIC, and as reflected in the Reconsideration List of Issues, this was a reconsideration focused on Project-related marine shipping - a comparatively narrow scope to the OH-001-2014 hearing. However, under subsection 30(4) of the CEEA 2012, the Reconsideration Panel is required to confirm or set out a different recommendation regarding whether the designated Project is likely, or is not likely, to cause significant adverse environmental effects after taking into account the implementation of mitigation measures. Similarly, under subsection 53(6) of the NEB Act, the Reconsideration Panel is required to confirm or set out a different recommendation as to whether or not the certificate should be issued for the Project, taking into account whether the pipeline is and will be required by the present and future public convenience and necessity. In order to make these recommendations regarding the overall designated Project, it was necessary for the Reconsideration Panel to rely on the previous findings and views of the Board regarding benefits and burdens from the OH-001-2014 Report that were outside the scope of the List of Issues for the Reconsideration.

Some intervenors argued that the Board must consider new information when reweighing the Project's benefits and burdens. As discussed earlier in Chapter 1.5.3, the Board is not persuaded that it should consider new information unrelated to the Reconsideration List of Issues (i.e., economics) when reweighing the Project's benefits and burdens. This would essentially circumvent the List of Issues and open the MH-052-2018 hearing up to other issues indirectly, rendering the purpose of section 53 of the NEB Act and narrow scope of the OIC meaningless. Therefore, the benefits and burdens summarized in Tables 2 and 3 contain a mixture of findings from the Board in the OH-001-2014 hearing and the Reconsideration Panel.

Table 2 and Table 3 summarize the key benefits and key residual burdens, respectively, of the designated Project as outlined in the various chapters of this MH-052-2018 Report. Both tables indicate whether the benefits or burdens would apply locally (e.g., within the immediate vicinity of the Project, such as the specific municipalities along the route), regionally (i.e., Alberta and B.C.) or nationally.

These tables are not intended to be a comprehensive list of all benefits and burdens mentioned by participants during the OH-001-2014 and MH-052-2018 hearings. Rather, it is a summary of the key benefits and key residual burdens that the Board identified during its analysis of the evidence. A description of how the Board considered the balance of benefits versus residual burdens is found in Section 2.5 and a more in-depth assessment of the evidence is provided in the various chapters of the MH-052-2018 Report that follow.

2.2.1 Benefits

In the OH-001-2014 hearing, the Board found that the benefits associated with the Trans Mountain Expansion Project, taken as a whole, are considerable.³⁹ This includes market diversification, jobs, competition among pipelines, spending on pipeline materials, Community Benefit Program, capacity development and Government revenues. The Reconsideration Panel relies upon these findings of the Board from the OH-001-2014 Report, for matters that are outside the scope of the Reconsideration List of Issues.

As a result of the MH-052-2018 hearing, the Reconsideration Panel confirms that there is a modest benefit associated with enhanced marine spill response, and capacity development connected to Project-related marine shipping and spill response. The Reconsideration Panel also finds that, if GIC implements its recommendations to make changes to the operation of all marine traffic, including Project-related traffic, and takes action to relieve other stressors within the broader system, there will be the added benefit of material improvements to the health of the Salish Sea.

Table 2: Summary of key benefits

Benefit associated with:	Brief description	Type of impact	Report chapter(s)
Market diversification	The Board finds there would be a considerable benefit gained by providing Canadian shippers with more flexible and diverse markets, the ability to manage risk associated with competing in multiple markets, the ability to manage development and operational risk, and a likely reduction of discounts to Canadian crude.	Regional National	12
Jobs	The Board finds a considerable benefit in the form of jobs created across Canada: <ul style="list-style-type: none"> • Pipeline construction - 400-600 workers per spread • Tank construction - between 60 and 370 workers • Westridge Marine Terminal construction - 95 workers • Over the first 20 years of operation – 443 jobs/year (313 in B.C., with remainder in Alberta) 	Local Regional National	11
Competition among pipelines	The Board finds a considerable benefit would be gained from the increase in flexibility and optionality for those producers looking to get their product to markets, and that all western Canadian producers are likely to benefit from the Project in the longer term, through greater customer choice and efficiencies gained through competition among pipelines.	Regional National	12
Spending on pipeline materials	The Board finds there would be a considerable benefit to local and regional economies from the direct spending on pipeline materials in Canada and spending within the regions where the Project is located.	Local Regional	11
Community Benefit Program	The Board finds a modest benefit to local communities and the environment along the Project from the establishment of a Community Benefit Program, including: <ul style="list-style-type: none"> • local emergency management capacity enhancements; • improvements to community parks and infrastructure; • support for events and educational programs; and • Environment Stewardship Program. 	Local Regional	10 11
Enhanced marine spill response	The Board finds there would be a modest benefit from the enhanced marine spill response planning for and capacity to respond to spills from vessels not associated with the Project (e.g., fuel spills from container ships and cruise ships).	Local Regional	14
Capacity development	The Board finds that a modest benefit from local economic and educational opportunities, and the development of capacity of local and Indigenous individuals, communities and businesses.	Local Regional	5 11
Government revenues	The Board finds that direct Project expenditures will likely result in considerable revenues to various levels of government.	Local Regional National	11

³⁹ Definitions for the terms “considerable” and “modest” are not provided. Rather, the terms are meant to illustrate the weight the Board attributed to the benefits and burdens relative to each other.

2.2.2 Burdens

As described below, there are impacts or residual burdens associated with the Project. In the OH-001-2014 Report, the Board stated:

A number of concerns are identified in this Report. Many of the issues underlying these concerns can be mitigated, and the Board assessed and weighed the likely success of potential mitigative options in reaching its recommendation. For example, one of the most significant mitigating factors is that most of the pipeline route for the Project parallels existing disturbance, including the right-of-way for Trans Mountain's existing pipeline. The Board finds this to be appropriate, as this reduces the requirements for new right-of-way disturbance, minimizes the potential impacts of construction, and reduces effects on nearby residents and communities.

Other mitigation would be found in the commitments from Trans Mountain and through conditions that the Board would attach to the new Certificate of Public Convenience and Necessity (CPCN), amended CPCNs, and other associated regulatory instruments (Instruments) should the GIC approve the Project, and which cover a wide range of matters including:

- emergency response and emergency management;
- protection of the environment, including marine mammals;
- consultation with those affected;
- socio-economic matters;
- safety and integrity of the pipeline;
- commercial support for the Project prior to construction; and
- financial responsibility.

Nevertheless, some impacts or residual burdens remain, and they must be considered and weighed in the Board's recommendation under Part III of the NEB Act.

In the OH-001-2014 hearing, the Board found there were burdens associated with municipal development plans; Indigenous groups' landowners' and land users' ability to use the land and water during construction and operation; and Project spills. The Reconsideration Panel relies upon these findings of the Board from the OH-001-2014 Report, to the extent that are outside the scope of the Reconsideration List of Issues.

The Reconsideration Panel confirms various burdens arising from Project-related marine shipping, including the likely significant adverse effects to Southern resident killer whales and associated Indigenous traditional use, as well as likely significant effects from marine greenhouse gas emissions. The Reconsideration Panel also finds that the level of risk associated with spill from a Project-related tanker to be acceptable. In Section 2.5 of this chapter the Reconsideration Panel has made recommendations to the GIC that, in the Board's view, would further reduce the residual burdens of Project-related marine shipping, as well as address broader effects on the Salish Sea.

Table 3: Summary of key residual burdens

Burden associated with:	Brief description	Type of impact	Report chapter(s)
Southern resident killer whales	The Board finds that the operation of Project-related marine vessels would likely result in significant adverse effects to the Southern resident killer whale. Although the effects from Project-related marine vessels on the Southern resident killer whale would be a small fraction of the total cumulative effects, the Board recognizes that the increase in Project-related marine vessels would further contribute to cumulative effects that are already jeopardizing the recovery of the Southern resident killer whale.	Local Regional National	14
Indigenous cultural use associated with Southern resident killer whales	The Board finds that the operation of Project-related marine vessels would likely result in significant adverse effects on Indigenous cultural use associated with Southern resident killer whales. The Board acknowledges concerns raised by a number of Indigenous groups about the social and cultural effects that would result from impacts of Project-related marine shipping on the Southern resident killer whale.	Local Regional	5 14

Burden associated with:	Brief description	Type of impact	Report chapter(s)
Marine greenhouse gas emissions	The Board finds that greenhouse gas emissions from Project-related marine vessels would result in measureable increases and, taking a precautionary approach, are likely to be significant.	Regional National	14
Municipal development plans	The Board finds that the Project may pose a modest burden on municipalities with respect to potentially constraining future plans for municipal development. There is the potential for reduced flexibility and/ or additional municipal time constraints with respect to planned or possible future municipal projects that may be impacted by the Project.	Local	11
Indigenous groups' ability to use the land and water during construction and operation	The Board finds that there would be modest burdens sustained by Indigenous groups as their ability to use the lands, waters and resources for traditional purposes would be temporarily impacted by construction and routine maintenance activities, and that some opportunities for certain activities such as harvesting or accessing sites or areas of traditional use would be temporarily interrupted. For activities directly affected by the Westridge Marine Terminal, the Board finds that these effects would persist for the operational life of the Project, as traditional activities would not occur within the expanded water lease boundaries. The Board finds that while the effects would be long term in duration, they would be reversible in the long term and would be confined to the water lease boundary for the WMT.	Local	11
Landowners' and land users' ability to use the land and water during construction and operation	The Board finds that there would be modest burdens sustained by Landowners and land users as their ability to use the land and water would be affected by construction and routine maintenance activities during operations. Construction and routine maintenance activities will cause temporary, limited effects on recreational and commercial hunting, fishing, agricultural practices and access to property, and will cause nuisance disturbance such as noise.	Local	11
Project spill (i.e., from pipeline, tank terminals, pump stations, or Westridge Marine Terminal)	The Board finds that there is a very low probability of a Project spill (i.e., from pipeline, tank terminals, pump stations, or Westridge Marine Terminal) that may result in a significant effect (high consequence). The Board finds this level of risk to be acceptable .	Local Regional	2 9 10 11
Spill from a Project-related tanker	The Board finds that there is a very low probability of a large marine spill from a Project-related tanker (a spill along the marine shipping lanes out to the 12-nautical-mile boundary) that may result in a significant effect (high consequence). The Board finds this level of risk to be acceptable .	Local Regional	2 14

2.3 Recommendation and decisions of the Reconsideration Panel

2.3.1 Recommendation under the CEAA 2012

In the OH-001-2014 Report, the Board recommended that the GIC find that the Project is not likely to cause significant adverse environmental effects under the CEAA 2012. This resulted from the fact that Project-related marine shipping was not included within the scope of the Board's environmental assessment under the CEAA 2012 in the OH-001-2014 hearing. The Board also made a recommendation with respect to the follow-up program to be implemented in respect of the Project under the CEAA 2012.

In the MH-052-2018 hearing, the Board carried out an environmental assessment of Project-related marine shipping under the CEAA 2012 (see Chapter 14). Pursuant to the CEAA 2012, the Board is of the view that Project-related marine shipping is likely to cause significant adverse environmental effects on the Southern resident killer whale, and on Indigenous cultural use associated with the Southern resident killer whale. The Board also finds that greenhouse gas emissions from Project-related marine vessels would result in measureable increases and, taking a precautionary approach, are likely to be significant. The Board finds that, although a credible worst-case spill from a tanker associated with the Project would result in significant adverse environmental effects, such an event is not likely. Therefore, under subsection 30(4) of the CEAA-2012, the Board is setting out a different recommendation and modifying the mitigation measures set out in this MH-052-2018 Report with respect to the environmental assessment. Taking into account the implementation of any mitigation measures specified in the MH-052-2018 Report, the Board concludes, that the Designated Project is likely to cause significant adverse environmental effects. Having so concluded, the Board must consider whether these effects can be justified in the circumstances.

2.3.1.1 Justification analysis under the CEAA 2012

The justification analysis under the CEAA 2012 involves balancing adverse environmental effects against social, economic and other benefits summarized in Table 2. In considering whether the significant adverse environmental effects of the designated Project could be justified in the circumstances, the Board accounted for the following:

- The Board's finding of likely significant adverse environmental effects on SRKW and Indigenous traditional uses associated with the SRKW was made because although the environmental effects from Project-related marine vessels would be a small fraction of the total cumulative effects, the Board found that the operation of Project-related marine vessels would further contribute to cumulative effects that are already jeopardizing the recovery of the SRKW. These effects will be reduced by Project-specific mitigation measures covered by Trans Mountain commitments and Board conditions.

Furthermore, the Board has also included recommendations to GIC relating to regional initiatives that have broader implications on marine shipping generally, but are all also relevant to avoiding or lessening the adverse effects of Project-related marine shipping. In particular, if the Board's recommendation to offset the additional underwater noise and strike risk from Project-related marine shipping is implemented, then adverse effects from Project-related marine shipping would be reduced to net zero if and when offsets are successful. The Board did not assume that the recommendations to GIC would be accepted, but the Board did factor in that some of the programs and initiatives are already partially implemented by those with regulatory responsibility.⁴⁰

- With respect to GHG emissions from Project-related marine vessels, in addition to Trans Mountain's commitments to mitigate the significant effects, which the Board's conditions require it to meet, the Board has made a recommendation to the GIC on greenhouse gas reduction measures related to marine shipping.
- Although the Board has found that the effects of a credible worst-case spill would probably be adverse and significant, the Board also found that this is unlikely to occur. Regardless, these effects will be mitigated by Trans Mountain commitments and Board conditions related to enhanced tug escort, enhanced marine oil spill response regime, and the supporting and adopting of TERMPOL Review Committee findings and recommendations. Board notes the broad range of existing initiatives, both currently underway and planned, to decrease the risk of spills and to address spill response (i.e., the Oceans Protection Plan). In addition, the Board has provided recommendations to the GIC that would further reduce the risk, and mitigate the effects, of spills from Project-related vessels (i.e., the review of federal marine shipping oil spill response regime).
- The Board placed significant weight on the considerable social benefits from jobs, the Community Benefit Program and development of capacity of local and Indigenous individuals, communities and businesses.
- The Board also placed significant weight on the considerable economic benefits from market diversification and likely reduction of discounts to Canadian crude, increased competition among pipelines, spending on pipeline materials, and revenues to various levels of government.

Therefore, in light of Trans Mountain's commitments, Board conditions and recommendations to GIC to mitigate and reduce adverse environmental effects, the Board is of the view that the expected significant social and economic benefits outweigh the significant adverse environmental effects of the Designated Project that have been identified in the MH-052-2018 Report. For these reasons, and the reasons provided throughout this MH-052-2018 Report, the Board recommends that the GIC find the Project is likely to cause significant adverse environmental effects that can be justified in the circumstances. The Board has also identified a recommended follow-up program to be implemented with respect to the designated project.

2.3.2 Overall recommendation under the NEB Act

Having identified the benefits and residual burdens of the Project and Project-related marine shipping (summary in Section 2.2 and details throughout the MH-052-2018 Report), the Board must weigh and balance all of them to determine whether to confirm its recommendation from the OH-001-2014 hearing. In particular, the Board considered whether its recommendation under the CEAA 2012 resulted in changes or additions to its previous recommendation under the NEB Act. In the OH-001-2014 Report, the Board concluded:

The Board must balance the totality of benefits against the totality of residual burdens to come to its final determination under section 52 of the NEB Act as to whether the Project is in the present and future public interest and necessity.

⁴⁰ The Board's approach to considering current regional, federal, and international initiatives and additional recommended measures is explained in Section 14.5.4 and Table 23.

In making its recommendation, the Board must focus on the overall Canadian public interest. On the whole, taking into account all of the evidence in this hearing, considering all relevant factors, and given that there are considerable benefits nationally, regionally and, to some degree, locally, the Board finds that the benefits of this Project outweigh the residual burdens. Accordingly, the Board concludes that the Project is in the present and future public convenience and necessity, and in the Canadian public interest.

In its assessment of the public interest in the Reconsideration, the Board considered its recommendation under the CEAA 2012 that the designated Project is likely to cause significant adverse environmental effects that can be justified in the circumstances. As discussed above in the justification analysis, the Board carefully considered the significant adverse effects relating to SRKW, indigenous cultural use associated with SRKW, greenhouse gas emissions and spills. The Board is of the view that some of these environmental effects will be mitigated by Trans Mountain's commitments, Board conditions, and regulatory requirements (a summary can be found in Table 23 in Chapter 14).

An important outcome of the MH-052-2018 hearing that differs from OH-001-2014 hearing is the Board's recommendations to GIC which have broader implications on marine shipping generally, as well as relevance to avoiding or lessening the adverse effects of Project-related marine shipping. In addition, the Board accounted for the measures taken to avoid or lessen effects on SARA-listed species and to monitor them under subsection 79(2) of the SARA.

After considering the relevant evidence from the OH-001-2014 and MH-052-2018 hearings, the Board also affirms the following reasons from the OH-001-2014 Report:

Many of the benefits, as can be seen from the foregoing analysis and the Report chapters, are national or regional in scope; fewer are strictly local. With respect to the burdens, the reverse is true; the majority of the burdens of the Project and Project-related marine shipping would be shouldered by local and regional communities.

In balancing the benefits and burdens, the Board placed significant weight on the economic benefits from the Project. There would be considerable local, regional and national benefits from market diversification. These include enabling increased capacity to access Pacific Rim markets. There will also be considerable spending on pipeline materials in Canada, as well as considerable jobs that would be created for Canadians, including jobs and opportunities for Indigenous communities. Many of the benefits would be realized throughout Canada, particularly in B.C., Alberta, Ontario, and Quebec. The national nature of the benefits was important to the Board.

In the Board's view, the benefits of the Project are considerable, including increased access to diverse markets for Canadian oil; jobs created across Canada; the development of capacity of local and Indigenous individuals, communities, and businesses; direct spending on pipeline materials in Canada; and considerable revenues to various levels of government.

However, the Board is also of the view that the Project and its related marine shipping carries risks. Its burdens include the significant adverse effects that are likely to be caused by Project-related marine shipping on the Southern resident killer whale and Indigenous cultural use associated with the Southern resident killer whale.

Further, the benefits and burdens of the Project and its related marine shipping are not distributed evenly across the country.

Addressing effects, and cumulative effects in particular, on the Salish Sea requires a broad, systemic, and multi-faceted approach. To understand the effects of Project-related marine shipping and how best to mitigate those effects, one needs to understand the complex and interconnected system that it would operate within. In order to be most effective in mitigating environmental harm to the Salish Sea and its ecosystem that is likely to be caused by the Project, a broader approach is required; one which extends beyond the NEB's regulatory authorities and one which will benefit the broader system. The Board has conducted its environmental assessment, set Project conditions, and made its broader recommendations to the GIC with this in mind. This includes making recommendations that use an offset-based approach. It is the Board's view that, should the GIC make changes to the operation of all marine traffic, including Project-related traffic, and take action to relieve other stressors within the broader system, it will offset the incremental effects of the designated project and make material improvements to the health of the Salish Sea.

The Board has completed the MH-052-2018 hearing, has conducted an environmental assessment of Project-related marine shipping, has considered all of the relevant evidence filed on the record, and has relied upon the findings of the Board from the OH-001-2014 hearing for matters that are beyond the scope of the reconsideration. On the whole, the Board finds that the benefits of this Project outweigh the residual burdens and concludes that the Project is in the present and future public convenience and necessity, and in the Canadian public interest.

Accordingly, the Board confirms its recommendation that a Certificate should be issued and the Project should be approved.

2.3.2.1 Instruments

The Board recommends that a CPCN be issued under section 52 of the NEB Act, and that CPCNs OC-2 and OC-49 be amended to permit the construction and operation of the Project, including the complete looping (or twinning) of the existing Trans Mountain Pipeline system between Edmonton, Alberta, and Burnaby, B.C., and the construction and operation of associated facilities. The details of the work/activities to be undertaken pursuant to each of the CPCNs the Board would issue, should the Project be approved by GIC, are provided in Appendix 2. In Appendix 3, the Board has set out the terms and conditions that it considers necessary and desirable in the public interest, and to which the new and amended CPCNs would be subject if the GIC were to direct their issuance.

The other instruments required for the construction and operation of the Project as proposed by Trans Mountain are also subject to terms and conditions as outlined in Appendix 3. Details of the work/activities to be undertaken pursuant to each Instrument are provided in Appendix 2. These include four NEB Act section 58 orders approving temporary infrastructure and the construction, operation, and/or modification of pump stations and tanks; and an order, pursuant to section 44 of the OPR, for the deactivation of one pump station.

Since this Project overall is subject to the GIC approval, all of these additional orders contain a precondition that makes them ineffective unless and until the GIC approves issuance of new and amended CPCNs approving the Project

2.4 Conditions

For the Reconsideration, the Board was directed by GIC in OIC P.C. 2018-1177 to reconsider all conditions set out in the OH-001-2014 Report that are relevant to addressing the issues specified by paragraph 770 of the *Tsleil-Waututh Nation* decision, including Conditions 91, 131 to 134, 144, and 151.

Regardless of what the Board sets out in its Reconsideration Report, subsection 53(7) of the NEB Act requires the Board to set out in the report all the terms and conditions that it considers necessary or desirable in the public interest, should the Project be approved by the GIC. The conditions that are the focus of this Reconsideration are intended to reduce or eliminate the effects of Project-related marine shipping in accordance with the requirements of the CEAA 2012 and SARA. The conditions outline requirements that are within the scope of the Board's regulatory authority and which Trans Mountain, as the proponent, would be required to meet in order for the Project to be carried out. Conditions imposed by the Board are attached to Board regulatory instruments, are legally binding, and enforced pursuant to the NEB Act.

On 10 January 2019, the Board issued draft conditions relevant to Project-related marine shipping for comment. The submissions made in response are summarized in Appendix 16. The various chapters of this MH-052-2018 Report provide reasons for changes made or not made, as do the summaries in Appendix 15. There were suggestions made by parties to include different conditions, but none of these were found by the Board to be appropriate or necessary in the circumstances of the Reconsideration.

The Board has decided to:

- confirm Condition 151;
- replace (amend) Conditions 2, 91, 132, 133, 134, and 144; and
- turn Condition 131 into a recommendation to the federal government which has the necessary authority to address such matters.

#	Conditions
91	<p>Plan for marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, within 6 months from the issuance date of the Certificate, a plan describing how it will ensure that it will meet the requirements of Condition 133 regarding marine spill prevention and response. The plan must be prepared in consultation with Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority, Vancouver Fraser Port Authority, British Columbia Coast Pilots, Western Canada Marine Response Corporation, Fisheries and Oceans Canada and the Province of British Columbia, and must identify any issues or concerns raised and how Trans Mountain has addressed or responded to them.</p> <p>Trans Mountain must provide the plan to the above-mentioned parties at the same time as it is filed with the NEB.</p>
131	<p>Marine Public Outreach Program</p> <p>The Board has converted this condition into a recommendation (see Recommendation 12).</p>
132	<p>Marine Mammal Protection Program</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing operations, a Marine Mammal Protection Program that focuses on mitigating effects from the Project and associated cumulative effects, and on fulfilling Trans Mountain's commitments as a terminal operator with regard to Project-related marine shipping. The program must include:</p> <ol style="list-style-type: none"> a) the goals and objectives of the program, including a discussion on how they align with the objectives of applicable Fisheries and Oceans marine mammal Recovery Strategies and Action Plans; b) a summary of the issues related to marine mammals from the Project and from Project-related marine vessels; c) a summary of the initiatives that Trans Mountain has supported or undertaken to-date, including the goals of each initiative and how they relate to the goals and objectives of the program; d) a discussion of the outcomes or progress updates of the initiatives identified in c), and how these outcomes have met or are contributing to the objectives of the program; e) any other initiatives that Trans Mountain intends to undertake or support in the future that are relevant to the program; and f) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the program, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding, MH-052-2018 Reconsideration proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information.
133	<p>Confirmation of marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, confirmation, signed by an officer of the company that:</p> <ol style="list-style-type: none"> a) Trans Mountain has included in its Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide a requirement for tankers nominated to load at the Westridge Marine Terminal to have a suitable arrangement for the proposed enhanced tug escort between the Westridge Marine Terminal and Buoy J prior to departure. The tug escort should be suitable for foreseeable meteorological and ocean conditions and be based on tanker and cargo size; and b) an enhanced marine oil spill response regime is in place that is capable of: <ol style="list-style-type: none"> i) delivering 20,000 tonnes of capacity within 36 hours of notification, with dedicated resources staged within the study area; and, ii) initiating a response within 2 hours for spills in Vancouver Harbour, and within 6 hours for the remainder of the Salish Sea shipping route to the 12-nautical-mile territorial sea limit.
134	<p>Updated Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and thereafter on or before 31 January of each of the first five years after commencing operations, an updated Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide, and a summary of any revisions made to each.</p>
144	<p>Ongoing confirmation of marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, on or before 31 January of each year after commencing operations confirmation, signed by an officer of the company, that it is continuing to meet the requirements of Condition 133 regarding Trans Mountain's marine spill prevention and response commitments.</p> <p>Trans Mountain must provide each filing to Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority, Vancouver Fraser Port Authority, British Columbia Coast Pilots, Western Canada Marine Response Corporation, Fisheries and Oceans Canada and the Province of British Columbia at the same time as it is filed with the NEB. If a particular party mentioned above requests that it not be provided the annual filing, Trans Mountain may cease providing it to that party.</p>

#	Conditions
151	<p>Post-construction environmental monitoring reports</p> <p>Trans Mountain must file with the NEB, on or before 31 January following the first, third, and fifth complete growing seasons after completing final clean-up, a post-construction environmental monitoring report for the Project that must include:</p> <ul style="list-style-type: none"> a) a description of the valued components or issues that were assessed or monitored; b) measurable goals for each valued component or issue; c) monitoring methods for each valued component or issue, results of the monitoring, and a comparison to the defined measurable goals; d) corrective actions taken, their observed success, and their current status; e) identification on a map or diagram of the locations where corrective actions were taken; f) any further corrective actions planned and a schedule for monitoring and reporting; and g) a summary of its consultations with appropriate government authorities and any potentially affected Indigenous groups and affected landowners/tenants. <p>In the post-construction environmental monitoring report filed after the fifth full growing season after completing clean-up, Trans Mountain must include:</p> <ul style="list-style-type: none"> i) an assessment of the effectiveness of mitigative and corrective actions and how learnings have been or will be applied to Trans Mountain's Environmental Protection Program; ii) a detailed description of all valued components or issues for which the measurable goals have not been achieved during the duration of the post-construction monitoring program; and iii) an evaluation of the need for any further corrective actions, measurable goals, assessments, or monitoring of valued components or issues, including a schedule for those. <p>All filed post-construction environmental monitoring reports must address issues related, but not limited, to: soils; weeds; watercourse crossings; riparian vegetation; wetlands; rare plants, lichens and ecological communities; municipal tree replacement; wildlife and wildlife habitat; fish and fish habitat; marine fish and fish habitat; marine mammals; marine birds; and species at risk.</p>

The remaining conditions from the Board's OH-001-2014 Report would still apply to the overall Project. The final list of 156 recommended conditions is provided in Appendix 3.

2.5 Recommendations to the GIC for the purposes of the CEAA 2012 and the SARA

For the GIC's consideration in deciding whether or not to approve the Project, the Board is including recommendations for measures to mitigate, avoid, or lessen the effects of Project-related marine shipping that are beyond the scope of the Board's regulatory authority and Trans Mountain's control, but within the authority of the GIC. This is consistent with the direction of the Court of Appeal in *Tsleil-Waututh Nation*:

While the Board lacked authority to regulate marine shipping, the final decision-maker was not so limited... the GIC required the Board's exposition of all technically and economically feasible measures that are available to avoid or lessen the Project's effects on the Southern resident killer whale.⁴¹

Unlike conditions, recommendations would not be attached to any Board regulatory instruments or enforced by the Board. However, the reporting requirement in Recommendation 2 provides an added layer of accountability for the implementation of the recommendations.

Recommendations were not taken into account in the Board's current significance evaluation under the CEAA 2012, but could result in future mitigation. Recommendations are also relevant to the justification analysis under the CEAA 2012 and the requirements of the SARA. Although the Board's recommendations to the GIC are directly related to its environmental assessment of Project-related marine shipping, the Board is of the view that, if implemented, they may assist in mitigating effects of all marine traffic in the area. This would be a positive outcome that would extend beyond mitigating or offsetting the impacts of the Project and its related marine shipping.

On 10 January 2019, the Board issued draft recommendations for comment. The Board revised some of the recommendations and also added three new recommendations. The various chapters of this MH-052-2018 Report provide reasons for changes made or not made, as do the summaries in Appendix 15. These recommendations and the Board's views on them are found in Chapter 14 of this MH-052-2018 Report.

⁴¹ *Tsleil-Waututh Nation* at para 456.

#	Recommendations
1	<p>The Governor in Council should develop and implement a regional cumulative effects management plan. This plan should assess the overall environmental state of, and cumulative effects on, the Salish Sea (including the Strait of Juan de Fuca and out to the 12-nautical-mile territorial sea limit), and should include a long-term strategy for managing those cumulative effects. It should also be used to inform the consideration of future proposed projects. This plan should include, but not be limited to:</p> <ul style="list-style-type: none"> a) consideration of the many impacts on the Salish Sea, including contamination from point and diffuse land-based sources, the multiple impacts on salmon and other fish stocks, and the impacts from all vessel traffic; b) incorporation of the work the federal authorities are already planning in the area, such as under the Coastal Environmental Baseline Program and the Cumulative Effects of Marine Shipping initiative (including its regional cumulative effects assessment); c) development of short-, medium-, and long-term targets for addressing cumulative effects, including consideration of the feasibility of reducing total underwater noise, strike/collision risk of vessels with marine species, and key contaminant levels over time, and feasible and effective measures for achieving those targets; and d) monitoring to help determine the extent of cumulative effects, the success of measures to manage those effects, and progress towards meeting targets. <p>The Governor in Council should consider whether a regional study pursuant to sections 73 or 74 of the CEAA 2012 should be undertaken as part of the cumulative effects management plan, and include in its public reporting a rationale on whether this would be advantageous. The plan should be developed and implemented in consultation with Indigenous peoples, other marine users, the Province of British Columbia and local governments, Vancouver Fraser Port Authority (VFPA), and other relevant stakeholders.</p>
2	<p>The Governor in Council should report publicly, on an annual basis, on the oversight, progress, and status of initiatives and measures to address cumulative effects on, and to support the health of, the Salish Sea (including the Strait of Juan de Fuca and out to the 12-nautical-mile territorial sea limit), including but not limited to:</p> <ul style="list-style-type: none"> a) progress on addressing Recommendation 1 above, including monitoring results and progress towards meeting targets; b) the Ocean Protection Plan, the Whales Initiative, and any other relevant commitments made by federal authorities during the Board's MH-052-2018 Reconsideration hearing; c) relevant initiatives and measures being undertaken by others, such as the marine shipping measures of the Enhancing Cetacean Habitat and Observation Program (ECHO) Program, for the duration such initiatives or measures are undertaken; d) species status updates for <i>Species at Risk Act</i>-listed species, including any relevant measures proposed in recovery documents under the <i>Species at Risk Act</i>; e) progress on addressing Recommendations 3 through 16 below, including results of monitoring to determine the effectiveness of measures and any adaptive management as part of a follow-up program; and f) consultation activities related to these initiatives and measures, including with Indigenous peoples, other marine users, the Province of British Columbia and local governments, VFPA, and other relevant stakeholders. <p>The public reporting should include an explanation of how these various initiatives and measures work together, the identification of any notable gaps, and plans for how those gaps will be addressed.</p>
3	<p>The Governor in Council should develop and implement, with support from industry, a marine bird monitoring and protection program to better understand impacts of all vessel use within the Salish Sea on marine bird species, including species at risk, and, if adverse effects are found, implement mitigation from those impacts. This program should include adaptive management measures by the Government of Canada where warranted by monitoring results, to avoid or reduce marine bird mortality and sensory disturbance.</p> <p>This program should be developed and implemented in consultation with relevant marine shipping stakeholders and Indigenous peoples.</p>
4	<p>The Governor in Council should expedite the work in completing the feasibility study for establishing a Southern Strait of Georgia National Marine Conservation Area Reserve, publicly report on the outcomes of that study, and (if considered feasible) proceed to establish it. Its potential establishment should include consideration of other initiatives under the Oceans Protection Plan, such as the Ports Modernization Review and the National Anchorage Strategy. This work should be done in consultation with potentially affected Indigenous and coastal communities and with relevant marine shipping stakeholders including Transport Canada, Canadian Coast Guard and the VFPA.</p>
5	<p>The Governor in Council should develop an Offset Program to offset both the increased underwater noise and the increased strike risk posed to <i>Species at Risk Act</i>-listed marine mammal and fish species (including Southern resident killer whale) due to Project-related marine shipping, at each relevant section of the marine shipping route (i.e., Strait of Georgia, Boundary Pass, Haro Strait, Strait of Juan de Fuca, and out to the 12-nautical-mile territorial sea limit), and at the relevant times of year. Each offset measure should apply to all appropriate vessels for that measure (i.e., not limited to Project-related vessels), to be determined on a case-by-case basis according to the type of measure and the type(s) of vessels it is targeted at.</p> <p>The Offset Program should be developed and implemented in consultation with Indigenous peoples, other marine users, the Province</p>

#	Recommendations
	of British Columbia and local governments, VFPA, and other relevant stakeholders. The Offset Program should include any further research and data collection that is necessary to successfully undertake it, including consideration of whether further information on the number of vessel strikes on marine mammals can be gathered. There should be periodic public reporting that provides, at the appropriate times, the information necessary to demonstrate a robust Offset Program. This should include measured or estimated underwater noise and strike risk due to Project-related marine shipping, and the extent over time to which that additional noise and strike risk has been offset in each section of the route, including the monitoring/modelling used to demonstrate that.
6	<p>As part of the Offset Program in Recommendation 5, the Governor in Council should further consider each of the following specific measures, each applicable to all appropriate vessels (i.e., not limited to Project-related vessels), and publicly report on the feasibility and likely effectiveness of each (including consideration of navigational safety, international coordination and socio-economic effects):</p> <ol style="list-style-type: none"> Slowdowns in each section of the marine shipping route (i.e., Strait of Georgia, Boundary Pass, Haro Strait, Strait of Juan de Fuca, and out to the 12-nautical-mile territorial sea limit). Potential limits on the activities of whale watching boats (such as the number of boats and/or their time on water, and other potential ways to limit their impacts). Noise reduction efforts for regularly operating ferries in the area, and an accelerated schedule for implementation. Identification of specific foraging, congregation and migration areas of the <i>Species at Risk Act</i>-listed species (including Humpback, Grey, Fin and killer whales, as well as Basking shark and Leatherback sea turtle) and consideration of mitigations in those areas (including Swiftsure Bank). Further incentives and requirements for quiet vessel design and refits to address underwater noise over the long term, including maximal participation in relevant initiatives and committees of the International Maritime Organization. <p>Consideration of the above measures should include consultation with Indigenous peoples, other marine users, the Province of British Columbia and local governments, VFPA, and other relevant stakeholders.</p>
7	<p>The Governor in Council should review and update federal marine shipping oil spill response requirements. This review should include consideration of the following:</p> <ol style="list-style-type: none"> updating the 1995 Response Organization Standards; response planning methodologies; response planning for <i>Species at Risk Act</i>-listed species, including marine mammals; how completed and ongoing research related to oil fate and behaviour and response methods and technology will be considered in response planning, procedures, and equipment; salvage requirements; public reporting by response organizations to promote transparency of information; inclusion of Indigenous peoples and local communities in response planning; and a requirement for additional response resources on all ocean-going vessels.
8	The Governor in Council should develop a regulatory framework for making enhanced tug escort mandatory in the Salish Sea for Project-related tankers. The framework should include oversight and enforcement mechanisms. Mandatory enhanced tug escort should also be considered for other vessels as appropriate.
9	The Governor in Council should, in conjunction with relevant United States regulatory authorities, consider the need for a Canada/United States Transboundary Vessel Traffic Risk Assessment.
10	<p>The Governor in Council should actively support the development and implementation of greenhouse gas reduction measures related to marine shipping that would align with the final International Maritime Organization Strategy by year 2023 for reducing greenhouse gas emissions. These measures could include, but not be limited to:</p> <ol style="list-style-type: none"> facilitating the use of low-carbon alternate fuels (such as liquefied natural gas) for marine vessels by developing any necessary marine safety regulatory framework, training programs, and bunkering infrastructure requirements; use of energy efficient technologies, such as engine and propulsion upgrades and hull modifications; and market-based measures, such as providing economic incentives for industry investment in the development and use of energy efficient technologies, and offsetting any increases in ship emissions. <p>In implementing the measures, the Governor in Council could also consider a mechanism to establish and monitor such reductions and to develop regulations under an appropriate legislation.</p>

#	Recommendations
11	The Governor in Council should, in conjunction with Transport Canada and the Canadian Coast Guard, facilitate opportunities, as appropriate, to engage and seek feedback from the Indigenous Advisory and Monitoring Committee on the marine safety system, including on the marine inspections and enforcement regime; in addition to identifying engagement opportunities for Project-related marine shipping activities that intersect with Canadian Coast Guard operational programs.
12	The Governor in Council should, in conjunction with the Pacific Pilotage Authority and Transport Canada, continue engagement and awareness activities targeting coastal Indigenous communities, recreational boaters, fishing vessel operators, and operators of small vessels with respect to safety of navigation and prevention of collisions with larger vessels. This should include incorporating the resources and information that Trans Mountain has already provided or will provide to the Pacific Pilotage Authority, such as applicable information on Project-related vessel timing and scheduling.
13	The Governor in Council should, in order to enhance the safety of all sizes of marine vessels, accelerate the development and implementation of the Enhanced Maritime Situational Awareness initiative and the proposed extension of the Automatic Identification System to smaller passenger vessels.
14	In order to foster a more rapid development and employment of new oil recovery technologies, the Governor in Council should administratively combine its current initiatives and investigate the use of new paths for the delivery of government grants and contributions in order to provide financial incentives to promote innovation in such developments.
15	The Governor in Council, in conjunction with Transport Canada, should review the federal marine oil spill compensation regimes with regards to compensation for non-use values, for Indigenous and non-Indigenous communities, including any non-coastal communities that may be impacted as a result of a marine oil spill.
16	The Governor in Council, in conjunction with VFPA, should develop a formal complaint resolution program that gathers community feedback, brings together diverse community stakeholders to facilitate discussions about port-related impacts, and resolves complaints about marine vessels anchored at the VFPA-managed anchorages.



Environmental assessment

Small changes have been made to this chapter since the Board's May 2016 OH-001-2014 Report. Most of this chapter is unchanged, since Chapter 10 focuses on the environmental assessment of the Project only (i.e., the pipeline facilities and Westridge Marine Terminal) and this is outside the scope of the Reconsideration. However, the Reconsideration Panel necessarily relies on Chapter 10 views and findings of the Board from the OH-001-2014 hearing in order to make the required recommendation to the GIC under subsection 30(4) of the CEAA 2012 for the designated Project. The Reconsideration Panel's environmental assessment under the CEAA 2012 of Project-related marine shipping is found in Chapter 14.

The only change of substance in Chapter 10 is in Section 10.1 where the scope of the CEAA 2012 environmental assessment has been revised to reflect the Reconsideration Panel's inclusion of Project-related marine shipping in the "designated project" to be assessed under the CEAA 2012. Beyond that, the limited amendments in Chapter 10 provide references to where topics are covered in Chapter 14 to avoid confusion.

10.1 Overview

The Board considers environmental protection as part of its public interest mandate under the *National Energy Board Act* (NEB Act) and assesses environmental protection in each application before it. This includes the current Trans Mountain Expansion Project (Project) where the Board is required to make a recommendation under section 52 of the NEB Act, which requires the Board to have regard to all considerations that appear to the Board to be directly related to the pipeline and to be relevant. Also, under section 52 of the NEB Act, the Board can consider any public interest that in the Board's view may be affected by the issuance of a certificate or the dismissal of the application.

The Board also has a mandate to conduct environmental assessments under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) for projects contained within that Act's *Regulations Designating Physical Activities*. As a responsible authority under the CEAA 2012, the Board must, in its report to the Governor in Council, set out its recommendation regarding the environmental effects of a project. Specifically, the NEB provides a recommendation that a project is likely, or is not likely, to cause significant adverse environmental effects after taking into account the implementation of mitigation measures. For effects that are likely to be significant, the Board must also recommend whether or not they are justified in the circumstances. As part of the Board's environmental assessment under the CEAA 2012, the Board considers any cumulative effects that are likely to result from the Project in combination with environmental effects from other physical activities that have been or will be carried out. The Board also considers the environmental effects of accidents and malfunctions that may occur in connection with the Project.

The Project involves constructing and operating an oil pipeline more than 40 km long that, if approved, would be regulated under the NEB Act. Therefore, the Project is contained within the *Regulations Designating Physical Activities* and the Board has conducted the necessary environmental assessment of it under the CEAA 2012.

This chapter focuses on the changes caused to the biophysical environment by routine Project construction and operations, and on the consequences of potential spills from the pipeline and the facilities. This includes the Westridge Marine Terminal (WMT). The socio-economic effects of routine Project construction and operations are addressed in Chapter 11. Chapter 14 addresses potential effects of the routine operation of Project-related marine shipping, and the consequences of potential spills from Project-related tankers.

10.1.1 Scope of the environmental assessment under the CEAA 2012

The scope of the environmental assessment under the CEAA 2012 includes the following three elements:

1. The physical works and activities making up the Project and Project-related marine shipping (as described by Trans Mountain in its application and subsequent filings).
2. The biophysical and socio-economic elements that are likely to be affected by the Project and Project-related marine shipping.
3. The factors that must be taken into account in conducting an environmental assessment (described in section 19 of the CEAA 2012).

On 2 April 2014, the Board released the Factors and scope of the Factors for its Environmental Assessment under the CEAA 2012. On 12 October 2018, the Board issued the Amended Factors and Scope of the Factors for the Environmental Assessment pursuant to the CEAA 2012 to reflect its decision to include Project-related marine shipping between the WMT and the 12-nautical-mile territorial sea limit in the “designated project” to be assessed under the CEAA 2012. This document is found in Appendix 10.

10.1.2 Potential effects associated with upstream and downstream activities

In its List of Issues for the OH-001-2014 hearing, the Board said that it did not intend to consider the environmental and socio-economic effects associated with upstream activities, the development of oil sands, or the downstream use of oil transported by the pipeline. During the hearing, the Parents from Cameron Elementary School, Burnaby, and the City of Vancouver, with the support of several other intervenors, requested that the Board expand its List of Issues to include these upstream and downstream effects. The Board decided against these requests in its 23 July 2014 Ruling No. 25, stating in part the following:

“The Project does not include upstream production and is not dependent on any particular upstream development; therefore, any link to environmental changes caused by such upstream production is indirect and is not necessarily incidental to Project approval.

In addition, no particular upstream development is dependent on the Project.”

With respect to downstream use, the Board said:

“The Project does not include downstream use and is not tied to, or dependent on, any particular use in any particular destination... The effects of end use are not directly linked or necessarily incidental to the Board’s regulatory process regarding the Project.”

“[D]ownstream effects are more effectively assessed and regulated by the jurisdictions where the use occurs.”

As a result and as fully detailed in Ruling No. 25, the Board did not consider these upstream and downstream effects in its assessment of the Project.⁸³ However, the Board did consider greenhouse gas emissions from Project construction and operation.

⁸³ The City of Vancouver sought leave to appeal Ruling No. 25. Leave to appeal was dismissed by the Federal Court of Appeal on 16 October 2014.

In the MH-052-2018 hearing, the Board received comments that the List of Issues should address effects of other upstream and downstream activities. In its reasons⁸⁴ for the Board's decision on the List of Issues, the Board said that the analysis in Ruling No. 25 applies in this case.

The Board received a notice of motion from Stand.earth which states that by excluding consideration of the environmental and economic effects associated with upstream activities (including oil sands development) and the downstream use of the oil intended to be shipped on the pipeline, the Board refused to consider evidence related to the impact of the increase in GHG emissions caused by the Project. The Board has issued Ruling No. 30 in this regard.

10.1.3 Responsibilities under other Acts

10.1.3.1 Fisheries Act

Under subsection 35(1) of the *Fisheries Act*, no person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Indigenous fishery, or to fish that support such a fishery, unless such work, undertaking or activity is exempted, as per subsection 35(2) of the *Fisheries Act*.

The Board and Fisheries and Oceans Canada (DFO) entered into a Memorandum of Understanding (MOU) on 16 December 2013. Under the MOU, the Board has the responsibility to assess potential impacts to fisheries from proposed NEB-regulated pipeline and power line applications, and notify DFO if any such works may likely require authorization under the *Fisheries Act*. DFO would then be responsible for issuing any *Fisheries Act* authorization(s). The MOU does not apply to marine terminals or marine shipping.

For this Project, the Board was responsible for reviewing Project works related to the construction of the pipeline and facilities (excluding the WMT), and refer any works to DFO that the Board determines may likely require authorization under the *Fisheries Act*. For a detailed discussion of this review, see Section 10.2.5 – Freshwater Fish and Fish Habitat. The Board was also responsible for conducting an environmental assessment of the potential effects of the Project (including the expansion of the WMT) on marine fish and fish habitat, as per the requirements of the CEEA 2012 (Section 10.2.14). The responsibility to review the potential effects from the expansion of the WMT on marine fisheries, under the *Fisheries Act*, remains the responsibility of DFO.

The Board also conducted an environmental assessment, under the NEB Act, of the potential effects on marine fish and fish habitat from Project-related marine vessels (Chapter 14, Section 14.7.3 – Marine Fish and Fish Habitat). The responsibility to ensure that Project-related marine vessels, as well as all other marine shipping vessels, are in compliance with the *Fisheries Act* remains the responsibility of DFO.

10.1.3.2 Species at Risk Act

Pursuant to the *Species at Risk Act* (SARA), the Board is required to identify the adverse effects of projects that are contained within the CEEA 2012 *Regulations Designating Physical Activities* on each listed wildlife species and its critical habitat. The Board must also ensure that measures are taken to avoid or lessen those effects, and to monitor them.

On 23 April 2014, the Board notified the Ministers of Environment and Climate Change Canada (ECCC), DFO, and Parks Canada Agency that the Project, if approved and constructed, may affect a number of species listed on Schedule 1 of the SARA (SARA-listed species) and/or their habitat.

In meeting the Board's obligations under the SARA, the Board assessed the environmental effects of the Project on the SARA-listed species. The Board identified the potential adverse effects that the Project might have on listed wildlife species and their critical habitats. The Board considered the mitigation measures proposed to avoid or minimize those effects, and the plans to monitor their effectiveness. The Board also considered all reasonable alternatives (e.g., routing, design, mitigation) to reduce the impact on species' critical habitat. In addition to Trans Mountain's proposed measures, the Board would also impose conditions requiring Trans Mountain to implement measures that are consistent with any applicable recovery strategies and action plans.

Under the MOU with DFO, the Board has the responsibility to determine if proposed projects would impact aquatic species at risk, and to notify DFO of such impacts. DFO would then determine if permitting may be required under the SARA.

With regard to Project-related marine shipping, the Board's responsibilities under section 79 of the SARA is discussed in detail in Chapter 14.

⁸⁴ Board's reasons for the List of Issues, 29 October 2018 (A95187-5)

10.1.4 Environmental and socio-economic assessment methods

In assessing the environmental and socio-economic effects of the Project, the Board considered the environmental and socio-economic setting, potential effects on valued components (both environmental and socio-economic), interactions between the valued components, the adequacy of Trans Mountain's proposed environmental protection strategies and mitigation measures to address them, environmental concerns or issues raised by intervenors and commenters, as well as the adequacy of Trans Mountain's own environmental and socio-economic assessment.

The Board generally adopted the spatial and temporal boundaries for each valued component as defined by Trans Mountain, for both Project effects and cumulative effects. The spatial boundaries (or study areas) are described in Appendix 11. For the temporal boundaries, the Board considered the planning, construction, operations and abandonment phases of the Project.

Section 10.2 provides detailed analyses of potential adverse environmental effects that were of elevated concern to the public or Indigenous groups, or have potential environmental consequences that require additional measures or Board conditions to mitigate them. The absence of a discussion on a particular effect in this section does not imply that it was not assessed.

Where any effects (whether significant or non-significant) were predicted to remain after proposed mitigation is applied (i.e., residual effects), the Board assessed cumulative effects. This involved considering the residual effects associated with the Project in combination with the residual effects of other past, current and future (i.e., reasonably foreseeable) physical facilities and activities, and that have effects within the temporal and spatial boundaries and ecological context adopted for the Project assessment.

In evaluating the significance of cumulative effects, the Board focused on the total cumulative effects resulting from all physical facilities and activities as defined above, considered in combination with Trans Mountain's proposed Project. Section 10.1.5 discusses the Board's views on using this approach for cumulative effects instead of the one originally proposed by Trans Mountain.

In Section 10.1.6, the Board discusses follow-up programs required under the CEAA 2012.

The Board discusses its environmental and socio-economic assessment methods for Project-related marine shipping in Chapter 14.

The Board's conclusion and recommendation to the Governor in Council on its overall CEAA 2012 significance determination for the Project is found in the introduction and disposition section at the front of this MH-052-2018 Report.

10.1.4.1 Indicator species-based approach and species at risk

Trans Mountain used an approach based on indicator species⁸⁵ to estimate potential operational effects of the Project on other species, and used this same approach for species at risk. Several intervenors raised concerns that Trans Mountain did not assess certain species as part of the environmental assessment, and that some key indicator species were missing.

Trans Mountain said that using indicators to assess potential Project effects on biotic elements is a commonly-employed method in environmental assessment. It said that it chose key indicators to be representative of certain potential Project effects since it is not necessary to assess all species individually. It said that, based on the information provided for the selected indicators, one could infer the potential effect pathways and likely responses to disturbance of other species with similar ecological requirements. Nevertheless, at the request of the Board and Environment and Climate Change Canada (ECCC), Trans Mountain completed, and filed as evidence, individual assessments for SARA Schedule 1-listed species that may be affected by the Project.

In the MH-052-2018 hearing, several intervenors again raised concerns about using an indicator species-based approach for assessing effects of spills and of the operation of Project-related marine shipping specifically. This issue is discussed in Chapter 14, along with the Board's corresponding views.

⁸⁵ This approach involves using one species to represent the similar environmental characteristics of a group of species or a particular ecosystem.

Views of the Board

The Board concludes that as long as the selected indicator species can reasonably represent other relevant species, then relying on this method of assessing Project effects is generally acceptable for most species (with the exception of the SARA-listed species) that have similar habitat or ecological function and requirements, and that are likely to respond similarly to certain effects.

Given the potential for the Project to affect various SARA-listed species, their residences or their critical habitat, and considering their at-risk status and potential sensitivity to further adverse effects, the Board considered it appropriate, in general, to assess the Project's effects on each of those species individually. This provided the Board with greater certainty that effects are appropriately identified, addressed and effectively mitigated, taking the particularities of each species at risk into account. Therefore, the Board has applied this approach to its assessment of species at risk. Although effects and mitigation have been considered for each individual species at risk separately, the Board only provided a species-specific discussion if it was deemed to be necessary (i.e., if a species was likely to be impacted from the Project) in addition to its more general discussion.

10.1.4.2 Determining significance

In determining the significance of residual environmental and socio-economic adverse effects from Project construction and operations, after taking mitigation and offsets into account, the criteria the Board considered were temporal extent, reversibility, geographic extent and magnitude. Appendix 12 provides the common ratings for each criterion, and basic definitions for each rating. The Board took into account ecological and social context when arriving at its findings with respect to each criterion, in addition to any uncertainties with respect to potential effects. Appendix 12 also provides the Board's definitions of "likely to be significant" and "not likely to be significant." In general, Project effects are considered "likely to be significant" when effects are either of "high magnitude," or "long-term, permanent, and of regional or global extent."

The Board's evaluation of the likely significance of adverse effects is presented in a tabular format for most key valued components (or indicators within those components). For each residual effect considered in detail, the Board has provided its views, including a discussion of any additional mitigation or actions required by way of recommended conditions. The significance tables also include a discussion of cumulative effects.

10.1.4.3 Methods for assessing accidents and malfunctions

Trans Mountain said that the methods it used to assess the environmental and socio-economic effects of Project spills were different than the methods it used for assessing the effects of routine Project activities. It said that different methods were required because spills represent low probability, unpredictable events, and are unlike predictable, routine project activities. Trans Mountain used a structured risk assessment approach to identify the consequences of credible worst-case and smaller spills. It conducted ecological risk assessments and human health risk assessments to evaluate potential acute and chronic environmental and socio-economic effects. It said that it assessed the spatial extent, magnitude and time to recover from likely oil spill effects.

Several intervenors, including Pacheedaht First Nation and Squamish Nation questioned Trans Mountain's method for assessing the significance evaluation of spill effects and said that Trans Mountain did not provide significance determinations of adverse effects from accidents and malfunctions, and thus did not follow the requirements of the CEAA 2012. Intervenors said that most large magnitude spill events are of low probability and Trans Mountain did not consider low probability events in determining significance.

Some intervenors, including Chawathil First Nation and Cheam First Nation, said that Trans Mountain used credible worst-case scenarios rather than worst-case scenario spill models. They said that the significance of a spill event cannot be assessed simply by looking at the probability of its occurrence but rather, must also factor in the consequences of the event.

Trans Mountain said that the central test in the CEAA 2012 is whether or not a Project is likely to cause significant adverse environmental effects. It said that likelihood was evaluated as one of several significance criteria and its approach in evaluating significance represents the accepted practice, and that it is a practical and defensible means of fulfilling the requirements of the CEAA 2012.

Views of the Board

Under the CEAA 2012, the Board is required to take into account the significance of effects of accidents and malfunctions that may occur, and to provide a recommendation with respect to whether accidents and malfunctions that may occur are likely to cause significant adverse environmental effects. Given that every conceivable malfunction

and accident cannot be considered in detail, the Board accepts Trans Mountain's approach of considering reasonably credible and representative events to gain an understanding of the types and magnitude of effects that could result from potential accidents and malfunctions. Nevertheless, to provide a robust picture of the risks associated with the Project, the Board considers it important to analyze both the likelihood of such events and the significance of the effects that could result from such events, even if they are unlikely.

This chapter therefore includes a discussion of the potential environmental effects of a spill that might result from accidents and malfunctions involving the Project, such as a spill from the pipeline, from the storage terminals or from the WMT. Chapter 9 provides an assessment of the likelihood of such events occurring, and Section 10.2.17 provides the Board's recommendation with respect to whether there are likely to be significant adverse environmental effects from any accidents and malfunctions. Chapter 14, Section 14.9 discusses the potential environmental effects of spills from Project-related increase in marine vessels on various valued environmental components.

10.1.4.4 Cumulative effects

Trans Mountain evaluated the significance of the Project's contribution to cumulative effects, rather than the significance of total cumulative effects (i.e., cumulative effects from past, existing and reasonably foreseeable physical facilities and activities, including the Project's effects). The Board questioned Trans Mountain regarding its methodology. Although Trans Mountain provided significance evaluations of total cumulative effects for each valued component as the Board requested, it maintained its argument that the Project's contribution to cumulative effects, rather than total cumulative effects, should be the key focus of the assessment.

Views of the Board

The Board does not accept Trans Mountain's position that the Project's contribution to cumulative effects, rather than total cumulative effects, is the appropriate focus for cumulative effects assessment.

Paragraph 19(1)(b) of the CEAA 2012 requires consideration of the significance of the environmental effects described in paragraph 19(1)(a), which includes the cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out. The Board finds this to mean that the focus of any cumulative effects assessment should be on the total cumulative effects. Consistent with this, the Board's Filing Manual states that the "evaluation of significance must focus on the total cumulative effect that may be created from all physical facilities and activities considered in combination with the proposed project." By focusing on total cumulative effects, cumulative effects assessment differs from project-specific effects assessment, and considers what is often the primary threat to valued components; namely the total cumulative effects on that component.

The Board notes that, although the focus when considering the significance of cumulative effects should be on total cumulative effects, the Project's relative contribution to total cumulative effects is also relevant. Thus, for example, if total cumulative effects are considered to exceed a relevant threshold for a particular valued component, then effects on that component will generally be found to be significant unless the Project contribution to total cumulative effects is inconsequential. Such thresholds might include, for example:

- Pollutants exceeding established standards or guidelines.
- A species being at risk because of cumulative effects.
- Habitat disturbance for a species of conservation concern or for a valued ecosystem exceeding an established threshold (such as for linear disturbance density) or otherwise being of sufficient concern to deserve no-net-loss.

If there is no relevant threshold for a valued component but cumulative effects are nevertheless considered substantial, then effects on that component may be found to be significant unless the Project contribution to total cumulative effects is relatively minor.

In the MH-052-2018 hearing, several intervenors raised concerns about the cumulative effects methodology. This issue is discussed in Chapter 14, along with the Board's corresponding views.

10.1.4.5 Mitigation hierarchy and offset measures

The Board requires companies to make considerable efforts to **prevent or avoid** environmental impacts and, if impacts are unavoidable, to **minimize and reduce** them. Where residual effects remain (i.e., the effects cannot be avoided or fully mitigated), **offset** measures can be used to help counteract those effects on a local or regional level.

Offset measures should generally not be seen as a replacement for the other options preceding it in the mitigation hierarchy, but rather be considered a last resort when reasonable efforts at avoidance and mitigation have been exhausted. In such cases, offsets can prove to be an effective tool for balancing environmental protection and development.

In this chapter, the Board has introduced several conditions that would require Trans Mountain to develop offset plans to counter unavoidable residual effects on certain valued components. For example, the Board requires offsets for a number of valued components for which cumulative effects exceed a relevant threshold but reasonable avoidance and mitigation measures are not able to bring the Project contribution down to levels that are inconsequential.

The concept of offsets could vary for each valued component: however, there are some general principles, including:

- equivalency (i.e., compensating with equivalent ecological function at another site);
- additionality (i.e., providing protection beyond business-as-usual or what would have happened anyway);
- comparable location (i.e., offset site should have comparable ecosystem values such as species composition and habitat structure);
- timing (i.e., avoiding or allowing for time lags between impact and compensation);
- duration (i.e., ensuring offset sites are protected for an appropriate amount of time, which may be long-term); and
- accountability (e.g., formalized protection).

The Board expects these principles to be applied in offset plans.

10.1.5 Follow-up program

Trans Mountain committed to a post-construction environmental monitoring program. The Board would impose conditions requiring Trans Mountain to include consideration of soils, weeds, watercourse crossings, riparian vegetation, wetlands, rare plants, lichens and ecological communities, municipal tree replacement, wildlife and wildlife habitat, fish and fish habitat, marine fish and fish habitat, marine birds, marine mammals and species at risk, as part of its post-construction environmental monitoring program. Trans Mountain committed to continue to monitor any unresolved environmental issues remaining after five years, until they are resolved. The Board would impose other conditions incorporating monitoring requirements, such as a ten year monitoring requirement for grasslands.

Paragraph 29(1)(b) of the CEAA 2012 requires a follow-up program. This is intended to verify the accuracy of the predictions regarding potential environmental effects and to determine if mitigation measures are working as intended. The Board's conditions would require Trans Mountain to undertake environmental monitoring, compare results with predicted effects, assess mitigation success, take remedial actions if needed, and report monitoring results and actions taken. Collectively, these requirements constitute a follow-up program under the CEAA 2012.

The Board's conditions also incorporate adaptive management, requiring the implementation of new or modified mitigation measures over the life of the Project in response to mitigation measures that do not achieve full success and to address unanticipated environmental effects.

10.1.6 Adaptive management

A number of participants discussed the interplay of adaptive management and the precautionary principle. Pro Information Pro Environment United People Network (PIPE UP), for example, emphasized adaptive management must be applied in a precautionary manner and said it is not appropriate if:

- potential effects and mitigation strategies are not sufficiently well known to control risk;
- the risk of harm to human health or species at risk may be serious or irreversible; or
- there is a lack of baseline information, conditions do not allow for effective monitoring using appropriate indicators, or there are no thresholds to trigger remedial action.

Adaptive management was also raised in the MH-052-2018 hearing in the context of Project-related marine shipping. This is discussed in Chapter 14, along with the Board's corresponding views.

Views of the Board

The Board generally agrees with the cautions expressed by PIPE UP, as summarized above, concerning reliance on adaptive management, understood here to typically mean the planned application of corrective actions in response to the results of monitoring which is designed to determine if environmental effects and mitigation success are proceeding as expected. In situations where effects may be significant, the Board agrees with PIPE UP that adaptive management should generally not be relied upon to conclude effects will not be significant if there is insufficient understanding of the risks or of the efficacy of mitigation or corrective actions, or where there is insufficient confidence in the effectiveness of monitoring to determine the need for corrective actions. However, in appropriate circumstances, adaptive management can be an important part of the follow-up program for a project to allow for uncertainties. The Board's conditions also incorporate adaptive management, requiring the implementation of new or modified mitigation measures over the life of the Project in response to mitigation measures that do not achieve full success and to address unanticipated environmental effects. For example, Conditions 36, 37, 149 and 150 require Trans Mountain to provide a pre-construction assessment of caribou habitat that could be affected by the Project, a restoration plan for such habitat including quantifiable targets and performance measures to evaluate restoration effectiveness, a monitoring program to verify the effectiveness of restoration measures that includes protocols for how restoration measures will be adapted as required based on monitoring results, and reporting on such effectiveness and adaptations. More generally, for all valued environmental components, Condition 151 requires Trans Mountain to include goals, monitoring results, corrective actions taken, and the observed success of such actions, in each post-construction monitoring report.

10.1.7 Alternative means of carrying out the Project

Section 19 of the CEAA 2012 identifies factors that must be considered in the environmental assessment of a designated project, including "alternative means" of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means.

The Board considered alternative means of carrying out the proposed Project, such as options for alternate locations, routes, construction methods and mitigation measures.

Trans Mountain committed to avoid sensitive areas as feasible when selecting the pipeline corridor and considered alternative construction measures such as trenchless watercourse crossings where that would reduce potential adverse environmental effects resulting from the Project. Trans Mountain committed to use least-risk timing windows and setback distances to reduce effects on wildlife and fish and their habitat during sensitive periods, Trans Mountain said that, in the event of conflicts between the least-risk windows and the construction schedule, it would consult with the appropriate regulatory authorities to develop appropriate mitigation.

A detailed discussion of alternative means of carrying out the Project is included in Chapter 11, Section 11.1, along with the Board's views. Chapter 14, Section 14.6.2 provides a discussion of alternate marine terminal locations, alternate shipping routes and mitigation options the Board considered for Project-related marine shipping in the MH-052-2018 hearing.

10.2 Environmental effects

In reaching its recommendations regarding the significance of adverse environmental effects on the valued environmental components, the Board considered Trans Mountain's environmental assessment, as well as all relevant evidence from intervenors and commenters, including where concerns were raised related to environmental issues resulting from Project construction and operations, and accidents and malfunctions that may occur in relation to the Project.



Project-related increase in shipping activities

The views in Chapter 14 are those of the Reconsideration Panel. The Reconsideration Panel assessed the relevant OH-001-2014 evidence, all of which was brought forward onto the Reconsideration record, and new and updated evidence related to the Reconsideration List of Issues. To the extent that any of the wording in the current views is similar to the OH-001-2014 views it is because the Board adopted those views based on its review of the record.

14.1 Overview

The environmental assessment of Project-related marine shipping under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) is the focus of this Reconsideration. On 30 August 2018, the Federal Court of Appeal set aside the Governor in Council's (GIC) Order directing the Board to issue the Certificate for the Project. As a result, on 20 September 2018, the GIC referred aspects of the Board's OH-001-2014 Report for the Project back to the Board for Reconsideration through Order in Council P.C. 2018-1177 (OIC). In particular, the OIC required the Board to take into account the environmental effects of Project-related marine shipping in view of the requirements of the CEAA 2012, and the adverse effects of Project-related marine shipping on species at risk in view of any requirements of section 79 of the *Species at Risk Act* (SARA). After considering comments from the public, the Board decided, on a principled basis, to include Project-related marine shipping between the Westridge Marine Terminal (WMT) and the 12-nautical-mile territorial sea limit in the "designated project" to be assessed under the CEAA 2012. As a result, the Board conducted a comprehensive environmental assessment of Project-related marine shipping under the CEAA 2012 and in accordance with the requirements of the SARA. This is in keeping with the OIC, Tsleil-Waututh Nation Court decision, Issue No. 5 on the List of Issues for the OH-001-2014 hearing and the List of Issues for the MH-052-2018 hearing, generally (both are found in Appendix 1).

The Board's regulatory oversight of the Project reaches from Edmonton to Burnaby, up to and including the WMT. The Board does not have regulatory oversight of marine vessel traffic. Other Federal Departments and Agencies, including Transport Canada, Vancouver Fraser Port Authority, Pacific Pilotage Authority and the Canadian Coast Guard have authority over a broad and detailed regulatory framework governing safety, security and environmental protection in relation to marine shipping, which would cover tankers associated with the Project. Trans Mountain also does not own or operate Project-related marine vessels. While Trans Mountain exercises initial control at WMT, it has very limited control over tankers once they leave the WMT.

During the OH-001-2014 and MH-052-2018 hearings, the Board heard concerns from many participants related to marine shipping, navigation and safety. Many participants expressed concerns regarding increased spill risk as a result of increased

Project-related tanker traffic, and the environmental and socio-economic effects that would result from spills. The Board also heard from Trans Mountain and some participants, including government departments, regarding the existing protections they said were already in place with respect to marine vessel traffic.

As a component of the CEAA 2012 environment assessment in the Reconsideration, the Board assessed the environmental effects of the routine operation of Project-related marine shipping, including cumulative environmental effects. The Board finds that Project-related marine vessels are not likely to cause significant adverse environmental effects on air emissions, marine fish and fish habitat, marine mammals (other than Southern resident killer whale (SRKW)), marine birds, socio-economic conditions (including marine commercial, recreational and tourism use), heritage resources, traditional marine and resource use (other than those associated with the SRKW), and human health.

However, the Board finds that greenhouse gas emissions from Project-related marine vessels would result in measurable increases and, taking a precautionary approach, are likely to be significant.

In addition, the Board finds that the routine operation of Project-related marine vessels are likely to cause significant adverse environmental effects on SRKW, and traditional marine and resource use associated with the SRKW. The SRKW population has crossed a threshold where any additional adverse environmental effects would be considered significant. Project-related marine shipping would overlap SRKW critical habitat along the shipping route, and add to both underwater noise and the risk of strikes throughout that route. While the effects from Project-related marine shipping will be a small fraction of the total cumulative effects, and the level of traffic is expected to increase with or without the Project, the increase in marine vessels associated with the Project would further contribute to cumulative effects that are already jeopardizing the recovery of SRKW. The Board recognizes the stated cultural importance of the SRKW to certain Indigenous groups.

The Board also assessed the environmental effects of malfunction or accidents (i.e., spills) that may occur in connection with Project-related marine shipping. This included consideration of air quality, shoreline and near shore habitats, marine fish, marine birds, marine mammals, marine commercial, recreational and tourism use, heritage resources, community well-being, traditional marine resource use, and human health. The Board finds that the environmental effects of a spill from a tanker would be highly dependent on the particular circumstances, such as the amount and type of product(s) spilled, location of the spill, response time, the effectiveness of containment and clean-up, the valued components that are impacted, and the weather and time of year of the spill. The Board is of the view that although impacts from a credible worst-case spill would probably be adverse and significant, natural recovery of the impacted areas and species would likely return most biological conditions to a state generally similar to pre-spill conditions. Such recovery may be as quick as a year or two for some valued components, or may take as long as a decade or more for others. Valuable environmental values and uses could be lost or diminished in the interim. For some valued components, including certain SARA-listed species, recovery to pre-spill conditions may not occur.

The Board finds that the robust marine shipping regulatory framework, safety measures including Trans Mountain's commitment to support and adopt the TERMPOL Review Committee's findings and recommendations, expert pilotage, and enhanced tug escort all play a significant role in spill prevention. The Board gave significant weight to this evidence from the Pacific Pilotage Authority, BC Coast Pilots Ltd., Trans Mountain, and Federal Departments and Agencies. The fact that pilots on the west coast of Canada have moved crude oil carriers without incident for over 50 years supports a conclusion that Project-related marine shipping can be conducted safely. Additional evidence that pilots can safely handle increased volumes reinforces this view. The Board also notes that the TERMPOL Review Committee had not identified any regulatory concerns, associated with Project-related tankers, for the tankers, tanker operations, the proposed routes, navigability, other waterway users and the marine terminal operations. The Committee said that implementation of its findings and recommendations, in conjunction with Trans Mountain's commitments, would provide for a higher level of safety for tanker operations commensurate with the increase in traffic. The Board remains of the view that although a large spill from a tanker associated with the Project would result in significant adverse environmental and socio-economic effects, such an event is not likely.

In the unlikely event of a spill, the Board finds that Trans Mountain's marine emergency preparedness and response planning is adequate in light of the existing marine spill response regulatory framework, Trans Mountain's enhanced oil spill response regime, and other improvements from federal departments and agencies, including the Canadian Coast Guard. The Board also notes that there is an existing regulatory regime in place related to marine financial liability and compensation to address a spill event.

The Board set out conditions regarding Project-related marine shipping that it considers necessary or desirable in the public interest, should the Project be approved by the GIC. Conditions include technically and economically feasible mitigation measures to eliminate, reduce, or control the adverse environmental effects of Project-related marine shipping in accordance with CEAA 2012. The Board also provided recommendations for measures to mitigate, avoid, or lessen the effects of Project-related marine shipping that are within the authority of the GIC, but beyond the scope of the Board's regulatory authority and Trans Mountain's control. Furthermore, the Board considered measures that would avoid or lessen

any adverse environmental effects of Project-related marine shipping on all SARA-listed species and their critical habitat, and to monitor them under subsection 79(2) of the SARA.

A summary of mitigation measures, regulatory requirements, current initiatives, and additional recommended measures considered by the Board is set out in Table 23. The Board took into account mitigation measures specific to Project-related vessels and regulatory requirements in its CEAA 2012 significance evaluation and under section 79 of the SARA. The current and additional initiatives and other recommended measures in Table 23 were not taken into account in the Board's significance evaluation, but may still be relevant to the justification analysis under the CEAA 2012 and the requirements of the SARA.

The Board considered other factors required under section 19 of the CEAA 2012, including comments from interested parties, purpose of the designated project, effects of the environment on Project-related marine shipping, requirements of follow-up programs, as well as community knowledge and Indigenous traditional knowledge. The Board also finds that Trans Mountain provided an adequate assessment, of technically and economically feasible alternative means of carrying out Project-related marine shipping, such as alternative marine terminal locations, alternate marine shipping routes, and alternate mitigation options to reduce effects.

The table below identifies the various topics and the corresponding section numbers where the evidence and the Board's views on each topic can be found in this chapter.

Section	Topic
14.1	Overview
14.2	Description of Project-related marine shipping
14.3	Regulatory framework
14.4	Public consultation
14.5	CEAA 2012 and SARA requirements
14.6	Purpose of the Project and alternative means
14.7	Environmental effects assessment (routine operations)
14.8	Socio-economic effects assessment (routine operations)
14.9	Environmental effects of malfunctions or accidents (spills)
14.10	Socio-economic effects of malfunctions or accidents (spills)
14.11	Spill prevention, risk analysis, and emergency preparedness
14.12	Financial responsibility, liability, and insurance
14.13	Other CEAA 2012 Factors

14.2 Description of Project-related marine shipping

As described in Chapter 1, the Project would result in the looping (or twinning) of the existing 1 147 km TMPL system between Edmonton and Burnaby with about 987 km of new buried pipeline. The Project would increase the capacity of the existing TMPL system from 47 690 m³/d (300,000 bbl/d) to 141 500 m³/d (890,000 bbl/d) of crude petroleum and refined products. Currently, Panamax tankers (less than 75,000 metric tonnes deadweight tonnage (DWT)) and Aframax tankers (75,000 to 120,000 metric tonnes DWT) call at the WMT. The existing WMT typically loads five tankers per month. The proposed expanded system associated with the Project would increase the WMT's loads to approximately 34 Aframax class vessels per month, with actual demand driven by market conditions.

14.2.1 Description and extent of the existing, future, and Project-related shipping activities

As set out in the OH-001-2014 Report, Trans Mountain said that it does not own or operate the vessels associated with existing marine shipping operations, nor will it directly own or operate those associated with the Project. Trans Mountain said that all large vessels destined for the Port of Vancouver, including those that would be associated with the Project, use existing shipping routes (Figure 25). It said that these routes are suitable for safe transit by current and future Project-related tankers. The route is approximately 160 nautical miles (296 km) in total between the WMT and the 12-nautical-mile limit off the west end of the Strait of Juan de Fuca. The passage takes approximately 14 to 15 hours to navigate, including about 8 hours transit time from the pilot boarding station near Victoria, B.C. to the WMT. The vessel speed would vary between 6 to 14 knots, depending on the route segment and on whether the tankers are empty or laden. Trans Mountain said that such speeds have proven to be both safe and efficient over many years of operating practice.

Trans Mountain provided a summary of the existing and future vessel movements at five locations in the Regional Study Area (RSA)¹⁰⁶ (Table 22). Trans Mountain said that future marine vessel movements in the RSA were projected to have a growth rate of two per cent per annum through to 2030 for marine tankers, including oil tankers, chemical tankers and liquefied natural gas (LNG) carriers. It said that cargo carriers and container ships were projected to grow at one per cent per annum through to 2030 and that the projected growth rate for all other marine vessels (e.g., tugs, barges, government vessels, passenger vessels and all other vessels) was also one per cent per annum over the same time period, with the exception of fishing vessels, which were projected to have a zero per cent growth rate. Trans Mountain identified multiple proposed development projects (e.g., Roberts Bank 2 Expansion Project, Fraser Surrey Docks and Gateway Pacific Terminal) and said, if approved, these developments are expected to contribute to the increase in commercial marine vessel traffic in Burrard Inlet, the Strait of Georgia, Haro Strait and Strait of Juan de Fuca. Trans Mountain also said that proposed parks and other recreational areas in the RSA that include marine components may also contribute to future increases in marine use by recreational and tourism users.

Trans Mountain said that Panamax tankers (less than 75,000 metric tonnes DWT) and Aframax tankers (75,000 to 120,000 metric tonnes DWT) call at the WMT.

¹⁰⁶ For the marine transportation component, the RSA extends from the WMT to the 12-nautical-mile limit and is of variable width extending from the marine shipping lanes, depending on the indicator.

Table 22: Trans Mountain's summary of existing and future vessel movements at five locations in the Regional Study Area

Location of cross-section ¹		Vessel movements by vessel type in 2012 (#/yr)										Project-related vessel movement ¹⁰ (#/yr)			Project-related tanker contribution to 2012 vessel traffic (%)	Project-related tanker and tug contribution to 2012 vessel traffic (%)	Estimated increase in non-Project vessel movements by 2030 (#/yr)	Estimated total vessel movements in 2030 (#/yr)	Project-related tanker contribution to total projected future vessel traffic (%)	Project-related tanker and tug contribution to total projected future vessel traffic (%)
Name	Description	Tankers ²	Cargo/Carriers ³	Tugs ⁴	Service ⁵	Passenger ⁶	Fishing ⁷	Others ⁸	Unknown ⁹	Total	Tanker	Tug	Total							
Burrard Inlet	North-south across Burrard Inlet just west of the WMT	263	108	5,631	473	68	25	261	29	6,858	720	2,160	2,880	9.5	29.6	1,401	11,139	6.5	25.9	
English Bay	North-south from Point Atkinson in West Vancouver to Point Grey area in Vancouver	384	3,170	5,755	682	477	192	1,244	337	12,241	720	720	1,440	5.6	10.5	2,453	16,134	4.5	8.9	
Strait of Georgia	Northeast across southern Strait of Georgia, from Delta near Tsawwassen to Active Pass area	385	5,301	3,237	1,316	5,634	459	672	590	17,594	720	720	1,440	3.9	7.6	3,450	22,484	3.2	6.4	
Haro Strait	Northeast from Victoria area east to San Juan Island	391	4,506	975	850	506	300	907	461	8,896	720	720	1,440	7.5	13.9	1,777	12,113	5.9	11.9	
Strait of Juan du Fuca	Southeast from Victoria to Port Angeles area	1,197	7,695	2,294	2,189	2,146	742	1,409	831	18,503	720	720	1,440	3.7	7.2	3,762	23,705	3.0	6.1	

Source: TERMPOL 3.2 (Volume 8C, TR 8C-2)

- Notes:**
- 1 Cross-sections were placed across the shipping lanes to characterize the movements of vessels in the area that may be travelling in or adjacent to the shipping lanes.
 - 2 Tanker traffic includes all chemical and petroleum products.
 - 3 Cargo/carrier includes bulk carriers and general cargo carriers.
 - 4 Tug traffic includes all tug movements, such as tugs engaged in towing and barging activities and harbour assist tugs.
 - 5 Service vessels include: law enforcement/patrol vessels, military vessels, pilot vessels, pollution control vessels, research/survey vessels, dredges, and others.
 - 6 Passenger includes ferries and cruise ships. While cruise ships operate in the summer months, most ferry services are year round. Strait of Georgia passenger vessel movements may be biased due to placement of the cross-section parallel to major ferry routes and may include more than one instance per ferry crossing. Due to the fact that the passenger vessels category combines ferry and cruise ship traffic, ferry movements were estimated as 1 per cent per annum from 2012 to 2030.
 - 7 Fishing: only fishing vessels greater than 24 m in length and 150 gross tonnes are required to call in to VTS. Smaller vessel movements are not captured.
 - 8 'Other' category may include pleasure craft greater than 30 m in length (required to call into VTS).
 - 9 'Unknown' category is likely to include private recreational vessels and all vessels smaller than 30 m that are not required to call into VTS.
 - 10 Tanker numbers calculated as: 30 vessels/month × 12 months/yr × 2 transits/vessel (inbound + outbound). Tug numbers calculated assuming 3 escort tugs for outbound tankers in Burrard Inlet and 1 escort tug for outbound tankers along the remainder of the shipping lanes. Tug numbers include outbound trip (i.e., while escorting tanker) and inbound trip (i.e., returning to point of origin).

Trans Mountain said the existing WMT typically loads five tankers per month. The expanded system associated with the Project would require approximately 34 Aframax class vessels per month, with actual demand driven by market conditions. Aframax vessels would be the maximum size of vessel accessing WMT.

Trans Mountain said that if the Project was approved, the Project-related increase in marine traffic within Burrard Inlet would represent approximately 16.4 per cent of total marine traffic volume, compared to the current 3.0 per cent. It also said that within the Strait of Juan de Fuca, Project-related tanker traffic would increase to about 6.6 per cent of total marine traffic volume as compared to the current 1.1 per cent.

Ms. Michelle Baudais said that Project-related tanker traffic east of the Second Narrows bridge would account for an even higher percentage of total large vessel traffic as compared to consideration of large vessel traffic within Burrard Inlet overall.

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NS NOPE, BROKE and others said that the increase in tanker traffic due to Project-related marine shipping is understated by Trans Mountain, and is much larger than the seven-fold increase as described by Trans Mountain. NS NOPE filed a report noting Trans Mountain's claim that WMT currently serves on average five tankers per month is inaccurate, and that from 2011 to 2017 the figure has ranged from just over one per month in 2016 to four per month in 2012 and 2013, with an average of less than three per month. The report said that three berths should not be required to accommodate the increased tanker traffic at WMT. Relying on the same report, BROKE said that with the proposed pipeline capacity and number of tanker berths, the Project could result in at least a 20-fold increase in tanker traffic between 2015 and 2017 as compared to the 7-fold increase described by Trans Mountain.

Trans Mountain said that the amount of vessel traffic can fluctuate month to month based on market conditions and other factors. Trans Mountain said it carried out extensive analysis in the OH-001-2014 hearing of projected berth utilization under different conditions and determined that three berths are necessary in order to conduct the daily maximum transfer smoothly without placing undue pressure on anchorages within the Port of Vancouver. It said Project-related tankers will anchor at anchorage locations that have been established within the jurisdiction of the Vancouver Fraser Port Authority (VFPA) and have been utilized by various types of vessels, including tankers, in the past. It said that it is expected that tankers will anchor at the three anchorages east of Second Narrows, and pressure on anchorages will be reduced by holding tankers at the dock whenever a berth is available, even if cargo transfer is not planned immediately. Trans Mountain said this is an advantage of having three berth locations available. VFPA said it does not anticipate the number of anchorages will have to be increased to service Project-related tanker traffic.

The Vancouver Fraser Port Authority said that from 2015 to 2017, there has been a 4 per cent total increase in foreign vessel arrivals in Burrard Inlet. Vancouver Fraser Port Authority said that at present, about 3,160 vessels call the Port of Vancouver each year, which is about nine ships per day. Based on its 2016 analysis, Vancouver Fraser Port Authority forecasts the number of vessel calls to the Port of Vancouver may increase to about 12 ships per day by 2026. It also said that the Port of Vancouver sees about 30 to 50 crude oil tankers per year. With the Trans Mountain pipeline expansion project, this number could increase to about 400 tankers per year, or about 11 per cent of total vessel traffic.

Views of the Reconsideration Panel

The Board, in its reasons related to the List of Issues for the MH-052-2018 hearing, noted that the existing Westridge Marine Terminal typically loads five tankers per month and that the expanded system associated with the Project would require approximately 34 Aframax class vessels per month, with actual demand driven by market conditions. The Board also heard evidence during the OH-001-2014 hearing that actual tanker numbers could vary depending on whether Panamax or Aframax class tankers were used. The Board reiterates that Project-related variations in incremental tanker shipments above the base/current project tanker shipments has been addressed in its OH-001-2014 Report. The Board accepts Trans Mountain's evidence regarding projected increase in tanker traffic due to Project-related marine shipping and is of the view that Trans Mountain's estimates are reasonable. In any event it is the Project-related marine shipping total of approximately 34 Aframax vehicles per month which has been the focus of the Board's analysis, as it was during the TERMPOL process. The Board recognizes there will be variation in the actual increase in vessels depending on which time periods the increases are measured from and what actual market demand will be. The Board gives considerable weight to the fact that the variation in tanker numbers within the range noted by NS NOPE and BROKE does not materially affect the results of the marine shipping quantitative risk analysis as discussed in Section 14.11.2 and related Views of the Board.

In regard to projected berth utilization, the Board is of the view that utilizing three berths would reduce undue pressure on existing anchorages as also noted by Trans Mountain. The Board finds that this issue was also considered in the OH-001-2014 hearing and the TERMPOL Review Committee did not find any concerns with the berth layout and design. The Board accepts that Trans Mountain will minimize the demand for anchorages by increasing berth use,

specifically by keeping vessels alongside in circumstances when they would typically use an anchorage. Therefore, the Board finds Trans Mountain's projected berth utilization reasonable.

14.3 Regulatory framework

14.3.1 Overview of existing regulatory framework for marine shipping

As set out in the OH-001-2014 Report, the Board's regulatory oversight of the Project reaches from Edmonton to Burnaby, up to and including the WMT. The Board does not have regulatory oversight of marine vessel traffic. However, evidence filed by many participants, including Trans Mountain, Transport Canada, Vancouver Fraser Port Authority, Pacific Pilotage Authority and the Canadian Coast Guard sets out a broad and detailed regulatory framework governing safety, security and environmental protection in relation to marine shipping, which would cover tankers associated with the Project. A summary of the framework is provided here.

International

Transport Canada said that regulations and standards that govern shipping operations are implemented through international agreements. It said that countries negotiate their governments' approved positions on international standards for the safety, security and environmental performance of international shipping, and, once agreement has been reached, member countries, like Canada, must create regulatory frameworks for the shipping industry that reflect the agreement. Transport Canada said there are over 50 International Maritime Organization (IMO) conventions covering a range of topics. Canada is a member state and signatory to most conventions. The conventions are reflected in Canada's marine safety and security system, including the *Canada Shipping Act, 2001*. Canadian maritime laws apply to all vessels operating in Canadian waters, and to Canadian vessels worldwide.

In addition to the IMO conventions, Canada and B.C. have other cooperative agreements and working relationships in place with the United States regarding spill prevention and response.

Some of the major conventions and agreements include:

International Convention / Agreement	Highlights
International Convention for the Safety of Life At Sea (SOLAS)	<ul style="list-style-type: none"> how a vessel is constructed, its required safety equipment and establishes security requirements
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)	<ul style="list-style-type: none"> the competencies of a vessel's crew
International Convention for the Prevention of Pollution from Ships (MARPOL)	<ul style="list-style-type: none"> limits on a vessel's operational discharges and sets detailed technical standards for: <ul style="list-style-type: none"> carrying and handling oil; carrying and handling noxious liquid substances in bulk; carrying packaged dangerous goods; and managing vessel sewage discharges, garbage and air emissions
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)	<ul style="list-style-type: none"> measures for dealing with pollution incidents, including oil pollution, either nationally or in co-operation with other countries
Maritime Labour Convention, 2006	<ul style="list-style-type: none"> standards for protecting the rights of seafarers
United Nations Convention on the Law of the Sea (UNCLOS)	<ul style="list-style-type: none"> sovereign rights that a coastal state can exercise in these areas of the sea the rights that other countries can exercise when they wish to undertake activities in these areas of the sea
International Maritime Organization's 2011 Guidelines for the Control and Management of Ship's Biofouling	<ul style="list-style-type: none"> voluntary guidelines that encourage the ship-owners to adopt practices to control and manage biofouling
International Convention on the Control of Harmful Anti-fouling Systems	<ul style="list-style-type: none"> prohibits, and/or restricts the use of harmful anti-fouling systems
Pacific States/British Columbia Oil Spill Task Force	<ul style="list-style-type: none"> emphasizes working together to reduce the likelihood of a transboundary spill occurring and to improve spill response

International Convention / Agreement	Highlights
Canada-United States Joint Marine Pollution Contingency Plan	<ul style="list-style-type: none"> Canadian Coast Guard and United States Coast Guard agreement to provide a coordinated system for planning, preparedness and responding to pollution incidents in contiguous Canadian and US waters.
Transboundary exercises and mutual aid agreements	<ul style="list-style-type: none"> CCG and United States Coast Guard hold joint planning and response exercises in the Strait of Juan de Fuca on an annual basis in the event of a cross-border oil spill, a mutual aid plan for the members of the Pacific States-British Columbia Oil Spill Task Force would be activated in order to coordinate the movement of mutual aid resources Western Canada Marine Response Corporation (WCMRC) participates in annual joint exercises, and cross border mutual aid exercises with partners in Washington and Alaska Transboundary cooperation is described in more detail in Section 14.11.3

National

Trans Mountain said that Transport Canada is responsible for Canada's transportation policies and programs that promote safe, secure, efficient and environmentally responsible transportation.

Participants filed evidence to show the role that federal departments have in regulating marine shipping activities or in marine spill response. Highlights are provided here:

Department	Legislation / Program	Highlights
Transport Canada	<i>Canada Shipping Act, 2001</i>	<ul style="list-style-type: none"> Part 4, which covers safety; Part 5, which covers navigation services; Part 8, which covers environmental preparedness and response, and is the foundation of Transport Canada's programs that certify Response Organizations and inspect oil handling facilities. Transport Canada requires response plans for Response Organizations to be based on regulations and planning standards set out under the Response Organizations Standards TP 12401 Part 9, which prohibits discharge of prescribed pollutants, requires vessels to have pollution emergency plans and grants the Minister of Transport the authority to direct vessels that have discharged or are likely to discharge pollutants; and Part 11, which relates to oversight and enforcement.
Transport Canada	<i>Ballast Water Control and Management Regulations</i>	<ul style="list-style-type: none"> vessels must have a ballast water management plan before arriving at the port regulations outlines measures and procedures for safe and effective ballast water management
Transport Canada	<i>Marine Transportation Security Act (MTSA)</i>	<ul style="list-style-type: none"> provides for the security of marine transportation
Transport Canada	<i>Marine Liability Act (MLA)</i>	<ul style="list-style-type: none"> establishes the Ship-Source Oil Pollution Fund and provides funding for spills from all classes of vessels in Canada MLA is discussed more in Section 14.12.
Transport Canada	TERMPOL review process	<ul style="list-style-type: none"> focuses on the marine transportation components of a project and examines the safety of tankers entering Canadian waters, navigating through channels, approaching berthing at a marine terminal and loading or unloading oil or gas TERMPOL report is discussed more in Sections 14.11.1 and 14.11.2.
Fisheries and Oceans Canada (DFO) / Canadian Coast Guard (CCG)	<i>Fisheries Act</i>	<ul style="list-style-type: none"> CCG, as a Special Operating Agency of DFO, provides maritime services related to navigation, spill response, communication, security, and search and rescue for a spill, CCG assumes role of on-water federal lead agency, monitoring the overall effort of the response organization to ensure it is timely, effective, and appropriate to the incident within Canadian waters and the Exclusive Economic Zone, CCG is responsible for providing aids to navigation and waterways management services, and providing marine communication and traffic services

Department	Legislation / Program	Highlights
Environment and Climate Change Canada (ECCC)	National Environmental Emergencies Centre (NEEC)	<ul style="list-style-type: none"> provides ECCC's technical and scientific environmental advice and assistance to the Lead Agency in the event of an environmental emergency uses a mapping application and data viewing portal, enabling quick identification of the location of an incident, its geographical context, and environmental concerns and protection priorities consolidates geospatial data for the purpose of delivering expert advice in a variety of formats – maps, reports and other associated documentation are delivered to the lead agency and others that assist on environmental emergencies. NEEC conducts post-emergency assessment, provides specialized advice on shoreline cleanup assessment technique, and provides advice on ecosystem recovery objectives.
ECCC	<i>Sulphur in Diesel Fuel Regulations</i>	standard setting the allowable sulphur levels in marine diesel fuel available for large ships

Provincial

While the federal government has constitutional authority for navigation and shipping, both the provincial and federal governments have shared authority over the environment. The province also has authority for the management of provincial lands and natural resources.

Province	Program	Highlights
Province of British Columbia	<i>Environmental Management Act</i>	<ul style="list-style-type: none"> Managing discharge of pollutants Environmental Emergency management Cost recovery from a spiller (polluter pays)
Province of British Columbia	<i>Wildlife Act</i>	<ul style="list-style-type: none"> Protection of wildlife
Province of British Columbia	<i>B.C. Emergency Program Act</i>	<ul style="list-style-type: none"> Environmental Emergency management

Regional

There are also regionally-focused bodies and organizations that have a role in regulating marine shipping activities or in marine spill response. Highlights are as follows:

Agency / Authority	Authorization	Highlights
Western Canada Marine Response Corporation (WCMRC)	<i>Canada Shipping Act, 2001</i>	<ul style="list-style-type: none"> ensure emergency preparedness and response capacity in the event an oil spill occurs in the marine environment on the west coast of B.C. WCMRC is discussed further in Section 14.11.3.
Vancouver Fraser Port Authority	<i>Canada Marine Act</i>	<ul style="list-style-type: none"> facilitate trade, ensuring goods are moved safely, while protecting the environment and considering local communities responsible for the operation and development of the assets and jurisdictions of the former Fraser River Port Authority, North Fraser Port Authority and Vancouver Port Authority, which were amalgamated in 2008 responsible for managing over 16,000 hectares of water, over 1,000 hectares of land and assets along hundreds of kilometres of shoreline
Pacific Pilotage Authority (PPA)	<i>Pilotage Act</i>	<ul style="list-style-type: none"> mandate is to provide a safe, reliable and efficient marine pilotage service on the west coast of Canada pilots are a resource to the master and bridge team providing them with expert local knowledge, and are responsible to the master for the safe navigation of the vessel while it is in British Columbia pilotage waters provides added level of safety to the vessel by placing a pilot on the vessel meaning at least one member of the bridge team has in-depth knowledge of local dangers, is not fatigued, and is a knowledgeable resource according to PPA, a robust pilotage is one of the tools used by governments to reduce a human error-based vessel incident.

Agency / Authority	Authorization	Highlights
BC Coast Pilots Ltd.	<i>Pilotage Act</i> <i>Canada Shipping Act, 2001</i>	<ul style="list-style-type: none"> · provides service to the Pacific Pilotage Authority · pilots have to meet rigorous levels of knowledge and experience requirements, and then be examined and licensed by the Pacific Pilotage Authority training program

In the MH-052-2018 hearing, Trans Mountain said that since the beginning of the Project in 2012, it has also maintained regular and consistent engagement and communications with United States regulatory authorities responsible for marine spill response and prevention at the federal, state, and local level to ensure they have Project information.

The Chamber of Shipping said that most of the marine shipping-related challenges being considered in the MH-052-2018 hearing are already being addressed through actions implemented by the proponent, the Government of Canada through the Oceans Protection Plan, and the marine industry itself in collaboration with governments in Canada and the United States. The Chamber of Shipping submitted that non-regulatory approaches can be equally or more successful than a regulatory approach as they are adaptive in nature and can leverage lessons learned quickly.

The Board's Marine Technical Advisor said that he was of the view that the current regulatory regime provides an effective framework governing safety, security and environmental protection in relation to marine shipping. This view was based on his assessment of international and domestic regulatory requirements, proposed improvements under the Oceans Protection Plan, use of pilots, the continual decline in tanker incidents on a global basis, and the use of double hull tankers and escort tugs.

14.3.2 Federal improvement initiatives

World-class Tanker Safety System

In 2013, the Tanker Safety Expert Panel submitted their report, *A Review of Canada's Ship-source Oil Spill Preparedness and Response Regime — Setting the Course for the Future*, to the Minister of Transport. The review and report focused on the Ship-source Oil Spill Preparedness and Response Regime south of the 60th parallel as it was in 2013. Generally, the Tanker Safety Expert Panel found that "the foundational principles of the Regime have stood the test of time, but that there are a number of areas that could be improved to enhance Canada's preparedness and response to ship-source oil spills."

The Tanker Safety Expert Panel made 45 recommendations for action by the federal Government and by federal departments, including Transport Canada, the Canadian Coast Guard, ECCC and Fisheries and Oceans Canada. Among the recommendations are:

- Transport Canada should require Response Organizations to have in place the arrangements for cascading resources and mutual assistance agreements necessary to address a worst-case discharge in their Areas of Response.
- The Government of Canada should implement a risk-based Area Response Planning model to prepare for ship-source oil spills.
- Transport Canada should regularly review and update the national Risk Assessment for Marine Spills in Canadian Waters and make these results public.
- Using a consistent methodology, Transport Canada should perform regional risk assessments for each Area of Response and make the results public.
- The Canadian Coast Guard should invite other stakeholders who are involved in oil spill preparedness and response to participate during the planning process. The Area Response Plans should be made publicly available.

Transport Canada outlined its roles and responsibilities as part of the World Class Tanker Safety System (WCTSS) initiative. It said that:

- the WCTSS is a comprehensive, multiyear strategy for all of Canada and that it is independent of any energy infrastructure project;
- implementation of the WCTSS measures was already underway; and
- WCTSS initiatives take into consideration the advice of the Tanker Safety Expert Panel, stakeholder input and other analyses.

The Canadian Coast Guard said that Canada's marine navigation system was being modernized through investments related to the WCTSS. It said that it was investing in state-of-the-art navigational services and technologies, and working with Transport Canada to examine current Automated Information System carriage requirements.

The Canadian Coast Guard said that it would be establishing the Incident Command System across the organization as part of the WCTSS. It said that this system allows multiple stakeholders to participate in important decision-making processes simultaneously and allows for effective planning and response initiatives to address all marine pollution and all-hazard incidents in a predictable and structured fashion.

The Canadian Coast Guard also said that in conjunction with other partners, it would develop Area Response Plans, to gain a common understanding of the key planning elements, and to further improve the decision-making process. Partners engaged would include local stakeholders and representatives from Indigenous communities, industry, other federal government departments and other levels of government. It noted that the Area Response Plans would be improved through scientific research on pollutants and how they behave in water. The southern portion of B.C. was identified as pilot area for implementation of area response planning.

ECCC also outlined its role in informing preparedness and response decisions (e.g., providing scientific information to inform response), as well as its role in research (e.g., behaviour of transported substances) in relation to the World Class Tanker Safety initiative.

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Legislative Changes

The federal departments and agencies said that amendments to the *Canada Shipping Act, 2001* and the *Marine Liability Act* have been introduced as Bill C86. This bill received Royal Assent on 13 December 2018. These amendments:

- Allow the Minister of Transport to issue an interim order if immediate action is required to address a risk to the marine environment or marine safety, including on a pre-cautionary basis.
- Enhance the ability of the GIC, on the recommendation of the Minister of Transport, to make or temporarily amend regulations to protect the marine environment from the impacts of shipping and navigation activities.
- Clarify when a pollution response by the Canadian Coast Guard can begin by removing ambiguity around when the Canadian Coast Guard can provide direction to avoid a pollutant from reaching the water in the first place.
- Provide immunity from liability to external parties that the Canadian Coast Guard works with when conducting a response that have additional knowledge or expertise required to respond to a pollution incident, such as industry contractors, scientists, local experts, and Indigenous groups.
- Provide the Canadian Coast Guard with additional access authority for private property when conducting marine pollution prevention and response.
- Enhance deterrence and enforcement provisions under the *Canada Shipping Act, 2001* by raising the maximum potential administrative monetary penalty for contraventions of marine safety and environmental requirements from \$25,000 to \$250,000 per violation.
- Enable the Minister of Transport to provide time-limited exemptions from regulatory requirements and standards for the purpose of promoting research and innovation to enhance marine safety or the protection of the environment.

Transport Canada said the final report to the Minister of Transport regarding the *Pilotage Act* Review was publicly released in 2018. The report outlines 38 recommendations for improvements. Transport Canada has consulted on the report and its recommendations, and intends to introduce legislation by June 2019 to enable improvements in the effectiveness, efficiency and accountability of Canada's pilotage system.

Transport Canada said that it is reviewing the regulations and standards that govern Canada's oil spill response organizations, including the 1995 Response Organization Standards. To support this work, a discussion paper was prepared and released in May 2018. Feedback is being solicited from all interested stakeholders and Indigenous groups in response to this discussion paper.

The Oceans Protection Plan

The federal government intervenors discussed the Oceans Protection Plan (OPP) that was announced by the federal government on 7 November 2016. The objective of this \$1.5 billion initiative is to improve marine safety and responsible shipping, protect Canada's marine environment, and offer new possibilities for Indigenous and coastal communities. The objective of the OPP is delivered by Transport Canada, ECCC, Natural Resources Canada, DFO, and the Canadian Coast Guard. The OPP's initiatives are grouped in four pillars:

- Improve responsible shipping and protect Canada's waters, including measures to prevent incidents and accidents, while enabling rapid response actions in the event of a spill;
- Restore and protect the marine ecosystems and habitats, using new tools and research, as well as taking measures to address abandoned boats and wrecks;
- Strengthen partnerships and launch co-management practices with Indigenous communities; and
- Invest in oil spill response research and methods to ensure that decisions taken in emergencies are evidence based.

Transport Canada said that the OPP is independent of the Project although, as detailed below, the OPP will have direct application to the Project's marine shipping components. The federal departments and agencies noted that in addition to directly responding to marine safety concerns raised through previous public consultations, including those on the Project, specific OPP initiatives apply to the Project's marine shipping components, such as those regarding:

- Enhanced Maritime Situational Awareness;
- Modern Hydrography and Charting in Key Areas;
- Cumulative Effects of Marine Shipping;
- Coastal Environmental Baseline Monitoring Program;
- Marine Environmental Quality Initiative;
- Whale Collision and Avoidance Initiative; and
- Coastal Restoration Fund.

The federal government intervenors also noted that the federal government is developing national frameworks, or proposing legislative changes that will apply to the Project area. These initiatives include Proactive Vessel Management; *Pilotage Act* Review; Places of Refuge; and Proposed Legislative Changes.

Transport Canada said that OPP initiatives are being implemented over the course of five years and the results in this period will inform the ongoing implementation beyond five years. Results will vary based on each initiative and several factors, such as the results of the first five years of implementation and the Indigenous codevelopment processes.

Additional discussion on regulatory framework improvement initiatives since the Board's OH-001-2014 hearing and related Views of the Board are provided throughout this chapter.

14.4 Public consultation – MH-052-2018 hearing

Trans Mountain provided an update of its stakeholder engagement and communications conducted on matters related to marine transportation. Trans Mountain reported that, from 1 July 2015 through to 30 September 2018, it held a total of 152 engagement events with individual stakeholders or stakeholder groups, including government authorities, marine trade industries, coastal communities, and commercial and recreational marine waterway users. The engagement activities were comprised of meetings, presentations or site tours, and other events involving updates through attendance and participation in multi-stakeholder events.

Trans Mountain said that meetings were held with stakeholders to proactively anticipate their key issues regarding marine transportation, to inform NEB condition compliance reports, as well as to maintain relationships with stakeholders, share information on Project progress, and keep track of new developments in shipping safety and environmental best practices. Trans Mountain noted that engagement on marine transportation typically involved the following key themes (most are associated with regulatory conditions of approval): marine safety, navigation safety, marine mammals; marine birds, boating safety for recreational vessel traffic, fate and behaviour of oil/spill response, and greenhouse gas emissions.

Trans Mountain said that it will continue to communicate with stakeholders regarding marine transportation.

Views of the Reconsideration Panel

The Board finds that Trans Mountain has continued to engage with stakeholders on matters related to marine transportation by providing timely, appropriate, and effective opportunities for all potentially affected parties to learn about Project-related marine shipping, provide their comments and concerns, and to discuss how Trans Mountain could address them. Given Trans Mountain's ongoing engagement activities with respect to Project-related marine shipping, the Board's views from the OH-001-2014 Report remain the same. Given all the public consultation opportunities provided, the Board finds that Trans Mountain has continued to develop and implement a broadly based public consultation program, offering numerous venues and opportunities for the public, landowners, governments, and other stakeholders to learn about the Project and Project-related marine shipping, and to provide their views and concerns to the company. The Board continues to be of the view that, with Trans Mountain's commitments and the Board's recommended conditions, Trans Mountain can continue to effectively engage the public, landowners, and other stakeholders, and address issues raised throughout the Project's operational life. Information about Trans Mountain's consultation with Indigenous communities is found in Chapter 5.

14.5 CEEA 2012 and SARA requirements

In the OH-001-2014 hearing, the Board assessed the potential environmental and socio-economic effects of the increased marine shipping resulting from the designated project as part of its public interest determination under the NEB Act, and not under the CEEA 2012. The Board at that time followed an approach similar to the environmental assessment conducted under the CEEA 2012 as described in Chapter 10, to the extent it was appropriate, to inform the Board's public interest determination.

When the Board established the List of Issues for the OH-001-2014 hearing, it included Issue 5 – The potential environmental and socio-economic effects of marine shipping activities that would result from the proposed Project, including the potential effects of accidents or malfunctions that may occur. The Board stated that this would be considered under the NEB Act.¹⁰⁷ On 10 September 2013, the Board issued filing requirements¹⁰⁸ specific to the issue of the potential effects of Project-related marine shipping activities to complement the Filing Manual. These additional filing requirements were related to consultation, description and extent of increase in marine shipping activities, effects assessment including but not limited to, an assessment of credible worst-case spill scenarios, and navigation and safety and mitigation measures. The Board said that it did not intend to duplicate the work being undertaken by the TERMPOL¹⁰⁹ Review Committee.¹¹⁰

¹⁰⁷ NEB letter of 2 April 2014, Trans Mountain Expansion Project, Factors and Scope of Factors for the Environmental Assessment, pursuant to the CEEA 2012 (Scoping Document).

¹⁰⁸ This document was titled: Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities, Trans Mountain Expansion Project

¹⁰⁹ "Technical Review Process of Marine Terminal Systems and Transshipment Sites." TERMPOL is an extensive yet voluntary review process that proponents involved in building and operating a marine terminal system for bulk handling of oil, chemicals and liquefied gases can request. It focuses on the marine transportation components of a project.

¹¹⁰ Transport Canada chairs a TERMPOL Review Committee for this Project. The following agencies and organizations have been involved in the TERMPOL Review Process: Transport Canada; Fisheries and Oceans Canada; the Canadian Coast Guard; Environment and Climate Change Canada; the Canadian Hydrographic Service; Pacific Pilotage Authority Canada; British Columbia Coast Pilots; and Port Metro Vancouver.

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As noted in Chapter 1 of this report, a 30 August 2018 decision of the Federal Court of Appeal set aside the GIC's Order directing the Board to issue the Certificate for the Project. As a result, on 20 September 2018, the GIC referred aspects of the Board's OH-001-2014 Report for the Project back to the Board for Reconsideration through Order in Council P.C. 2018-1177 (OIC). In particular, the OIC required the Board to take into account the environmental effects of Project-related marine shipping in view of the requirements of the CEAA 2012, and the adverse effects of Project-related marine shipping on species at risk in view of any requirements of section 79 of the SARA.

On 26 September 2018, the Board specifically sought public comments on:

- whether, "on a principled basis, Project-related marine shipping should be included in the "designated project" to be assessed under the CEAA 2012; and
- a draft Amended Factors and Scope of the Factors for the Environmental Assessment pursuant to the CEAA 2012 (Amended Factors Document), and a draft List of Issues to be considered in the MH-052-2018 hearing.

In its letter dated 12 October 2018, the Board decided, on a principled basis, to include Project-related marine shipping between the WMT and the 12-nautical-mile territorial sea limit in the "designated project" to be assessed under the CEAA 2012. On the same date, the Board released the confirmed List of Issues that includes issues related to factors described in paragraphs 19(1)(a) through (h) and subsection 19(3) of the CEAA 2012, such as mitigation measures, alternative means, and requirements of any follow-up program, each in relation to Project-related marine shipping. It also includes issues related to section 79 of the SARA, such as measures to avoid or lessen adverse effects of Project-related marine shipping on species at risk.

On 12 October 2018, the Board also issued a letter to Trans Mountain describing additional Filing Requirements for Trans Mountain that the Board required for the Reconsideration.¹¹¹ In addition, the Board also issued a letter, pursuant to paragraph 20(a) of the CEAA 2012, to request specialist or expert information or knowledge in the possession of each of DFO, ECCC, Transport Canada, Vancouver Fraser Port Authority, Pacific Pilotage Authority, Health Canada, Parks Canada, and Natural Resources Canada in relation to the Reconsideration.

This section focuses on the Board's responsibilities under the CEAA 2012 and the SARA, and environmental and socio-economic methods.

¹¹¹ NEB letter of 12 October 2018 to Trans Mountain, Filing requirements for Trans Mountain

14.5.1 Responsibilities under the CEAA 2012

CEAA 2012 requires the Board to assess the environmental effects of the Project-related marine shipping by taking into account the factors described in section 19 of the CEAA 2012.

On 26 September 2018, the Board issued the Amended Factors and Scope of the Factors for the Environmental Assessment pursuant to the CEAA 2012 to reflect the inclusion of Project-related marine shipping in the “designated project” to be assessed under the CEAA 2012. This document is included as Appendix 10.

Specifically, for the MH-052-2018 hearing, the Board considered issues (described in the List of Issues) related to the factors described in paragraphs 19(1)(a) through (h) and subsection 19(3) of the CEAA 2012, and as detailed in the table below.

Section/paragraph of the CEAA 2012	Reference to chapter/section/subsection in the MH-052-2018 Report
19(1)(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 environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out	Sections 14.7 and 14.8 of this chapter discusses the environmental and socio-economic effects of Project-related marine shipping (routine operations of the tankers), including any cumulative effects under each valued component. Sections 14.9 and 14.10 of this chapter discusses the potential environmental and socio-economic effects of malfunctions and accidents.
19(1)(b) the significance of the effects referred to in paragraph (a)	Sections 14.7 and 14.8 of this chapter sets out the significance tables relating to operational effects from Project-related marine shipping. Appendix 12 provides the common ratings for each criterion, and basic definitions for each rating. Appendix 12 also provides the Board’s definitions of “likely to be significant” and “not likely to be significant.” In general, Project effects are considered “likely to be significant” when effects are either of “high magnitude,” or “long-term, permanent, and of regional or global extent.”
19(1)(c) comments from any interested party — that are received in accordance with this Act	The comments regarding the environmental assessment of Project-related marine shipping raised by the public, including intervenors and commenters, are addressed throughout this chapter.
19(1)(d) mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project	The Board has discussed these measures under each valued component in various sections of this chapter. The Board’s approach to mitigation is discussed in Sections 14.7 and 14.8 of this chapter. Table 23 contains a summary of measures (including mitigation measures specific to Project-related vessels, regulatory requirements, current initiatives, and recommended measures) considered by the Board in the MH-052-2018 hearing as part of its CEAA 2012 assessment.
19(1)(e) the requirements of the follow-up program in respect of the designated project	Section 14.13 of this chapter discusses the Board’s consideration of a follow-up program for Project-related marine shipping. Chapter 10 also discusses the follow-up program for the overall Project
19(1)(f) the purpose of the designated project	Section 14.6 of this chapter discusses the purpose of the Project.
19(1)(g) alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means	Section 14.6 of this chapter discusses alternative means of carrying out Project-related marine shipping. The Alternative means of carrying out the Project is also discussed in Chapter 11.
19(1)(h) any change to the designated project that may be caused by the environment	Section 14.13 of this chapter discusses the effects of the environment on Project-related marine shipping.
19(1)(i) the results of any relevant study conducted by a committee established under section 73 or 74	The Board is not aware of any study that is relevant to Project-related marine shipping conducted by a committee established under section 73 or 74 of the CEAA 2012.
19(1)(j)) any other matter relevant to the environmental assessment that the responsible authority requires to be taken into account	There are no additional matters relevant to the environmental assessment that the Board as responsible authority requires to be taken into account.
19(3) The environmental assessment of a designated project may take into account community knowledge and Aboriginal traditional knowledge	The Board’s environmental assessment of Project-related marine shipping has incorporated community knowledge and Indigenous traditional knowledge throughout this chapter and Chapter 5.

Paragraph 29(1)(b) of the CEAA 2012 requires a follow-up program. Section 14.13.2 of this chapter discusses the follow-up program for Project-related marine shipping.

The Board must also make its recommendations under subsection 30(4) of the CEAA 2012 regarding significant adverse environmental effects, justification, and applicable mitigation measures.

14.5.2 Responsibilities under section 79 of the SARA

Chapter 10, Section 10.1.4 describes the Board's responsibilities under section 79 of the SARA. As noted in Chapter 10, on 23 April 2014, the Board notified the Ministers of Environment and Climate Change Canada (ECCC), DFO, and Parks Canada Agency that the Project, if approved and constructed, may affect a number of species listed on Schedule 1 of the SARA (SARA-listed species) and/or their habitat. This notification included the species that may be affected by the Project-related marine shipping.

For the MH-052-2018 hearing, on 14 November 2018, pursuant to subsection 79(1) of the SARA, the Board notified the Minister of Environment and Climate Change and the Minister of Fisheries, Oceans and the Canadian Coast Guard that the Project, if approved and constructed, may affect additional species listed on Schedule 1 of the SARA and/or their habitat.

Pursuant to subsection 79(2) of the SARA, the Board is required to identify the adverse effects of projects on each SARA-listed wildlife species and its critical habitat. The Board must also ensure that measures are taken to avoid or lessen those effects, and to monitor them.

The Board's previous assessment in the OH-001-2014 hearing considered adverse effects of Project-related marine shipping on SARA-listed marine fish, marine mammal, and marine bird species, and their critical habitat. For the MH-052-2018 hearing, the Board focused its assessment of adverse effects primarily, but not exclusively, on any species that have been newly listed or have seen a change to their designation since the issuance of the Board's report and could be affected by Project-related marine shipping. In the Reconsideration, the Board also considered measures that would avoid or lessen any adverse environmental effects of Project-related marine shipping on all SARA-listed species (including the newly listed ones) and their critical habitat, and to monitor them. The Board undertook this analysis regardless of whether the adverse effects are significant or not.

In addition, the Board considered how these measures are consistent with any applicable recovery strategy or action plan, and how the Board could ensure that these measures are undertaken.

The Court in *Tsleil-Waututh Nation* found that the Board had not substantially complied with its obligations under subsection 79(2) of the SARA in the OH-001-2014 hearing.¹¹² Although the Board could not regulate marine shipping, "it was nonetheless obliged to consider the consequences at law of its inability to "ensure" that measures were taken to ameliorate the Project's impact on the Southern resident killer whale."¹¹³ The Board also applied this to other SARA-listed wildlife species that will likely be affected by Project-related marine shipping. To comply with subsection 79(2), the Board is providing GIC with an exposition of all technically and economically feasible measures that are available to avoid or lessen the Project's effects on SARA-listed wildlife species that are within the authority of the federal government.¹¹⁴

Section 14.5.4 of this MH-052-2018 Report discusses the measures the Board considered pursuant to section 79 of the SARA. Some measures are within the regulatory authority of the Board and the control of Trans Mountain. These measures are technically and economically feasible and will avoid or lessen the adverse effects of Project-related marine shipping on SARA-listed species. The Board can ensure that such measures are in place if the project is carried out, through the enforcement of its conditions and lifecycle oversight. For example, Trans Mountain's commitment to participate in initiatives to protect marine mammals.

Other measures are outside of Trans Mountain's control and the Board's regulatory authority, but within the authority of the federal government. The Board does not regulate marine shipping and while Trans Mountain exercises initial control at WMT, it has very limited control over tankers once they leave the WMT. Therefore, the Board made recommendations to GIC in relation to these measures. These include measures to avoid or lessen the effects of Project-related marine shipping on SARA-listed species (i.e., Recommendations 5 and 6 regarding offsets) and measures to monitor them (i.e., Recommendation 2 regarding public reporting).

Some intervenors suggested that the Board's recommendations should be turned into enforceable conditions in the CEAA 2012 decision statement to "ensure" the measures are taken. Under subsection 31(5) of the CEAA 2012, the decision

¹¹² *Supra* note at paras 451-456.

¹¹³ *Ibid* at para 455.

¹¹⁴ This approach is consistent with *ibid* at para 456.

statement is considered to be part of the certificate issued under section 54 of the NEB Act. The Board would not be in a position to enforce such conditions, since it does not have the jurisdiction to impose binding requirements on GIC. Furthermore, paragraph 31(b)(ii) of the CEAA 2012 indicates that the conditions in a decision statement must be complied with by the proponent in relation to the designated project. Therefore, the Board is addressing accountability to the best of its ability through Recommendation 2 regarding annual public reporting by GIC on the progress of initiatives, measures and Board recommendations, as well as other recommendations that include reporting and consultation.

Living Oceans and Raincoast argue that measures under subsection 79(2) of the SARA must not be merely hypothetical, should in fact mitigate the effects of the Project, and precede the approval of a project (i.e., conditions precedent). The Board notes that the development of numerous government initiatives such as the OPP, Whales Initiative, and ECHO Program have made significant headway since the OH-001-2014 hearing, with various aspects in different stages of progress. Furthermore, the Board's recommendations do not merely rely on these Government initiatives, but provide further details on specific measures the GIC should implement. For example, a regional cumulative effects management plan, offsets, marine bird monitoring program, mandatory enhanced tug escort, etc. Although most of the Board's recommendations would have broader implications on marine shipping generally, they are all still relevant to avoiding or lessening the adverse effects of Project-related marine shipping.

The Board finds that the Federal Court in *Pembina Institute for Appropriate Development v. Canada (Attorney General)*¹¹⁵ is also informative. Section 79 of the SARA was raised in relation to the Yellow Rail bird in the context of an environmental impact assessment of the Kearl Oil Sands Project. The Joint Review Panel made various recommendations in relation to the Yellow rail including, that in the next two years Alberta Environment in collaboration with ECCC, coordinate a regional review of the cumulative impacts on the Yellow rail in the oil sands region, using appropriate regional nocturnal surveys in areas of potentially suitable habitat and that this initiative should determine the mitigation options to minimize impacts on the Yellow rail. The Court found that further studies of the Yellow rail population do not constitute mitigation measures. However, the Court determined that the Joint Review Panel adopted an approach that was consistent with the dynamic nature of the assessment process; it highlighted concerns and made recommendations consistent with the information before it. The Court found the approach employed to manage the existing uncertainty to be reasonable.¹¹⁶

Accordingly, the Board is taking an approach consistent with the dynamic nature of the environmental assessment process. The Board is highlighting its concerns about various SARA-listed species and in addition to the measures proposed in its conditions, it is also making recommendations consistent with the information before it, even though they may not constitute immediate mitigation measures. The Board also relied on applicable recovery strategies and action plans to help determine if its measures were sufficient to meet the requirements of subsection 79(2) of the SARA. For example, Recommendations 5 and 6 recommend a suite of measures to offset the additional underwater noise and strike risk created by Project-related marine shipping, which are two threats identified in the Recovery Strategy and Action Plan for SRKW, as well as in recovery documents for a number of other SARA-listed species.

The Board notes that the Court in *Pembina* did not take issue with the fact that the regional review was recommended to take place in the next two years, rather than preceding the approval of the project. This suggests flexibility in the timing of measures under subsection 79(2) of the SARA. The final decision regarding the timing and implementation of recommendations rests with GIC.

14.5.3 Environmental and socio-economic assessment methods

For the MH-052-2018 hearing, in assessing the environmental and socio-economic effects of the Project-related marine shipping under the CEAA 2012, the Board considered the environmental and socio-economic setting, interactions between the valued components, potential effects on valued components (both environmental and socio-economic), the adequacy of Trans Mountain's proposed mitigation measures to address them, federal government initiatives taken to date or currently being planned, environmental concerns or issues raised by intervenors and commenters, as well as the adequacy of Trans Mountain's own environmental and socio-economic assessment. The Board also considered its responsibilities under the CEAA 2012, and section 79 of the SARA, as described above in Sections 14.5.1 and 14.5.2.

The Board evaluated and accepted the spatial and temporal boundaries for each valued component as defined by Trans Mountain, for both Project-related marine shipping effects and cumulative effects. The spatial boundaries (or study areas) are described in Appendix 11. The marine shipping lanes are defined to include the normal tanker transit patterns from the WMT to the 12-nautical-mile limit, including transit within Burrard Inlet in the internationally designated marine shipping

¹¹⁵ 2008 FC 302 [*Pembina*].

¹¹⁶ *Ibid* at para 69.

lanes. The time frame of the assessment includes the operation phase of the Project-related marine vessels (i.e., the time during which increased marine vessel traffic operations are expected to occur, or more than 50 years).

In addition, the Board considered transboundary effects under paragraph 5(1)(b) of the CEAA 2012. For example, the Board assessed any potential effects of Project-related marine shipping in US and Canadian waters as the shipping lanes in the Strait of Georgia, Haro Strait, and the Strait of Juan de Fuca are located on either side of the international boundary for much of the Marine RSA. The Board expects very similar types of effects in US and Canadian waters. Further, although the Board concluded that Project-related marine shipping between the WMT and the 12-nautical-mile territorial sea limit is part of the designated Project, the Board also took into account the effects of Project-related marine shipping that occur outside of the territorial sea limit in the EEZ or elsewhere outside of Canada. The Board notes that some effects are far-ranging, such as effects of spills or underwater noise on an endangered species with a large geographical range.

Where any effects (whether significant or non-significant) were predicted to remain after proposed mitigation is applied (i.e., residual effects), the Board assessed cumulative effects. This involved considering the residual effects associated with the Project in combination with the residual effects of other past, current and future (i.e., reasonably foreseeable) physical facilities and activities, and that have effects within the temporal and spatial boundaries and ecological context adopted for the Project assessment.

Incorporation of public comments and community knowledge, and Indigenous traditional knowledge

The Board considered comments from the public in its environmental assessment (e.g., assessing the concerns and issues raised directly by intervenors and commenters, and the mandated consultation performed by Trans Mountain). The comments raised by the public, including intervenors and commenters, are addressed throughout this chapter.

The Board also considered community knowledge and Indigenous traditional knowledge in its environmental assessment (e.g., assessing the concerns and issues raised directly by intervenors and commenters, the oral traditional evidence provided by Indigenous peoples, and the mandated consultation performed by Trans Mountain). The Board's environmental assessment has incorporated community knowledge and Indigenous traditional knowledge throughout this chapter and Chapter 5, one example being the information provided by Indigenous communities regarding the importance of SRKW, as noted in Sections 14.8.3 and 14.10.5.

Indicator-based approach and species at risk

Trans Mountain in the Application for the OH-001-2014 hearing, used an indicator-based approach to assess the potential environmental and socio-economic effects of the Project-related marine shipping for both operational effects and spills. For the assessment of operational effects, the Board required Trans Mountain to complete species-specific effects assessments for all marine fish, marine bird, and marine mammal species on Schedule 1 of the SARA that have the potential to be affected by Project-related marine transportation.

In the MH-052-2018 hearing, Trans Mountain identified two newly listed marine bird species (Western grebe and Horned grebe) and conducted an assessment of potential residual effects resulting from an increase in Project-related marine vessel traffic using an indicator-based approach. Several intervenors raised concerns about using an indicator species-based approach for assessing operation of Project-related marine shipping, and of the effects of spills.

Upon Board's request, for operational effects Trans Mountain provided species-specific assessment for the additional species, mitigation measures to avoid or lessen effects, and information about monitoring effects, including taking into account the requirements of section 19 of the CEAA 2012 and section 79 of the SARA.

Views of the Reconsideration Panel

Similar to Board's views in Chapter 10, the Board finds that given the potential for the Project-related marine shipping to affect various SARA-listed species, their residences or their critical habitat, and considering their at-risk status and potential sensitivity to further adverse effects, the Board considered it appropriate, in general, to assess the operational effects of Project-related marine shipping on each of those species individually. The Board recognizes the importance of conducting species-specific assessments for operational effects of Project-related marine shipping, since these effects are more predictable and likely.

This approach provided the Board with greater certainty that effects are appropriately identified, addressed and effectively mitigated, taking the particularities of each species at risk into account. Therefore, the Board has applied this approach to its assessment of species at risk. Although effects and mitigation have been considered for each individual species at risk separately, the Board only provided a species-specific discussion if it was deemed to be necessary (i.e., if a species was likely to be impacted from the Project-related marine shipping) in addition to its more general discussion.

The issue of using an indicator species-based approach for assessing the effects of spills is discussed in Section 14.9.1 of this chapter, along with the Board's corresponding views.

Cumulative effects

The Board used the same cumulative effects methodology that was discussed in Chapter 10. The Board considered any cumulative effects that are likely to result from Project-related shipping, in combination with environmental effects arising from other current or reasonably foreseeable marine vessel traffic, within the temporal and spatial boundaries (element-specific RSA) and ecological context adopted for the Project assessment. In considering the environmental effects of existing and future physical activities, the Board considered whether the potential environmental effects of the designated project on the selected valued components of the designated project interact with effects of other physical activities that have been or will be carried out.

Trans Mountain considered specific terminal expansions in Vancouver harbour area, projected growth rates of vessel movements in the Marine RSA, and existing and future vessel movements at five locations in the Marine RSA, as shown in Table 22 of this chapter.

During the MH-052-2018 hearing, some intervenors raised concerns regarding the cumulative effects methodology.

Barkley Sound Stewardship Alliance described two other proposed projects (Kwispaa LNG and Port Alberni Transshipment Hub [PATH]) in the region that would add up to an additional 6540 large vessel passages through the area, and that the total cumulative effects should be taken into account. It said that, if the Trans Mountain Expansion Project, Kwispaa LNG, and PATH proceed as planned, there would be up to an additional 6540 large vessel passages through the area. The scale of each of these operations is large enough to merit an individual impact assessment but the total combined effects are too large to not apply a cumulative impacts assessment methodology.

Trans Mountain said it did not consider these two proposed projects in its cumulative effects assessment during the OH-001-2014 hearing, because at the time of submission of Trans Mountain's application in December 2013, neither the Kwispaa LNG project nor the PATH project had been proposed. It has since reviewed publicly available information on the two proposed projects and has concluded that even if it were to re-do its cumulative effects assessment from the OH-001-2014 hearing, neither of the proposed projects meets the requirements for inclusion in a cumulative effects assessment for Project-related marine transportation. Trans Mountain referred to the *Operational Policy Statement: Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*, and said that the following two conditions (among others) must be met to scope any future project or activity into a cumulative effects assessment: the future project or physical activity is certain or reasonably foreseeable; and the residual environmental effects of the future project or physical activity will overlap with the predicted residual effects of the designated project.

Trans Mountain said that proposed PATH project is not considered reasonably foreseeable. It said that while a pre-feasibility study was completed in June 2014, the project proponent (Port Alberni Port Authority) for this project has not yet publicly disclosed its intention to seek the necessary regulatory approvals to proceed. Trans Mountain said that the proposed Kwispaa LNG project is considered reasonably foreseeable, however, based on the project description submitted to Canadian Environmental Assessment Agency on 16 October 2018, vessel traffic associated with the Kwispaa LNG project would not overlap with Project-related vessel traffic. Trans Mountain concluded that given the spatial separation of vessel traffic, the residual effects associated with the Trans Mountain Expansion Project would not be expected to overlap with potential residual effects associated with the Kwispaa LNG project.

Tsartlip First Nation said that Board should take into account the cumulative effects from other projects including the Roberts Bank Terminal 2 Project as this project would also be increasing their tanker traffic. It said that community leaders are concerned that regulators are doing little to support the development of regional marine cumulative effects plans, and failing to consider all currently proposed and reasonably foreseeable vessel increases into their assessment of the Project.

Trans Mountain said that Roberts Bank Terminal 2 Project is specifically identified as a contributor to future vessel traffic increases and was fully addressed in its cumulative effects assessment in the OH-001-2014 hearing.

Views of the Reconsideration Panel

The Board's Filing Manual requires proponents to provide clear reasoning, with supporting rationale, for selecting the other existing and future physical facilities or activities to be included within the cumulative effects assessment. The Filing Manual states that when identifying other physical facilities or activities, include those physical facilities or activities likely to take place as opposed to those not reasonably foreseeable or hypothetical.

The Board agrees with Trans Mountain that the two proposed projects namely, Kwispaa LNG project, and the PATH project does not meet the requirements for inclusion in the cumulative effects assessment for Project-related marine transportation. In Board's view, the proposed Kwispaa LNG project is not considered as reasonably foreseeable as this

project is not publicly disclosed yet. In regard to the Kwispa LNG project, Trans Mountain said that based on the project description submitted by the proponent to the Canadian Environmental Assessment Agency, the residual effects associated with the Trans Mountain Expansion Project would not be expected to overlap with potential residual effects associated with the Kwispa LNG project. The Board notes that Trans Mountain followed the guidance provided in “*Operational Policy Statement: Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*,” and finds Trans Mountain’s explanation for not including the two projects suggested by Barkley Sounds Stewardship Alliance, as reasonable.

The Board confirms that Roberts Bank Terminal 2 was considered as a contributor to future vessel traffic increases, and was addressed in Trans Mountain’s cumulative effects assessment in the OH-001-2014 hearing.

Mitigation measures and significance determination

In order to determine whether the effects of Project-related marine shipping are likely to cause significant environmental effects, the Board, pursuant to paragraph 19(1)(d) considered any information or knowledge concerning the potential effectiveness, safety, and technical and economic feasibility of each of the potential mitigation measures, including how each could be implemented and monitored. The Board required Trans Mountain to provide this information by including this topic in the Filing Requirements for Trans Mountain, and requested similar information from Federal authorities pursuant to paragraph 20(a) of the CEAA 2012. The Board also asked several Information Requests to the participants during the MH-052-2018 hearing regarding the potential mitigation measures.

The Board has provided a discussion of mitigation measures¹¹⁷ that would mitigate any adverse environmental effects of the designated project under each valued component in this chapter. Generally, to determine if a measure qualifies as mitigation, and to determine the extent to which to rely on it as a means to mitigate adverse environmental effects, the Board looks at whether there is sufficient confidence in each of the following:

- a) *Effectiveness*: will the measure eliminate, reduce or control the adverse environmental effects?
- b) *Feasibility*: is the measure technically and economically feasible?
- c) *Reliability*: will the measure be effectively implemented?

In cases where there is a lack of full certainty, the Board considers the potential for enforcement, monitoring and adaptive management.

Mitigation measures include Trans Mountain commitments and conditions imposed by the Board. The Board took the mitigation measures specific to Project-related vessels and regulatory requirements into account as mitigation measures in its CEAA 2012 significance evaluation and under section 79 of the SARA. The Board’s evaluation of the likely significance of adverse effects takes into account the implementation of mitigation measures, and is presented in a tabular format for most key valued components (or indicators within those components). The significance tables also include a summary of cumulative effects. For these specific mitigation measures that are relied on in the significance evaluation, the Board requires that they are confirmed as being in place prior to Project operation.

The Board recognizes that some Board conditions and recommendations do not meet the criteria for a mitigation measure, but may result in future mitigation. Conditions and recommendations that do not meet the criteria for a mitigation measure were not taken into account in the Board’s significance evaluation. However, they may still be relevant to the justification analysis under the CEAA 2012 and a reasonable approach to manage uncertainty in light of the dynamic nature of the assessment process.

For example, the federal government is undertaking several regional-level multi-stakeholder initiatives, and if implemented, these measures may reduce or offset the effects of Project-related marine shipping. The Board has not considered them as mitigation measures since the Board cannot be certain they will be effectively implemented as they are outside of the Board’s regulatory authority. Instead, the Board has made recommendations to the GIC in relation to them. Further, since the Board is not relying on these recommendations in its significance evaluation, it is not necessary for them to be in place prior to the project’s approval. However, this is not to suggest that longer term measures that cannot be confirmed as being effective, feasible, or reliable at this time should be discouraged. To the contrary, current mitigation measures combined

¹¹⁷ Mitigation measures is defined by CEAA 2012 as “measures for the elimination, reduction or control of the adverse environmental effects of a designated project, and includes restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means.”

with broader recommendations and adaptive management all play an important role in the protection and recovery of species under the SARA.

Precautionary principle and adaptive management

The Board recognizes the important role of the precautionary principle under the CEAA 2012. The mandate of the CEAA 2012 explicitly references the precautionary principle in subsection 4(2). The purposes of the CEAA 2012 also refer to the consideration of designated projects in a careful and precautionary manner. Section 1.5.6 contains detailed views of the Board regarding the precautionary principle and adaptive management, including how the Board applies the precautionary principle in conducting its environmental assessments and its significance determinations.

14.5.4 Summary of measures to mitigate adverse environmental effects considered in the MH-052-2018 hearing

Table 23 sets out a summary of measures (including mitigation measures specific to Project-related vessels, regulatory requirements, current initiatives, and recommended measures) considered by the Board in the MH-052-2018 hearing as part of its CEAA 2012 assessment and under section 79 of the SARA. Details on each measure and how the Board considered them are discussed under each valued component in various sections of Chapter 14.

Generally, to determine if a measure qualifies as mitigation, and to determine the extent to which to rely on it as a means to mitigate adverse environmental effects, the Board looks at whether there is sufficient confidence in each of the following:

- a) *Effectiveness*: will the measure eliminate, reduce or control the adverse environmental effects?
- b) *Feasibility*: is the measure technically and economically feasible?
- c) *Reliability*: will the measure be effectively implemented?

In cases where there is a lack of full certainty, the Board considers the potential for enforcement, monitoring and adaptive management.

The Board took the mitigation measures specific to Project-related vessels and regulatory requirements (Table headings A and B) into account as mitigation measures in its CEAA 2012 significance evaluation and under section 79 of the SARA.

The current initiatives and additional recommended measures (Table headings C to E) were not taken into account in the Board's current significance evaluation. However, these measures could result in future mitigation and may still be relevant to the justification analysis under the CEAA 2012 and the requirements of the SARA. The Board is of the view that the recommended measures for implementation (Table heading D) are technically and economically feasible. The recommended measures for further consideration (Table heading E) require additional study and examination. Although these current initiatives and recommended measures have broader implications on marine shipping generally, they are all still relevant to avoiding or lessening the adverse effects of Project-related marine shipping. Other potential mitigation measures raised by participants in the hearing are not included in Table 23, where the Board did not find them to meet the criteria for mitigation above, or did not have enough evidence to warrant further examination.

Table 23: Summary of measures to mitigate adverse environmental effects considered in the MH-052-2018 hearing

Measures	Relevant Board condition(s) or recommendation(s) to GIC	Marine air / GHG emissions	Marine mammals ¹¹⁸	Marine fish ¹¹⁹	Marine birds ¹²⁰	Marine commercial, recreational, and tourism use	Traditional marine resource uses, cultural practices and activities	Human health	Accidents and malfunction (spills) ¹²¹
A – Mitigation measures specific to Project-related vessels¹²²									
Enhanced tug escort between the Westridge Marine Terminal and Buoy J (included in Trans Mountain's Vessel Acceptance Standard (VAS))	Conditions 91, 133, 134, 144, Recommendation 8					ü	ü		ü
Enhanced marine spill response regime	Conditions 91, 133, 144								ü
Age limit for tankers (included in Trans Mountain's VAS)	Condition 134	ü						ü	
Education regarding vessel effects on marine mammals (information included in Trans Mountain's VAS and Westridge Marine Terminal Regulations and Operations Guide)	Conditions 2, 134		ü				ü		
Hull and propeller not fouled excessively (included in Trans Mountain's VAS)	Conditions 2, 134		ü	ü			ü		
Participate in the initiatives to protect marine mammals	Condition 2		ü				ü		
Consider underwater noise when selecting escort tug(s)	Condition 2		ü	ü			ü		
Support and adopt TERMPOI Review Committee Findings and Recommendations	Condition 2					ü	ü		ü
Request vessel operators to reduce the amount of exterior deck lighting wherever possible.	Condition 2				ü			ü	
Minimize the use of anchorages by holding tankers at the WMT dock whenever a berth is available	Condition 2						ü	ü	

¹¹⁸ Measures were considered for marine mammals including each of the following potentially affected SARA-listed marine mammal species: Humpback, Fin, Sei, Grey, Blue, and North Pacific right whales; offshore, transient, Northern resident and Southern resident killer whales; Harbour porpoise; Steller sea lion; and Sea otter.

¹¹⁹ Measures were considered for marine fish including each of the following potentially affected SARA-listed marine fish species (including marine invertebrates and reptiles): Basking shark, Bluntnose sixgill, Longspine thornyhead, Northern abalone, Olympia oyster, tope, Yelloweye rockfish (outside and inside population), Rougheye rockfish type I and type II, Green sturgeon, and Leatherback sea turtle.

¹²⁰ Measures were considered for marine birds including each of the following potentially affected SARA-listed marine bird species: Marbled murrelet, Pink-footed shearwater, Red knot (*roselaari* type), Short-tailed albatross, Ancient murrelet, Black-footed albatross, Great blue heron, Long-billed curlew, Western grebe, Horned grebe.

¹²¹ Accidents and malfunctions reflects measures related to spill prevention, emergency response and preparedness measures which will decrease the likelihood of a spill and resulting consequences on valued components.

¹²² These include Trans Mountain commitments and Board conditions that apply specifically to Project-related vessels.

Measures	Relevant Board condition(s) or recommendation(s) to GIC	Marine air / GHG emissions	Marine mammals ¹¹⁸	Marine fish ¹¹⁹	Marine birds ¹²⁰	Marine commercial, recreational, and tourism use	Traditional marine resource uses, cultural practices and activities	Human health	Accidents and malfunction (spills) ¹²¹
B – Regulatory Requirements¹²³									
<i>Canada Shipping Act, 2001 - vessel safety and navigation requirements</i>						ü	ü		ü
<i>Vessel Pollution and Dangerous Chemicals Regulations</i>		ü						ü	
<i>Ballast Water Control and Management Regulations</i>			ü	ü			ü		
<i>Sulphur in Diesel Fuel Regulations</i>		ü						ü	
<i>Vessel Pollution and Dangerous Chemicals Regulations - Energy Efficiency Design Index and Ship Energy Efficiency Management Plan requirements</i>		ü						ü	
Tier III Emissions for NO _x in North American Emission Control Areas (International Convention for the Prevention of Pollution from Ships Annex VI)		ü						ü	
<i>Amendments to the Canada Shipping Act, 2001 and the Marine Liability Act – Ship-Source Oil Pollution Fund and compensation</i>									ü
<i>Pilotage Act</i>									ü
<i>Canada Marine Act - VFPA Port Information Guide (practices and procedures)</i>						ü	ü	ü	ü
<i>Marine Mammal Regulations</i>			ü				ü		
C – Current Regional, Federal and International initiatives¹²⁴									
Enhancing Cetacean Habitat and Observation (ECHO) Program (e.g., Haro Strait slowdown, Strait of Juan de Fuca lateral displacement)	Recommendation 2		ü	ü			ü		
Whale watching guidelines			ü				ü		

¹²³ Regulatory requirements that apply to all vessels can mitigate not only potential adverse effects from Project-related vessels, but also potential cumulative effects from all vessels.

¹²⁴ Current Regional, Federal and International initiatives have broader implications on marine shipping generally, but are still relevant to avoiding or lessening the adverse effects of Project-related marine shipping and associated cumulative effects.

Measures	Relevant Board condition(s) or recommendation(s) to GIC	Marine air / GHG emissions	Marine mammals ¹¹⁸	Marine fish ¹¹⁹	Marine birds ¹²⁰	Marine commercial, recreational, and tourism use	Traditional marine resource uses, cultural practices and activities	Human health	Accidents and malfunction (spills) ¹²¹
Oceans Protection Plan, including Enhanced Maritime Situational Awareness Cumulative Effects of Marine Shipping Coastal Environmental Baseline Monitoring Program Whale Collision and Avoidance Initiative Marine communications and traffic services improvements Coastal Situational Awareness Portal	Recommendations 1, 2 & 13		ü	ü	ü	ü	ü		ü
Whales Initiative and additional October 2018 federal government commitments	Recommendation 2		ü				ü		
Coastal Restoration Fund, Pacific Salmon Treaty, 2018-2022 Implementation Plan under Canada's Wild Salmon Policy				ü			ü		
2014 IMO Guidelines for the Reduction of Underwater Noise			ü	ü			ü		
2011 IMO Guidelines for the Control and Management of Ships' Biofouling, and associated IMO review			ü	ü			ü		
Proposed amendments to <i>Navigation Safety Regulations</i> for extension of automatic identification system requirements	Recommendation 13					ü	ü		
Indigenous Advisory Monitoring Committee	Recommendation 11		ü	ü	ü	ü	ü		ü
Inclusion of Indigenous People in Oil Spill Planning and Response by Canadian Coast Guard and WCMRC									ü
WCMRC initiatives including training opportunities, geographic response strategies, capacity building and employment, and coastal response program									ü
Ongoing Research Informing Spill Response Planning	Recommendation 7								ü
Review of 1995 Response Organization Standards	Recommendation 7								ü

Measures	Relevant Board condition(s) or recommendation(s) to GIC	Marine air / GHG emissions	Marine mammals ¹¹⁸	Marine fish ¹¹⁹	Marine birds ¹²⁰	Marine commercial, recreational, and tourism use	Traditional marine resource uses, cultural practices and activities	Human health	Accidents and malfunction (spills) ¹²¹
Actively support international implementation of GHG reductions for vessels, such as low carbon alternate fuels, use of energy efficient technologies (such as engine and propulsion upgrades and hull modifications) and market-based measures	Recommendation 10	Ü							
D – Additional Recommended Measures for Implementation									
Cumulative effects management plan	Recommendation 1		Ü	Ü	Ü	Ü	Ü	Ü	
Annually report on progress on all measures, how they work together, and monitoring results	Recommendation 2	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü
Marine bird monitoring and protection program	Recommendation 3				Ü				
Expedite feasibility study of Southern Strait Georgia National Marine Conservation Area Reserve	Recommendation 4								
Offset Program to offset additional underwater noise and strike risk from Project-related vessels	Recommendation 5		Ü	Ü			Ü		
Review of federal marine shipping oil spill response regime	Recommendation 7								Ü
Inclusion of Indigenous People in Marine Safety System, Oil Spill Planning and Response	Recommendations 7 and 11								Ü
Continued engagement and awareness activities targeting coastal communities and users (including information on Project-related vessel timing and scheduling)	Recommendation 12					Ü	Ü		
Develop a formal complaint resolution program for vessels located at VFPA managed anchorages	Recommendation 16	Ü				Ü	Ü	Ü	
E – Additional Recommended Measures for further consideration									
Slowdowns in each section of the marine shipping route	Recommendation 6	Ü	Ü	Ü			Ü		
Potential limits on the activities of whale watching boats to limit their impacts	Recommendation 6		Ü				Ü		
Reduce underwater noise from regularly operating ferries	Recommendation 6		Ü	Ü			Ü		
Identification of specific	Recommendation 6		Ü	Ü			Ü		

Measures	Relevant Board condition(s) or recommendation(s) to GIC	Marine air / GHG emissions	Marine mammals ¹¹⁸	Marine fish ¹¹⁹	Marine birds ¹²⁰	Marine commercial, recreational, and tourism use	Traditional marine resource uses, cultural practices and activities	Human health	Accidents and malfunction (spills) ¹²¹
foraging, congregation and migration areas of the SARA-listed species and consideration of mitigations in those areas									
Further incentives and requirements for quiet vessel design and refits to address underwater noise	Recommendation 6	ü	ü	ü			ü		
Canada/United States Transboundary Vessel Traffic Risk Assessment	Recommendation 9								ü

14.6 Purpose of the Project and alternative means

14.6.1 Purpose of the Project

In accordance with paragraph 19(1)(f), the Board took into account the purpose of the designated project. Trans Mountain said that the primary purpose of the Project is to provide additional transportation capacity for crude oil from Alberta to markets in the Pacific Rim including B.C., Washington State, California, and Asia. Trans Mountain also said the provision of enhanced access to growing Pacific Rim markets will provide a critical alternative market to Canadian crude oil producers. Trans Mountain said the additional capacity is required to meet both the needs of Trans Mountain's long-term contractual shippers and the general growth in demand for transportation service by all shippers.

14.6.2 Alternative means

As required under the CEAA 2012, paragraph 19(1)(g), the Board considered alternative means of carrying out the designated project, including Project-related marine shipping. Chapter 11 discusses the alternative means of carrying out the Project, including alternative pipeline corridor locations, and alternative marine terminal locations based on the evidence the Board heard in the OH-001-2014 hearing. During the MH-052-2018 hearing, the Board considered alternative means of carrying out Project-related marine shipping, and the environmental effects of such alternative means under Issue # 3 in the List of Issues (Appendix 1). The Board considered options such as alternate marine shipping routes, marine terminal locations, and alternate mitigation options to reduce the effects. A discussion of alternate shipping routes and mitigation options are discussed throughout this chapter.

Tsleil-Waututh Nation raised the concern that significant adverse effects cannot be justified if the project could be built using a different marine terminal location and / or different marine shipping routes that are economically viable. Tsleil-Waututh Nation did not provide any new evidence about specific alternative marine terminal locations. Commenter Mr. Priaro suggested an alternative route for the expansion, namely to twin the existing Trans Mountain Pipeline only to the Sumas, B.C. pump station and then twin the existing Puget Sound Pipeline from there to cross the border to the refineries and the Cherry Point Marine Terminal on Washington State's Puget Sound.

BC Nature and Nature Canada (BC Nature) submitted a report by EnSys Energy & Systems Inc. that analyzed different scenarios in which the additional crude oil would be diverted to refineries and export terminals in Puget Sound, rather than exported from the WMT as proposed. Squamish Nation said that neither Trans Mountain nor Canada have put forward alternative locations or routes for carrying out the Project-related marine shipping, despite the significant risk to Squamish Nation of the location and route proposed.

Trans Mountain said that during the initial Project scoping process, it considered six alternative marine terminal locations, including two locations in Washington State. Trans Mountain said that it assessed information about these locations in the OH-001-2014 hearing, and explained that the Washington locations were eliminated from future consideration early in the planning process because they would require a longer pipeline and would pose complex regulatory issues including additional permits required by Washington State and the United States federal government.

Views of the Reconsideration Panel

With respect to the CEAA 2012, paragraph 19(1)(g) requires the Board to consider “alternative means” of carrying out the designated project¹²⁵. The Board’s Filing Manual describes the Board’s guidance which is reflective of the Board’s view of the appropriate considerations that ought to be taken into account in considering alternative means.

For the reasons below, the Board is of the view that Trans Mountain has provided an adequate assessment, of technically and economically feasible alternative means of carrying out Project-related marine shipping.

In the OH-001-2014 hearing, the City of Burnaby raised the concern that Trans Mountain did not provide an assessment of the risks, impacts and effects of the alternate marine terminal locations at Kitimat, B.C., or Roberts Bank in Delta, B.C.

The Board required Trans Mountain to elaborate on each of the criteria listed above for considering the various marine terminal locations. The Board also required Trans Mountain to provide a rationale for choosing Westridge Marine Terminal as the preferred alternative. Trans Mountain said that it considered both northern and southern route alternative, but favoured expansion of the existing system south over northern lateral and terminal due to greater technical challenges, increased footprint and potential impact, and greater costs and uncertainty. Trans Mountain also provided reasoning for eliminating alternative southern locations.

For the MH-052-2018 hearing, the Board considered the additional evidence submitted by intervenors and commenters related to technical and economic feasibility of alternative marine terminal locations. In its reasons for scoping the MH-052-2018 hearing, the Board stated that:

The Board is of the view that the technical and economic feasibility of alternative terminal locations was extensively considered in the OH-001-2014 hearing. That evidence will be used by the Board in its consideration of the issues relevant to the Reconsideration. As noted at the bottom of the List of Issues, Parties are expected to restrict their submissions to new and updated evidence only.”

Accordingly, the Board focused on whether there was sufficient new or updated evidence that would change the Board’s original conclusion about alternative marine terminal locations.

The Board, in its Information Request, asked Trans Mountain to discuss the comparative environmental effects of using the Cherry Point Marine Terminal on Washington State’s Puget Sound, as proposed by Mr. Priaro. Trans Mountain, in its response, relied on the evidence from OH-001-2014 hearing.

The Board finds that the selection of general areas considered by Trans Mountain as alternatives in each of the northern-leg and southern-leg options for the Project was reasonable. The Board accepts Trans Mountain’s reasons for eliminating alternative northern locations (e.g., pipeline length, capital costs, technical challenges, greater environment footprint and potential impact, and opportunities to benefit from existing operations and infrastructure). The Board is of the view that Trans Mountain’s reasons for eliminating alternative southern locations from further assessment were also satisfactory (e.g., feasibility of pipeline access, location of storage facilities, pipeline length, water depth for tanker access, footprint, and environmental effects). The Board considers that some of the detail about alternative means that intervenors were expecting is unreasonable and not supported by the Board’s filing requirements. The Board considers that some of the detail about alternative means that intervenors were expecting is unreasonable and the Board does not expect that alternative means need to be supported by the same level of detailed filings as would be prepared for the Project application itself.

The Board notes that EnSys examined scenarios for alternative locations of the marine shipping terminal. Evidence on alternative marine terminal locations was filed as part of OH-001-2014 and reviewed by the Board as part of that hearing.

The Board reviewed the EnSys Report, as well as argument by intervenors, like the City of Burnaby, who argued that Trans Mountain did not discuss the “complex regulatory issues” or explain why an expansion to Washington State was not technically or economically feasible. The Board accepts that concerns about the complexity of regulatory issues and a considerably longer pipeline are valid reasons for eliminating the two locations in Washington State’s Puget Sound from consideration. In fact, EnSys identified a number of complex regulatory issues associated with diverting 590,000 bpd of Project-related crude to Puget Sound, including the cross-border permits for an expansion of the Puget Sound pipeline, as well as potential modifications to marine terminals or existing refineries. As it stands, the

¹²⁵ Alternative means considered in an environmental assessment for carrying out a designated project must be technically and economically feasible. Alternatives means should be considered by the proponent as early as possible in the planning process, see CEAA Guidance updated March 2015 <https://www.canada.ca/en/environmental-assessment-agency/news/media-room/media-room-2015/addressing-purpose-alternative-means-under-canadian-environmental-assessment-act-2012.html>

Project would be largely contiguous to existing disturbances including the existing pipeline and a longer pipeline that is less contiguous would be expected to raise many additional issues. As stated above, the Board has sufficient detail in its consideration of alternative means and requiring detailed studies on these points is not considered worthwhile.

The Board is of the view that Trans Mountain has provided an adequate assessment, including consideration of technical, socio-economic and environmental effects, of technically and economically feasible alternative marine terminal locations. The Board finds that Trans Mountain's assessment is consistent with the Board's Filing Manual and Canadian Environmental Assessment Agency guidance relating to alternatives means.

14.7 Environmental effects of increased marine shipping (routine operations of the tankers)

This section focuses on the changes to the environmental and socio-economic setting caused by the routine operation of the Project-related marine vessels. The environmental effects of the spills from marine shipping are discussed in Section 14.9 of this chapter.

14.7.1 Operational air and greenhouse gas emissions from tankers

This section focuses on operational air and greenhouse gas emissions from tankers in transit, at anchor and underway. Air and GHG emissions from tankers at berth are discussed in Chapter 10.

Several participants raised concerns about the impacts of Project-related marine shipping on air quality. Participants, such as BC Métis Federation and Living Oceans Society, said that tankers are a primary source of greenhouse gas emissions and contribute substantially to both the local, and the global burden of greenhouse gas emissions.

Island Trust Council said that any displacement of other vessels to anchorages due to delays in transiting the Second Narrows Traffic Control Zone will also contribute to increased air pollution.

The Barkley Sound Stewardship Alliance said that it does not support the project because it will be detrimental to the climate and it will prevent Canada from meeting its GHG reduction commitments.

Trans Mountain's air quality assessment

As set out in the Board's OH-001-2014 Report, Trans Mountain conducted an air quality assessment to predict operational air and greenhouse gas emissions from Project-related marine shipping. It estimated air emissions (criteria air contaminants, volatile organic compounds, secondary particulate matter, ozone and visibility) and greenhouse gas emissions for the:

- existing conditions reflecting all projects and activities in the area, including current marine vessels associated with Trans Mountain's current operations;
- Project-related shipping effects, including the proposed increase in vessel traffic associated with the Project; and
- cumulative effects, including existing conditions, the Project-related shipping, and all reasonably foreseeable projects and activities in the area.

Trans Mountain said that combustion emissions are generated by operating tankers, barges and associated tug escorts. Combustion emissions include emissions from tankers' main and auxiliary engines and boilers. Trans Mountain said that combustion emissions are not associated with the barge itself but with the engine aboard the tugboat. Trans Mountain used the methodology adopted in Environment and Climate Change Canada's (ECCC) 2010 National Marine inventory to estimate the combustion and fugitive emissions that will be generated from Project-related marine vessels. Trans Mountain said that fugitive emissions from vessels at berth are associated with product loading activities at the WMT. Fugitive emissions could also potentially escape through tanker vents during transit.

Trans Mountain compared the total predicted annual combustion emissions from Project-related marine shipping to the existing totals in the RSA (defined in Appendix 11). It estimated an increase of 0.6 to 7.0 per cent in annual marine combustion emissions in the RSA as a result of Project-related marine shipping. Trans Mountain predicted that all modelled contaminant concentrations for the Application Case would be below applicable objectives, with the exception of the daily 1-hour 99th percentile for sulphur dioxide.

Trans Mountain said that marine transportation associated with existing operations at the WMT is estimated to represent 0.98 per cent of marine greenhouse gas emissions in the RSA, 0.30 per cent of marine greenhouse gas emissions in B.C., and 0.17 per cent of marine greenhouse gas emissions in Canada. As a result of Project-related marine shipping, Trans Mountain estimates increases of approximately 6.9 per cent in marine greenhouse gas emissions in the RSA, 2.1 per cent in marine greenhouse gas emissions in B.C., and 1.2 per cent in marine greenhouse gas emissions in Canada. Trans Mountain

estimated a total of 68,100 carbon dioxide equivalent annual marine greenhouse gas emissions from vessels in transit and at berth associated with Project expansion.

Trans Mountain said that the contribution of greenhouse gas emissions from Project-related marine vessels to B.C. and Canadian total emissions would be small, about 0.11 per cent and 0.01 percent, respectively.

MH-052-2018 hearing

In the MH-052-2018 hearing, ECCC estimated a total of 76,200 tonnes of CO₂ emissions per year of combustion greenhouse gas emissions from Project-related tankers. The Board questioned Trans Mountain to explain the differences between Trans Mountain's and ECCC's estimate of total annual greenhouse gas emissions from the Project-related marine shipping, and the rationale for the differences. Trans Mountain, in its response, said that ECCC emissions were based on CO₂ only, and were derived from the Marine Emission Inventory Tool (MEIT) 2015 version whereas Trans Mountain's emissions were estimated based on carbon dioxide equivalent tonnes (i.e., include CO₂, CH₄, and N₂O). Trans Mountain said that ECCC's estimate accounts for an additional 11,200 tonnes CO₂ for current tanker traffic to and from WMT whereas Trans Mountain's said that its estimate only includes Project-related tanker traffic. Trans Mountain also provided other reasons and assumptions for the difference in the estimate for total annual greenhouse gas emissions.

Trans Mountain submitted that, regardless of the difference in Trans Mountain's and ECCC's estimates in total annual greenhouse gas emissions from the Project-related marine shipping, the percentage increases from Project-related marine greenhouse gas emissions are very small, ranging from 5.9 per cent to 6.9 per cent relative to B.C. marine greenhouse gas emissions, and 1.2 per cent to 1.5 per cent when compared to Canada-wide marine greenhouse gas emissions.

Boiler emissions

In the OH-001-2014 hearing, ECCC said that Trans Mountain's exclusion of tankers' boiler emissions in its estimation of Project-related marine air emissions leads to multiple uncertainties regarding pollutants, such as nitrogen oxides and particulate matter 2.5 microns or less in diameter (PM_{2.5}). ECCC said that the boiler emissions were not included in the calculation of marine emissions on the assumption that boilers are used for preheating the heavy fuel oil, and that only distillate would be used after 2015 and the implication of the North American Emission Control Area. ECCC said that the Trans Mountain's decision to exclude boiler emissions is expected to result in a 20 per cent underestimation of Project marine-source PM_{2.5} emissions.

ECCC said that main and auxiliary boilers are used for other reasons than pre-heating heavy fuel oil (e.g., ships' machinery and various services). Trans Mountain disagreed with ECCC's statement and said that neither main nor auxiliary boilers are required to operate when a tanker is at anchor or at berth. Port Metro Vancouver said that although it is unable to confirm whether both main and auxiliary boilers operate when a tanker is at anchor or at berth, it is of the view that boiler emissions should not be excluded from the assessment.

Transport Canada said that beyond setting limits on overall air emissions from vessels, it does not have a regulatory interest in whether boilers operate when a tanker is at berth and at anchor. It noted that the North American Emission Control Area (under MARPOL) puts in place the most stringent air emissions requirements for tankers. Under these standards, all tankers must either burn fuel with 0.10 per cent sulphur content or use alternative technology that results in equivalent emissions. Transport Canada said that engines fitted onto tankers after 1 January 2016 will need to meet Tier III nitrogen oxide standards for a reduction of nitrogen oxide emissions of up to 80 per cent.

MH-052-2018 hearing

In the MH-052-2018 hearing, Trans Mountain said that, since the issuance of the Board's OH-001-2014 Report in May 2016, it prepared an updated air quality assessment for the Project which conservatively assumed the inclusion of boiler emissions from Project-related marine shipping. The updated air quality assessment report notes that the assumptions include tanker boiler emissions from three berth locations, three anchorage locations, and underway vessels. Trans Mountain also filed an air quality assessment report that was prepared for Vancouver Fraser Port Authority (VFPA) that is consistent with VFPA's permit application process.

Trans Mountain said that the contribution of these boiler emissions was found to be very small. It will be further reduced starting from 1 January 2020 when the new global sulfur cap of 0.5 per cent on marine fuels will, in many cases, require that these vessels use distillate fuels instead of heavy fuel oil.

Anchorage and berth times and locations

In the OH-001-2014 hearing, ECCC said that tankers at berth and at anchorage are a source of emissions within the Westridge Local Study Area (LSA). It expressed concerns regarding Trans Mountain's assumptions on anchorage times and locations, and their impact on the air quality assessment. ECCC said that Trans Mountain's estimates indicate that the total time a tanker spends in port, including the inbound trip, the outbound trip, and the time at anchorage and berth, is about 80 hours. It said that only one anchorage location, Indian Arm, was included in Trans Mountain's assessment. ECCC said that it expects that, with the Project, the incidence of tankers using anchorages other than at Indian Arm will increase, as will the frequency at which the English Bay anchorages will be fully used.

Trans Mountain said that it will maintain high level of berth use in order to best manage its future operations. It noted that in most cases, arriving vessels will proceed directly to their assigned terminal berth. If the assigned berth is not available, vessels may anchor at one of the four designated anchorages near the mouth of Indian Arm. Port Metro Vancouver said that when a vessel requires an anchorage, the local shipping agent would request Port Metro Vancouver operations to assign an anchorage. Port Metro Vancouver said that while its role is to direct tankers to an anchorage when one is required or requested, it is not involved in scheduling berths for tankers. It said that this activity is managed by individual operators of each marine terminal.

Port Metro Vancouver said that it is satisfied with Trans Mountain's estimate for the amount of time Project-related tankers may spend at anchor east of Second Narrows and its rationale that anchorage demand will be minimized by increasing berth use. Port Metro Vancouver added that, for the purpose of calculating air emissions from Project-related tankers, the anchorage use assessment is incomplete. It raised concerns that the assessment does not include the amount of time Project-related tankers may spend at locations west of Second Narrows.

Cumulative effects

Trans Mountain assessed the potential and likely environmental residual effects associated with the increase in Project-related marine vessel traffic on marine air quality (air and greenhouse gas emissions) along with the identification of existing activities and reasonably foreseeable marine traffic that could act in combination with the increase in Project-related marine vessel traffic.

Trans Mountain said that the modelled particulate matter and sulphur dioxide concentrations for the Cumulative Case (including non-Project-related vessels) in the RSA decreased substantially relative to the Base and Application Cases. It associated this decrease with more stringent fuel sulphur regulations.

Trans Mountain predicted that nitrogen dioxide concentrations for the Cumulative Case would decrease relative to the Base and Application Cases due to the more rigorous Tier II and Tier III standards for marine vessels built on 2 January 2011 or later, and 1 January 2016 or later, respectively.

Trans Mountain said that by year 2030, more stringent marine vessel emissions requirements would be in place. As a result, sulphur dioxide and particulate matter emissions for tankers underway and at anchor are projected to decrease substantially.

Trans Mountain said that it expects carbon monoxide and volatile organic compounds concentrations to increase by almost 40 per cent and 20 per cent respectively, from the Base and Application Cases due to the growth in marine traffic.

In regard to the cumulative effect assessment of greenhouse gas emissions, Trans Mountain said that the spatial boundary of greenhouse gas emissions is international, and therefore, no cumulative effects assessments for greenhouse gas emissions is provided as it would need to include all international foreseeable future development. Trans Mountain provided per cent increases due to Project-related tanker traffic to marine greenhouse gas emissions in Marine RSA for air quality, in B.C., and in Canada.

Air and GHG emissions Regulatory framework

In the OH-001-2014 hearing, Trans Mountain said all marine vessels are required to adhere to the federal requirements including:

- Canada's *Vessel Pollution and Dangerous Chemicals Regulations* under the *Canada Shipping Act, 2001*; and
- ECCC's *Sulphur in Diesel Fuel Regulations*.

Transport Canada said that the *Vessel Pollution and Dangerous Chemicals Regulations* under the *Canada Shipping Act, 2001* requires a crude oil tanker's master or owner to ensure the implementation of a volatile organic compounds management plan that meets the requirements of the International Convention for the Prevention of Pollution from Ships.

Trans Mountain said that tugboats classified as large marine vessels will adhere to ECCC's *Sulphur in Diesel Fuel Regulations*.

In the MH-052-2018 hearing, Trans Mountain and Transport Canada said that in 2017, the IMO Member States agreed on an initial strategy for reducing greenhouse gas emissions from ships, which targets at least a 50 per cent reduction from 2008 levels by year 2050. Trans Mountain said that an internationally registered oil tanker that would call at the WMT would be subject to this IMO reduction target. Trans Mountain said that the IMO regime includes two primary measures for improving energy efficiency:

- Energy Efficiency Design Index (EEDI): Transport Canada said that in 2013, the Government of Canada implemented energy efficiency standards through the *Regulations Amending the Vessel Pollution and Dangerous Chemicals Regulations*. Transport Canada said that the EEDI requires new vessels to be 10 per cent more efficient in 2015 (Phase 1), 20 per cent in 2020 (Phase 2), and 30 per cent in 2025 (Phase 3) compared to a baseline established for new vessels constructed from 1999-2009. It said that as new more efficient vessels account for a greater share of the fleet over time, these standards help contribute to lowering greenhouse gas emissions from marine shipping.

Transport Canada said that the Proponent could consider investigating the availability of Phase 2 and 3 EEDI compliant Aframax tankers in order to assess the feasibility of the mitigation measure. Trans Mountain said it is not responsible for sourcing or operating tankers, however it will discuss the EEDI as part of Trans Mountain's future discussions with shippers on marine issues.

- Ship Energy Efficiency Management Plan (SEEMP) – Trans Mountain said that the Energy Efficiency Operational Indicator is an example of a monitoring tool that provides owners and operators with a method of measuring the fuel efficiency of a ship in operation and to estimate the result of any changes, such as improved voyage planning or more frequent propeller cleaning.

ECCC noted that a federal Clean Fuel standard is under development and will require producers and importers of fossil fuels to reduce the carbon intensity of the fuels they produce and import. ECCC said that pending the ultimate design of these regulations, the carbon intensity of marine fuels sold in Canada could be required to be lower, resulting in greenhouse gas emissions reductions. ECCC said that proposed regulations are planned for spring/summer 2019, to be published in the Canada Gazette, Part I.

Trans Mountain said that it has set the age limits for tankers that would be acceptable to call at the WMT, and this requirement related to vessel age limits are stated in Trans Mountain's Vessel Acceptance Standards. Trans Mountain anticipates that the ongoing improvements to the global fleet with respect to emissions reduction requirements will apply to tankers that transit to and from the WMT.

Trans Mountain said that it believes the authorities that regulate marine transportation (i.e., one or more of Transport Canada, Environment and Climate Change Canada, and the Canadian Coast Guard), would be better placed to establish any requirements for greenhouse gas emissions, and to monitor and enforce such programs, for all vessels. It said that as new more efficient vessels account for a greater share of the fleet over time, these standards help contribute to lowering greenhouse gas emissions from marine shipping.

Trans Mountain said that the IMO (under MARPOL Annex VI) has established emission control areas (ECAs) to reduce emissions of SO_x, NO_x and particulate matter in designated sea areas. Trans Mountain said that for large ships like oil tankers constructed after 1 January 2016, Tier III emission standards for NO_x must be met for a vessel to operate in an Emission Control Areas such as in the Port of Vancouver. It said that relative to Tier I emission standards from year 2000, the Tier III standards are expected to provide a significant reduction in NO_x emissions by 80 per cent or a factor of five.

Measures

In the MH-052-2018 hearing, the Board received submissions on the following measures that may reduce air and greenhouse gas emissions, and are discussed below.

- Speed reduction
- Vessel design, retrofit, operational, and maintenance measures
- Alternate fuels, including LNG
- Greenhouse gas emissions carbon taxation, carbon pricing / fiscal incentives
- Data collection on fuel oil consumption

Speed reduction

ECCC said that it estimated the reduction in greenhouse gas emissions based upon speed reduction ranging from 10 per cent to 30 per cent for the entire route (except within the Burrard Inlet) as well as the effect of limiting the vessels' speeds to 10 knots for the entire route between WMT and the 12-nautical-mile limit. ECCC estimated that this could lead to between eight (8) per cent and 20 per cent reduction in greenhouse gas emissions, depending on the percentage of speed reduction achieved. Trans Mountain said that while it is supportive of greenhouse gas emissions reduction initiatives that are efficient and equitably applied, further reducing the speed of Project vessels would have limited environmental benefits, create safety concerns, and reduce the economic viability of Canadian-sourced petroleum products transported on the Trans Mountain system to compete in foreign markets.

Vessel design, retrofit, operational, and maintenance measures

Trans Mountain said that vessels are increasingly using technologies and operations strategies to reduce greenhouse gas emissions from ships, such as by undertaking propeller polishing, hull cleaning, speed reduction, and weather routing on a regular basis. It said that retrofits and upgrades to achieve waste heat reduction/recovery, higher main engine performance, and improved propeller efficiency are also likely tools in the ship owner's toolbox of available mechanisms.

Department of Justice on behalf of federal authorities said that Canada has submitted a paper to the Marine Environment Protection Committee of the IMO noting that Maersk (container shipping company) has invested in ship design retrofits for 11 of its Panamax-size container ships for the purpose of improving fuel economy, as well as a 10 per cent improvement in fuel efficiency and associated air and GHG emission reductions.

Transport Canada provided a list of currently available measures that are related to ship design, retrofits, operations, and maintenance, and that may lead to further reducing air and greenhouse gas emissions from Project-related marine shipping. Table 24 discusses the measures that are technically and economically feasible.

Table 24: List of technically and economically feasible measures to reduce air and greenhouse gas emissions

Category	Description	Application	Measures	Feasibility
Engine upgrades	Engine upgrades focus on improving the main and auxiliary engines of the ship. They improve fuel efficiency by optimizing fuel burn or by improving thermal efficiency	Ship design and retrofits	<ul style="list-style-type: none"> Propulsion engine de-rating Common rail fuel injection 	<ul style="list-style-type: none"> Engine upgrades that are currently available are technically feasible to be installed in newly built tankers.
Propulsion upgrades	Propulsion upgrades optimize the thrust provided by the propeller. They minimize the amount of energy that is lost to turbulence and the wake of the ship.	Ship design and retrofits	<ul style="list-style-type: none"> High efficiency propellers Contra-rotating propellers Pre-swirl devices Wake equalizing duct Propeller boss cap fins Rudder bulb Vane vessels Twisted rudder 	<ul style="list-style-type: none"> The propulsion upgrades listed are generally proven technologies. While all of these measures can contribute to improved fuel efficiency, they are best considered through the perspective of optimizing the overall hydrodynamic profile of the ship. The payback time for many of these measures can be within a few years, particularly on newly built vessels that have considered them from conception.
Hull modification and maintenance	Hull modifications improve the flow of water across the hull and reduce waves and wake produced by the ship. Energy dissipated away from the ship in the forms of wave and wake increase exponentially with speed. Hull cleaning and coatings reduce the friction of water along the hull.	Ship design, retrofits, and maintenance	<ul style="list-style-type: none"> Optimization of hull openings (e.g., for bow thrusters, side thrusters) Optimized bilge keel Optimized bulbous bow Hull cleaning and coatings Propeller polishing 	<ul style="list-style-type: none"> Similar to propulsion upgrades, the hull upgrades listed are proven technologies but they should be considered through the overall hydrodynamic and engine design of the ship. Also, different hull modifications are best suited for different sizes of tanker ship. Bilge keels are best on ships under 50,000 DWT. The bulbous bow of a ship should be matched to the intended cruising speed of the ship. The payback time for these upgrades can be within a few years, however the upfront costs depends on how much of the rest of the ship requires upgrades to arrive at a holistically optimized design.

Alternate fuels, including liquefied natural gas (LNG)

Trans Mountain discussed alternative fuels to power the ships as a plausible mitigation measure to avoid or reduce the greenhouse gas emissions of Project-related marine shipping. It provided a comparison of greenhouse gas emissions for alternative fuels, including LNG, liquefied petroleum gas, methanol, biofuel and hydrogen. Trans Mountain said that there will be no sulphur oxide emissions related to it, particulate emissions will be very low, the oxides of nitrogen emissions will be lower than those of other fuel oils, and other emissions such as hydrocarbons, carbon monoxide, or formaldehyde from gas engines are low and can be mitigated by exhaust gas after treatment, if necessary. Trans Mountain said although the use of LNG as fuel for ocean going vessels, including Aframax tankers, is technically feasible, their viability for use for the Project is very limited at this time due to the present scarcity of such vessels in the international tanker fleet and the lack of globally available bunkering infrastructure necessary to support this type of vessel. It said that LNG is the most economical alternative fuel compared to other alternative fuels, but requires investments for infrastructure and storage, so the price fluctuations are different than with conventional fuel. It said that according to the Canadian Natural Gas Vehicle Alliance's feasibility study for Canada's west coast (2014), the two major barriers to widespread use of LNG as a marine fuel are a lack of familiarity with LNG in this role and the need to expand the supply chain to bring LNG to the marine market.

Vancouver Fraser Port Authority said that it is working with industry and government to facilitate the use of LNG as a marine fuel in the Port of Vancouver. In 2016, a study was conducted that suggested the port would start seeing demand for LNG as a marine fuel as early as 2020, which would increase steadily toward 2030.

Transport Canada said vessels complying with the IMO International Code of Safety for Ships Using Gases or other Low-Flashpoint Fuels may use LNG as a fuel. MARPOL Annex VI Regulation 4, also allows the use of LNG as an alternative to low-sulphur fuel.

Trans Mountain referred to Chapter 6 of the Studies on the feasibility and use of LNG as a fuel for shipping (2016), published by the IMO, where it noted that the Canadian regulations currently do not permit the use of LNG as fuel for ships and the IMO Interim Guidelines are not incorporated by reference in any Canadian regulation. Trans Mountain stated that there is work in progress in order to develop a regulatory framework to accepting the use of LNG as fuel for Canadian vessels.

Carbon taxation, carbon pricing / fiscal incentives and offsetting

Trans Mountain said based on B.C. tax guidance, the fuel that is used to power the tankers that visit the Westridge Marine Terminal may, upon registration of the owner or operator as a registered marine service, be exempted from the B.C. carbon tax as the fuel is used in a voyage between a location in B.C. and a location in another jurisdiction.

ECCC and Transport Canada said that there are no international, federal or provincial carbon pricing policies that would apply to Project-related marine shipping at this time, with the exception of the EEDI and the SEEMP, both of which are IMO requirements that have been implemented in Canada. ECCC and Transport Canada said that market-based measures are identified under the initial IMO strategy as potential measures to reduce emissions from international marine shipping. Trans Mountain said that market-based mechanisms are also being investigated by the IMO, and that the International Monetary Fund serves to provide a fiscal incentive for the maritime industry to invest in more energy efficient manner and for offsetting growing ship emissions.

ECCC said that there are no known fiscal incentives available at the international or state level for the maritime industry to invest in more energy efficient vessels or offset ship emissions. It said that ports operating such incentive programs have typically leveraged industry developed environmental rating programs, such as the Environmental Ship Index, the Clean Shipping Index, the GHG Emission Rating program or the Green Award program, in order to determine qualifying ships that may be eligible for port incentives. These environmental rating programs are voluntary for ship owners or operators, and have different requirements. The port incentive programs offer a monetary driver for ship owners or operators to participate in the environmental rating program(s) and reduce their environmental footprint (which may include improving vessel energy efficiency).

In regard to offsetting greenhouse gas emissions, ECCC said Canada continues to work with the IMO on the next steps outlined in the Initial Greenhouse Gas Emissions Strategy and if a relevant measure such as an offset system for the sector was agreed to, Canada would need to develop and introduce regulations under an appropriate domestic legislation in line with the IMO regulation.

Data collection on fuel oil consumption

Trans Mountain said that data collection system on fuel oil consumption of ships over 5,000 gross tons, which begins on 1 January 2019, will feed into a process towards adoption of a revised IMO strategy in 2023. This monitoring will provide a better understanding of actual greenhouse gas emissions for large maritime vessels to better track the intended reduction of GHG emissions via direct measurement.

Transport Canada said that it will delegate to Classification Societies the collection of fuel oil consumption data for Canadian vessels that operate internationally and are over 5000 GT, to collect the fuel oil consumption data required for the IMO data collection system. This data will then be submitted to the IMO Ship Fuel Oil Consumption Database through the IMO reporting system. The collection and reporting of the fuel oil consumption data will be done once a year as per the requirements of Regulation 22A, Annex VI MARPOL.

Transport Canada said that Project-related vessels will report to the responsible Flag State (country of vessel registration), which will then report to IMO as per the requirements of Regulation 22A, Annex VI MARPOL.

Air quality monitoring

In the OH-001-2014 hearing, ECCC said that it found several uncertainties in Trans Mountain's photochemical modelling of the formation of secondary particulate matter and ozone. It conducted a scoping analysis and provided specific recommendations in this regard. Chapter 10 provides a discussion on this issue. In light of the uncertainties related to predicting marine source combustion emissions, ECCC recommended that Trans Mountain develop an air quality monitoring, reporting, and mitigation plan in conjunction with the Lower Fraser Valley Air Quality Coordinating Committee.

ECCC said that it expects emissions from Project-related tankers to increase concentrations of nitrogen dioxide and PM_{2.5} (with their associated health impacts) in the vicinity of the Tsleil-Waututh Nation reserve. It said that although Trans Mountain predicted that pollutant concentrations will remain well within ambient air quality standards, the multiple uncertainties regarding those emissions reduce confidence in that conclusion. Therefore, ECCC recommended that Trans Mountain establish a program to monitor air contaminants, including nitrogen dioxide and PM_{2.5}, at or adjacent to Tsleil-Waututh Nation's Burrard Inlet No. 3 reserve. ECCC said that the monitoring program should verify predicted impacts under the full range of expected meteorological conditions.

In response to ECCC's comment on Board's draft conditions, Trans Mountain said that it will consult with Indigenous groups about the possibility of undertaking an ambient survey on the Tsleil-Waututh Nation's reserve lands. Trans Mountain said that it is willing to consider and discuss the request with the interested parties, such as Tsleil-Waututh Nation and other groups, such as North Shore No Pipeline Expansion (NS NOPE), who also reside on the North Shore and expressed interest in ambient air quality measurements.

Port Metro Vancouver said that in conducting its review, it would rely on the results of the environmental assessment carried out by the Board to the extent the results satisfy its standards and requirements. Port Metro Vancouver said that its air emissions management plans do not typically address emissions from tankers at anchor. Rather, these plans focus on measures the terminal can control and influence. It added that all tankers operating at the port are expected to comply with the relevant regulations in its Port Information Guide.

MH-052-2018 hearing

In the MH-052-2018 hearing, Trans Mountain said that since the report was prepared for VFPA, the Canadian Ambient Air Quality Standards ("CAAQS") for NO₂ were announced by the Canadian Council of Ministers of the Environment (2018). Trans Mountain said that these CAAQS are intended to be objectives for ambient air quality measurements recorded at air quality monitoring stations in large urban areas or municipalities, as opposed to assessing dispersion modelling results (which are inherently conservative) at points close to the emission sources. Trans Mountain said that it has committed to monitor the ambient air quality at a new monitoring station within the fence-line of the WMT (as well as the three other Project storage terminals in B.C. and Alberta), and to comply with applicable ambient air quality objectives as noted in the Air Emissions Management Plan, in accordance with the requirements of NEB Condition 52.

Views of the Reconsideration Panel

Air emissions

The Board finds that although Project-related increase in marine shipping is expected to increase emissions in the Regional Study Area (RSA), these emissions are expected to remain below applicable objectives. The Board recognizes that volatile organic compounds and carbon monoxide in the study area are expected to increase over time as a result of the growth in marine shipping, whereas other contaminants (e.g., nitrogen dioxide, sulphur dioxide, particulate matter) are expected to decrease due to more stringent regulations.

The Board finds that Trans Mountain's predicted concentrations for both PM_{2.5} and nitrogen dioxide emissions at the Tsleil-Waututh Nation's Burrard Inlet No. 3 reserve, as a result of Project-related marine shipping, are well below the applicable objectives. The Board acknowledges ECCC's concern that nitrogen dioxide concentrations are generally high in the area due to other non-Project sources and that there are uncertainties with Trans Mountain's prediction of marine-source combustion emissions. As mentioned in Chapter 10, Section 10.2.1, the Board would impose Condition 52 requiring Trans Mountain to develop an air emissions management plan at the Westridge Marine Terminal for approval by the Board. Air monitoring conducted pursuant to this plan would verify predicted emissions levels, and exceedances of criteria established within the approved plan would require Trans Mountain to implement appropriate mitigation. Trans Mountain has committed to consult with the relevant Indigenous groups about the possibility of undertaking an ambient survey on Tsleil-Waututh Nation's reserve lands. Consequently, the Board is not persuaded that a program to monitor air contaminants at or adjacent to Tsleil-Waututh Nation's reserve is warranted at this time. The Board's views around photochemical modelling are discussed in Chapter 10.

With respect to tanker boiler emissions, the Board notes that since the issuance of Board's OH-001-2014 Report in 2016, Trans Mountain has prepared an updated air quality assessment for the Project which conservatively assumed the inclusion of boiler emissions from Project-related marine shipping. The Board finds that the contribution of these boiler emissions is very small, and will be further reduced starting in 2020 when the new global sulfur cap of 0.5 per cent on marine fuels will require these vessels use distillate fuels instead of heavy fuel oil.

Trans Mountain has committed to maintain a high level of berth utilization. In the Board's view, it is difficult to estimate the amount of time spent at the anchorage locations and at berth, which, in turn, could affect any air quality assessment, as it depends on a number of factors. The Board notes that Port Metro Vancouver's role is to direct vessels to an anchorage when one is required or requested, but is not involved in scheduling berths.

In regard to the issues raised by Metro Vancouver in the MH-052-2018 hearing, the Board accepts Trans Mountain's reasoning that CAAQS are intended to be objectives for ambient air quality measurements recorded at air quality monitoring stations in large urban areas or municipalities, as opposed to assessing dispersion modelling results (which are inherently conservative) at points close to the emission sources. In the Board's view, the air quality objectives are designed to facilitate air quality management on regional scales.

The Board acknowledges that there is an existing regulatory regime governing air emissions from tankers underway or in transit. All Project-related tankers and barges are required to follow international and federal regulations, and apply best practices during operations. These tankers would carry an International Air Pollution Prevention Certificate and be required to have onboard a volatile organic compound management plan.

In the MH-052-2018 hearing, the Board received evidence from Transport Canada that suggests a number of technically and economically feasible measures available to reduce air emissions from Project-related marine shipping, as outlined in Table 23.

The Board realizes that since the issuance of the OH-001-2014 Report, more stringent emission requirements are in place for marine vessels, such as Tier III emission standards for NO_x in the Emission Control Areas for oil tankers constructed after 1 January 2016. The Board notes that Trans Mountain's implementation of programs and initiatives, such as the Energy Efficiency Design Index and Ship Energy Efficiency Management Plan, would help further reduce certain emissions. The Board notes that although Trans Mountain said it is not responsible for sourcing or operating tankers, it committed to discuss the EEDI as part of Trans Mountain's future discussions with shippers on marine issues.

Taking into consideration that Trans Mountain and Project-related vessels will be required to adhere to all federal and international emission requirements¹²⁶ to reduce emissions from Project-related marine shipping, the Board finds that the residual effects from Project-related marine shipping is not likely to cause significant adverse effects. The Board notes that Trans Mountain has set the age limits for tankers that would be acceptable to call at the WMT, which in Board's view, will improve the efficiency of the vessels resulting in reduction of air emissions. The Board notes that this requirement related to vessel age limits is stated in Trans Mountain's VAS. The Board has imposed Condition 134 which requires Trans Mountain to file an updated VAS with the Board, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and thereafter on or before 31 January of each of the first five years after commencing operations. The Board notes that as new more efficient vessels account for a greater share of the fleet over time, these standards help in reduction of air emissions from Project-related marine shipping.

The Board finds that the increase in operational air emissions from the tankers is expected to be of long-term (expected to occur for the operational life of the tankers), reversible (emissions will reverse shortly once the tankers exit the RSA), low to moderate magnitude, and is expected to disperse in the RSA. In addition, the Board finds that the contribution from Project-related marine shipping to total cumulative effects on marine air emissions is not likely to be significant given that there is an existing regulatory regime that governs the air emissions from the tankers.

Significance evaluation: increase in operational air emissions from Project-related marine shipping

	Criteria	Rating	Description
Project effects	Temporal extent	Long term	Effects are expected to occur for the operational life of the tankers.
	Reversibility	Reversible	Emissions will reverse shortly once the tankers exit the RSA
	Geographic extent	RSA	Emissions are expected to disperse in the RSA.
	Magnitude	Low to moderate	The Board finds that although Project-related increase in marine shipping is expected to increase emissions in the Marine Air Quality RSA, these emissions are expected to remain below applicable objectives. The Board recognizes that volatile organic compounds and carbon monoxide in the study area are expected to increase over time as a result of the growth in marine shipping, whereas other contaminants (e.g nitrogen dioxide, sulphur dioxide, particulate matter) are expected to decrease due to more stringent regulations. The Board recognizes that Project-related vessels will be required to adhere to all federal and international emission requirements to reduce emissions from Project-related marine shipping.
Cumulative effects	The Board finds that the contribution from Project-related marine shipping to total cumulative effects on marine air emissions is not likely to be significant given that there is an existing regulatory regime that governs the air emissions from the tankers. Taking into consideration that Trans Mountain and Project-related vessels will be required to adhere to all federal and international emission requirements to reduce emissions from Project-related marine shipping, the Board finds that the residual effects from Project-related marine shipping is not likely to cause significant adverse effects. The Board notes that Trans Mountain has set the age limits for tankers that would be acceptable to call at the WMT which in Board's view will improve the efficiency of the vessels resulting in reduction of air emissions. The Board is of the view that as new more efficient vessels account for a greater share of the fleet over time, these standards help in reduction of air emissions from Project-related marine shipping.		
Recommendation	Not likely to cause significant adverse environmental effects.		

¹²⁶ Regulatory requirements include Canada's *Vessel Pollution and Dangerous Chemicals Regulations* under the *Canada Shipping Act, 2001* and ECC's *Sulphur in Diesel Fuel Regulations*.

Greenhouse gas emissions

The Board has focused its assessment on the direct greenhouse gas emissions generated from the Project-related vessels, as opposed to assessing the global climate effects of the greenhouse gas emissions. As described in Chapter 10, Section 10.2.2 in the Board's view, attempting to determine and assess the eventual global climate effects of greenhouse gas emissions generated by the Project-related vessels is not practical in terms of meaningfully informing an environmental assessment recommendation on this Project. The Board has not provided a table for describing the significance of GHG emissions unlike for other valued components. The Board relied on the magnitude of GHG emissions (i.e., increase in GHG emissions from Project-related marine shipping) given that the GHG emissions accumulate in the global atmosphere and are permanent in nature.

The evidence indicates that the Project-related marine vessels are expected to result in an increase of approximately 6.9 per cent in marine greenhouse gas emissions in the RSA, 2.1 per cent in marine greenhouse gas emissions in B.C., and 1.2 per cent in marine greenhouse gas emissions in Canada.

The Board notes that in the MH-052-2018 hearing, ECCC estimated a total of 76,200 tonnes of CO₂ emissions per year of combustion greenhouse gas emissions from Project-related tankers as opposed to Trans Mountain's estimate of 68,100 carbon dioxide equivalent tonnes per year. The Board accepts Trans Mountain's methodology for estimating total GHG emissions from Project-related tankers and finds that ECCC's estimate included emissions from the current tanker traffic as opposed to estimating emissions from Project-related marine shipping only. The Board also notes other differences in the assumptions which in Board's view would could increase the total estimate. The Board notes that the difference in Trans Mountain's and ECCC's estimates of increases from Project-related marine greenhouse gas emissions are very small and insignificant, ranging from 5.9 per cent to 6.9 per cent relative to B.C. marine greenhouse gas emissions, and 1.2 per cent to 1.5 per cent when compared to Canada-wide marine greenhouse gas emissions.

In regards to Trans Mountain's cumulative effects assessment, the Board finds the approach reasonable. Trans Mountain provided per cent increases due to Project-related tanker traffic to marine greenhouse gas emissions in Marine RSA, in B.C., and in Canada. The Board agrees with Trans Mountain's reasoning that conducting a cumulative effect assessment of greenhouse gas emissions would need to include all international foreseeable future development, which in the Board's view is not practical. In addition, the Board notes that the Canadian Environmental Assessment Agency's guidance document "Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners" does not prescribe a certain methodology for conducting cumulative effects assessment of greenhouse gas emissions.

The Board notes that in the OH-001-2014 hearing, no mitigation measures were considered in Trans Mountain's marine greenhouse gas emissions assessment and there are currently no regulatory reporting thresholds in Canada for marine greenhouse gas emissions. The Board notes that Project-related marine vessels are required to adhere to all federal and international emission requirements, including standards for bunker fuel. The Board recognizes that new energy efficiency standards were adopted by the International Maritime Organization in July 2011, and that these standards may reduce greenhouse gas emissions from new vessels in the future.

In the MH-052-2018 hearing, the Board heard that in 2017, the IMO Member States agreed on an initial strategy for reducing greenhouse gas emissions from ships, which targets at least a 50 per cent reduction from 2008 levels by year 2050. The Board also received various submissions that discussed plausible mitigation measures to reduce greenhouse gas emissions from marine vessels. These include speed reduction, vessel design, retrofit, and maintenance measures, use of alternate fuels, carbon taxation, and carbon pricing. The Board also heard that there are no fiscal incentives available at international or state level for the maritime industry to invest in more energy efficient vessels.

The Board also received evidence around use of LNG as a fuel source for Project vessels. The Board acknowledges the argument from Chamber of Shipping that notes that the efficiency of the supply chain may be an area worthy of an increased focus for achieving potential benefits from reduced greenhouse gas emissions. The Board supports Chamber of Shipping's view and encourages the supply chain visibility efforts undertaken by VFPA and Transport Canada.

The Board notes that with the federal clean fuel standard, the carbon intensity of the fuels will be lowered, thereby reducing the GHG emissions. The Board further notes that data collection system on fuel oil consumption of ships over 5,000 gross tons, which begins on 1 January 2019, will feed into a process towards adoption of a revised IMO strategy in 2023. This monitoring will provide a better understanding of actual GHG emissions for marine vessels, and to better track the intended reduction of GHG emissions.

The Board received comments from Shackan Indian Band that the Board ought to recommend additional conditions be placed on Trans Mountain to offset the GHG emissions of Project-related marine vessels. The Board notes that

Project-related marine vessels are required to adhere to all federal and international emission requirements, including standards for bunker fuel. In addition, Trans Mountain has set the age limits for tankers that would be acceptable to call at the WMT which will improve the efficiency of the vessels resulting in reduction of GHG emissions. The Board notes that this requirement related to vessel age limits is stated in Trans Mountain's VAS. The Board has imposed Condition 134 which requires Trans Mountain to file an updated VAS with the Board, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and thereafter on or before 31 January of each of the first five years after commencing operations. In regard to requiring offsets, the Board notes that Trans Mountain does not own or operate the vessels. The Board also notes ECCC's statement in regard to offsetting greenhouse gas emissions that Canada continues to work with the IMO on the next steps outlined in the Initial Greenhouse Gas Emissions Strategy and if a relevant measure such as an offset system for the sector was agreed to, Canada would need to develop and introduce regulations under an appropriate domestic legislation in line with the IMO regulation. Therefore, the Board is not persuaded to impose any additional conditions on Trans Mountain to offset the GHG emissions of Project-related marine vessels.

The Board finds that greenhouse gas emissions are a concern because of their long term accumulation in the atmosphere. The Board also finds that any incremental contribution from Project-related marine vessels would increase the burden at a global scale, regardless of how large or small the contribution.

Given that there are no regulatory reporting thresholds for marine greenhouse gas emissions in Canada and that the contribution from Project-related marine vessels to total Canadian greenhouse gas emissions would be 0.01 per cent, and taking a precautionary approach, the Board finds that greenhouse gas emissions from Project-related marine vessels are likely to be significant. The Board recommends to the GIC that it should support the development and implementation of greenhouse gas reduction measures related to marine shipping that would align with the final International Maritime Organization Strategy in year 2023 for reducing greenhouse gas emissions (Recommendation 10). These measures could include, but not be limited to facilitating the use of low-carbon alternate fuels, use of energy efficient technologies, and market-based measures, such as providing economic incentives for industry investment in the development and use of energy efficient technologies and offsetting any increases in ship emissions. The Board notes that Recommendation 2 would also be relevant in that it includes a description of the progress on each of the recommendations.

In the Board's view, if GIC implements the Board's recommendation around development and implementation of GHG reduction measures related to marine shipping that aligns with the final IMO strategy by 2023, the GHG emissions from Project-related shipping would be reduced. In addition, the Board is of the view that with the new energy efficiency standards adopted by the International Maritime Organization, and with the proposed regulations for federal clean fuel standard planned for spring/summer 2019, the GHG emissions will be further diminished.

14.7.2 Marine mammals

Trans Mountain described the marine waters of B.C. as home to a broad range of marine mammal species, including cetaceans (whales, dolphins, and porpoises), pinnipeds (seals and sea lions), and sea otters. It said that the productive straits and sounds of the RSA provide important habitat for foraging, breeding, socializing, and migration. Trans Mountain said that many species of marine mammal can be observed in the RSA year-round, and thus depend on this environment for all aspects of their life history, while other species are predominantly seasonal in their presence, coming to feed for a season or simply passing through during migration. Trans Mountain identified 10 species of marine mammals, and 4 killer whale ecotypes, that are SARA-listed and have potential to occur in the RSA (Table 25). Trans Mountain said that critical habitat for the Southern resident killer whale and the North Pacific Humpback whale has been identified in the RSA (Figure 26).

Trans Mountain said that marine mammals in the RSA face a variety of anthropogenic threats and stressors. It said that stressors vary in intensity and relative importance for individual species but, broadly speaking, include: chemical contamination from both legacy contaminants and current inputs; reductions in prey abundance or quality; physical disturbance; acoustic disturbance or injury from both acute and chronic sources; risk of collisions; risk of entanglements; and, climate change.

MH-052-2018 hearing

In the MH-052-2018 hearing, Trans Mountain referenced its previous individual assessment for each SARA-listed marine mammal species. Trans Mountain and DFO noted that in 2017, Humpback whale was reclassified under the SARA from Threatened to Special Concern.

Table 25: Species listed under Schedule I of the Species at Risk Act potentially found within the Regional Study Area

Species	Status
Humpback whale	Special concern
Fin whale	Threatened
Sei whale	Endangered
Grey whale	Special Concern
Blue whale	Endangered
North Pacific right whale	Endangered
Offshore killer whale	Threatened
Bigg's killer whale (formerly Transient)	Threatened
Northern resident killer whale (NRKW)	Threatened
Southern resident killer whale (SRKW)	Endangered
Harbour porpoise	Special Concern
Steller sea lion	Special Concern
Sea otter	Special Concern

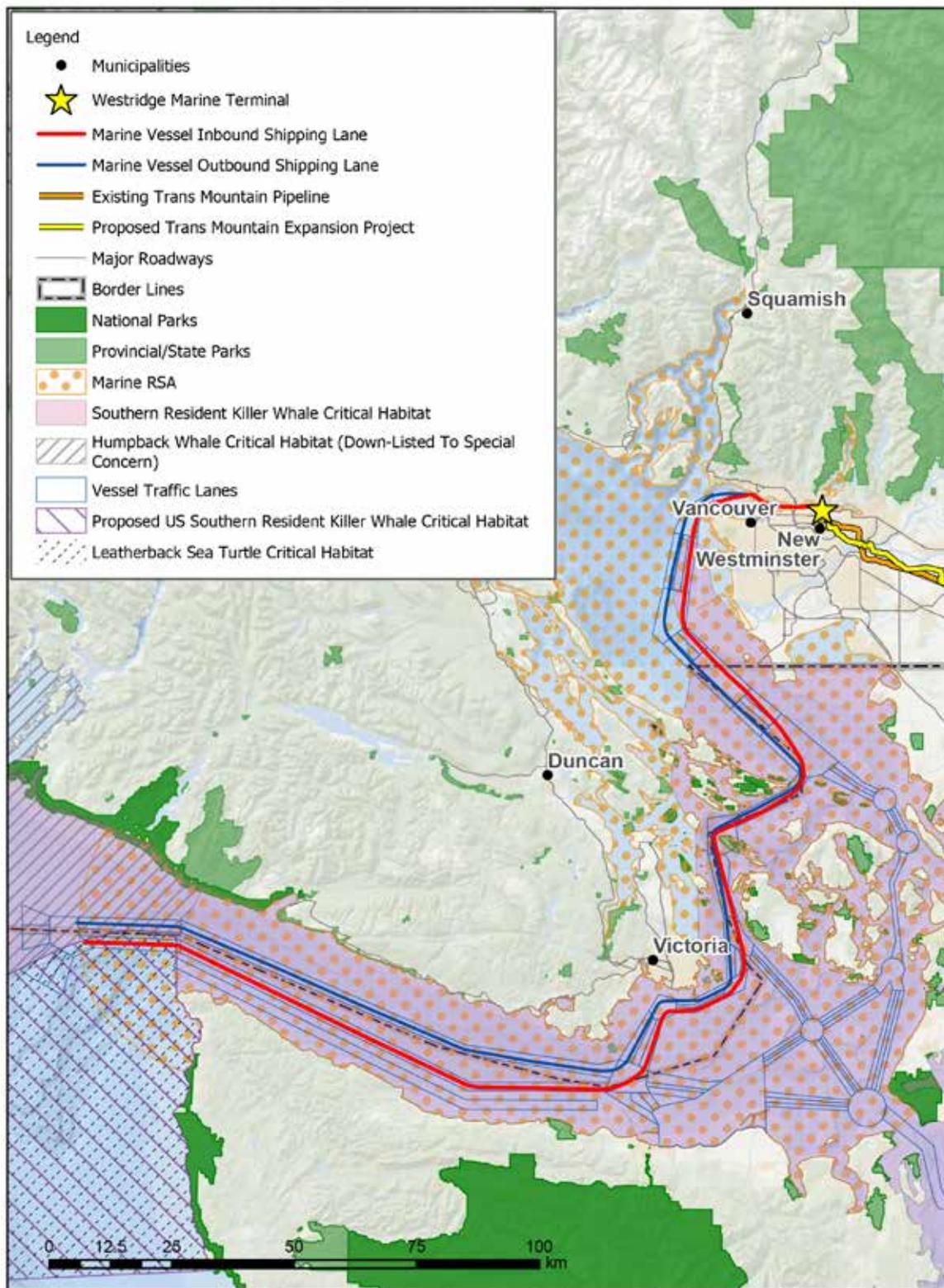
Many participants in the OH-001-2014 hearing and in this reconsideration filed evidence and raised issues related to impacts of Project-related marine vessels on marine mammals. This section focuses on the following key issues:

- permanent auditory injury, temporary auditory injury, and sensory disturbance;
- vessel strikes;
- Southern resident killer whale;
- other marine mammals; and
- mitigation.

Permanent auditory injury, temporary auditory injury, and sensory disturbance

Trans Mountain said that loud underwater noise has the potential to result in temporary or permanent auditory injury (i.e., temporary or permanent threshold shifts [TTS] or [PTS]), or cause sensory disturbance to marine mammals. To determine the potential effects of Project-related vessel-based underwater noise on marine mammals, Trans Mountain, in the absence of any Canadian legislation or guidelines, compared sound source levels from tankers and tugs, based on literature values and acoustic modelling, against thresholds predicted to cause PTS, TTS, and sensory disturbance to marine mammals. Trans Mountain said that based on these results, no PTS or TTS to marine mammals is expected as a result of Project-related marine vessel operations.

Figure 26: Southern resident killer whale and North Pacific Humpback whale critical habitat identified in the Regional Study Area



Trans Mountain said that based on the results of the acoustic modelling study, noise levels associated with an increase in Project-related marine vessel traffic within the RSA are expected to exceed thresholds for behavioral disruption. Trans Mountain said that underwater noise levels above the threshold are predicted to extend for 4 to 7 km from Project-related marine vessels and would be centered on the shipping lanes. Trans Mountain said that sensory disturbance could result in a variety of impacts, such as habitat avoidance, changes in activity states (e.g., feeding, resting, or travelling), and/or interference of communication or perception of sounds (i.e., masking). It said that the degree of sensory disturbance experienced by a marine mammal depends on numerous factors, including: the source level; frequency and duration of the underwater noise; the context (i.e., the animal's activity state at the time); and the species in question.

Trans Mountain said that while exposure of a stationary marine mammal in the RSA to a Project-related marine vessel will be intermittent, this daily exposure will occur throughout the life of the Project. It said that most studies report that marine mammal behaviour returns to normal after sound production ceases, and in consideration of only routine effects associated with the Project, it is expected that the time between vessel transits would allow marine mammals to recover from the sensory disturbance before the next transit of a Project-related marine vessel. Trans Mountain further said that while marine mammals may not encounter another Project-related marine vessel for the remainder of the day, they are very likely to encounter other marine vessels within minutes to hours of the Project-related marine vessel passing, which could conceivably approach near-continuous sensory disturbance. Trans Mountain said that shipping is not a novel activity in the RSA, and many species that use this area regularly are likely to have become 'habituated' to sounds associated with marine transportation activities.

Raincoast Conservation Foundation indicated that compensatory mechanisms (i.e., habituation) come with an energetic cost.

Participants raised concerns over potential impacts of underwater noise on marine mammals. Dr. Lance G. Barrett-Lennard commented that the impact of increased underwater noise from tankers and escort tugs would affect the behaviour, distribution and potentially the health of marine mammals.

DFO raised concerns regarding Trans Mountain's assessment methods, indicating that the locations and dataset used by Trans Mountain in its underwater noise predictive modelling may not accurately represent all locations within the assessment area, specifically in areas considered critical habitat for the Southern resident killer whale (e.g., Boundary Pass). Trans Mountain said that the four locations selected for acoustic modelling scenarios were meant to be reasonably representative of all locations within the RSA and that the addition of an extra modelling scenario location for Boundary Pass would not alter the conclusions of the assessment. DFO noted that Trans Mountain's assessment only addressed the noise produced and propagated from Project-related ships, and did not consider the potential cumulative and/or additive effects of such noise in combination with existing shipping activity.

In the MH-052-2018 hearing, the U.S. Tribes filed a 2016 paper that asserts the conclusion that larger vessels generate more noise at low frequencies (< 1000Hz) and thus the peak power in ship noise overlaps baleen whale signals. DFO filed evidence which noted that a significant part of shipping noise also extends to high frequencies used by SRKW for social calls and echolocation clicks. Transport Canada said that while tankers and escort tugs are not as loud as other vessel classes, they are louder than most in high frequencies of critical importance to the SRKW.

In a 2018 memo from Canada to the IMO that the federal authorities filed with the Board, Canada said that there is potential for hearing damage or loss in whales that are exposed to prolonged periods of shipping noise. DFO described a modelling study which noted that because there are typically many whale-oriented boats in the vicinity of SRKWs, modelled total noise levels were found to be close to the critical noise threshold assumed to cause a permanent hearing loss over prolonged exposure.

Vessel strikes

Trans Mountain said that all marine vessels have the potential to accidentally strike marine mammals. Trans Mountain indicated that the probability and resulting effect of a strike depends on a variety of factors, including the speed of the vessel, the species of marine mammals, and density of vessel traffic and marine mammals in a given area. Trans Mountain said that depending on the severity of the injury, an individual marine mammal may or may not recover from a vessel strike. It said that while the primary effects associated with being struck are blunt-force trauma or lacerations, long-term consequences may include immediate direct mortality; indirect mortality resulting from complications or infection of internal or external injuries; long-term or permanent injuries; reduced fitness or fecundity; or short-term recoverable injuries. Trans Mountain said that the magnitude of this effect may therefore range from low to high. It said that while a strike resulting in minor injuries may be low magnitude, mortality of a SARA-listed species would be considered a high magnitude effect. Trans Mountain said that at the population scale, recovery from the mortality of an individual would depend on the population in question, its generation time, and its conservation status. Whereas population-level effects for some species may be reversible in the medium-term, mortality of individuals listed as Endangered (e.g., North Pacific right whale) could have long-term or permanent population-level consequences.

Trans Mountain conducted a qualitative review of relevant literature and DFO's Marine Mammal Incident Database to support its assessment of Project-related marine mammal vessel strikes. Trans Mountain said that the overall probability of a Project-related marine vessel striking and injuring a marine mammal is considered low. It said that while ship strikes leading to marine mammal fatalities can and do occur, such occurrences are infrequent relative to the number of vessels (of all sizes and classes) on the water. DFO cautioned that the DFO's Marine Mammal Incident Database, or any database that relies on the recovery of dead whales, may not be representative of the true frequency of ship strike occurrences and may underrepresent the true frequency of marine mammal vessel strikes.

The Board requested Trans Mountain provide a quantitative study that evaluated the risk to marine mammals from Project-related marine vessel strikes. Trans Mountain developed an encounter risk model to predict the probability of Project-related marine vessels encountering various marine mammals along the shipping lanes and anywhere within the RSA, in combination with the existing and predicted marine traffic levels. Trans Mountain said that, based on the model results, the encounter risk for any particular vessel is quite small and to date, there have been no known instances of a tanker servicing the WMT having collided with a whale. As such, the potential for Project-related vessel strikes is considered to be a low probability event.

Several participants raised general concerns related to marine mammal vessel strikes. Raincoast Conservation Foundation said that Trans Mountain's encounter risk model relied on occurrence data derived from opportunistic sightings collected primarily from whale watchers and not corrected for effort. It further said that density cannot be derived from opportunistic sightings and consequently, the assessment is severely limited and unreliable for estimating ship strike risk or identifying areas of greatest risk.

Trans Mountain acknowledged the limitations of the data used to inform the encounter risk model and said that a quantitative seasonal accounting of densities is not publicly available for many of the marine mammal species considered, or for the entire RSA, and that such information would greatly improve the applicability and spatial resolution of the encounter model. Trans Mountain committed to include, as part of its Port Information and Terminal Operations, explicit guidance for reporting marine mammal vessel strikes and mammals in distress to the appropriate authorities to ensure clarity around marine mammal vessel strikes.

DFO said that although it is possible to estimate the current risk to marine mammal indicator species from ship strikes in the RSA and the additional risk that could result from Project-related vessel traffic, such estimates would likely have a high degree of uncertainty. DFO further said that high resolution spatial data on the densities of marine mammal indicator species are lacking, particularly for the Humpback whale, which is the species most likely to be affected by ship strikes. Thus, an accurate quantitative assessment of risk to Humpback whales from existing shipping traffic is not feasible at this time, nor is an estimate of the increased risk associated with Project-related vessels.

In the MH-052-2018 hearing, the Board heard there is new data on whale densities and quantitative estimates of strike risk, as described in a 2017 paper by Nichol et al., which is discussed below.

DFO noted that as water passes a large hull, it can advect a nearby whale towards the side of the ship. A 2017 paper by Nichol et al. explained that, in addition to direct strikes, large ships travelling at high speeds are more likely to collide with whales as a result of hydrodynamic draw, which can pull a nearby whale toward the vessel's hull and thus extend the lethal strike zone to 1–2 times beyond a ship's actual draft.

Southern resident killer whale

Participants noted that the Southern resident killer whale is listed as Endangered under the SARA. Trans Mountain said that according to DFO's Recovery Strategy for Northern and Southern Resident Killer Whale and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Assessment and Update Status Report on the Killer Whale, key threats to the Southern resident killer whale population include: chemical and biological contaminants; reductions in the availability or quality of prey (primarily Chinook and Chum salmon); and physical and acoustic disturbance. Trans Mountain also said that DFO has included the environment's acoustic attributes in their designation of critical habitat for Southern resident killer whales, and sources of acoustic disturbance are noted as including both high-intensity sounds, such as those produced by seismic surveys, and chronic sources such as vessel traffic.

Trans Mountain's environmental assessment concluded that even though the Project contribution to overall sensory disturbance effects is small, the potential effects of increased Project-related marine vessel traffic, and their contribution to potential cumulative effects, are determined to be significant for Southern resident killer whales. Trans Mountain acknowledged that, despite operating legally, and being proportionally small relative to the existing marine vessel traffic, the Project will contribute additional underwater noise that could affect the Southern resident killer whale population, and that this noise will act cumulatively with noise from existing and reasonably foreseeable marine vessel traffic. Trans Mountain said that past and current activities, including all forms of mortality, high contaminant loads, reduced prey, and sensory and physical disturbance, have resulted in significant adverse cumulative effects to the Southern resident killer whale population. Trans Mountain said that given the current state of knowledge, and the ability of threats to interact with one

another, it is not possible to completely partition how each threat may be affecting the population. Trans Mountain argued that the shipping lanes will continue to host marine vessel traffic with or without the Project, and that the impacts to the Southern resident killer whales will continue to exist with or without the Project.

Trans Mountain said that a Project-related marine vessel was predicted to encounter killer whales along the shipping lanes once every six days. Trans Mountain said that the return intervals only represent the frequency with which a Project-related vessel and marine mammal are expected to occur in the same place at the same time. It said that encounter risk model does not factor in any behavioural responses of the whale (i.e., movement out of the area as the vessel approaches), nor any avoidance response (e.g., dives, bursts of speed, changes of course), and that only a fraction of the encounters will result in actual physical contact between a vessel and a whale, and out of the incidences of physical contact, only a fraction will result in fatal injuries. Trans Mountain said that killer whales in particular are small, agile, and fast-moving, and that based on historical records, the percentage of encounters that ultimately lead to collisions with killer whales is expected to be low. According to strike event records obtained from DFO's B.C. Marine Mammal Incident Database (1973 to October 2012), there have been six records of strikes with killer whales that were confirmed or deemed likely to have occurred in B.C. (maximum vessel size reported for a killer whale strike was a ferry in the Strait of Georgia).

Participants provided substantial amounts of evidence in regards to the Southern resident killer whales and potential Project-related effects.

DFO supported Trans Mountain's significance conclusion, stating that overall, Trans Mountain's assessment of residual effects on the Southern resident killer whale may be accurate, given the current endangered status and the declining trend of this population in recent decades. DFO said that the poor survival and birth rates of Southern resident killer whales over the past 20 years suggest that the current habitat quality, including that of designated critical habitat within the RSA, may be insufficient to allow for recovery of this population. It further noted that due to a lack of information that is needed to quantify the impact of existing underwater noise conditions in the RSA on the Southern resident killer whale population, it is not possible to predict what further effects might be anticipated from future Project-related vessel traffic. DFO also acknowledged that the risk to Southern resident killer whales from Project-related marine vessel collision may be extremely low or negligible.

Raincoast Conservation Foundation said that the viability and conservation status of the Southern resident killer whales is adversely affected by repeated and multiple human-caused disturbances that interact and have cumulative harmful effects. It said that the main factors believed to be impeding recovery and viability of the Southern resident killer whales include physical and acoustical disturbance caused by marine traffic and other industrial activities, nutritional stress from inadequate prey availability, and exposure to environmental contaminants. Raincoast Conservation Foundation further stated that the Project-related marine vessels have the potential to exacerbate many threats facing Southern resident killer whales and that while an understanding of how the current threats may act synergistically to impact killer whales is unknown, in other species multiple stressors have been shown to have strong negative and often lethal effects, particularly when animals carry elevated levels of environmental contaminants.

Raincoast Conservation Foundation said empirical measurements of ambient sound levels (natural and anthropogenic) found that critical habitats for Southern resident killer whales have the noisiest levels of all sites sampled along the B.C. mainland coast and that the Project's proposed activities will only increase noise levels in an already noisy environment. Raincoast Conservation Foundation said that present noise levels under busy ship traffic conditions are already so high that additional ship traffic may 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.

Raincoast Conservation Foundation said that there is a reasonable likelihood of population level and ecological consequences for Southern resident killer whales from Project-related increases in vessel noise events and the chronic deterioration of whales' acoustic habitat. Raincoast Conservation Foundation critiqued Trans Mountain's assessment methods and suggested that the Project-related marine vessel effects need to be translated into population and ecological level risks. Raincoast Conservation Foundation completed a Population Viability Analysis which modelled the future population based on current conditions with no Project, and contrasted that with a model that assumes the Project is approved. Raincoast Conservation Foundation said that modelling results indicated that if base line conditions persist, the Southern resident killer whale population will most likely remain about at its current size or continue a very slow decline. It further said that modelling shows that increased threats from Project-related effects increase the risk of extinction and accelerate decline. It said that it is abundantly clear that the population cannot withstand additional negative pressures, recover from its current endangered status, and persist. Raincoast Conservation Foundation also said that the factor with the largest effect on depressing population size and possibly leading to extinction is a reduction of Chinook prey base.

Tsawwassen First Nation indicated that the Southern resident killer whale population has declined over recent years and said that population recovery seems unlikely unless drastic changes to those factors compromising the population's demographics occur.

The Board heard substantial additional evidence on SRKW in the MH-052-2018 hearing, including the following.

Prey availability & Chinook salmon

According to the November 2018 Southern Resident Orca Task Force Report and Recommendations, SRKW diet is composed almost entirely of salmon, and about 80 per cent of their total diet comes from Chinook salmon. DFO evidence established that Chinook salmon productivity is estimated to have declined from 25-40 per cent since the early 1980s across many B.C. indicator stocks. DFO said the abundance of Fraser Chinook salmon continued to drop in 2018, and the outlook for 2019 is for continued unfavorable conditions and low productivity for these Chinook stocks. A literature review by Dr. Burnham filed by the Province of B.C. attributed the decline in natural stocks to degradation of spawning and rearing habitat, competition, loss of access to habitat due to dams, historical overfishing, and adverse environmental conditions such as strong El Niño conditions and recently by an anomalous warm water mass creating altered oceanic conditions referred to as the 'Blob'. The 2018 RKW Recovery Strategy states that climate change is affecting entire ecosystems, and it is likely that in order to survive, killer whales will have to adapt to the consequences of local changes in their prey base.

DFO pointed out that migratory routes for some Chinook salmon stocks overlap with Project shipping lanes, but there is no published source of information that identifies stocks of Chinook salmon that are impacted by marine shipping activities.

Contamination

The 2018 RKW Recovery Strategy states that there are likely thousands of chemicals to be found in the killer whales of B.C. The high contaminant levels found in SRKW may arise from consuming prey that are from industrialized areas near the B.C.-Washington border, and contaminants enter the marine environment from local, regional and international sources. These include point sources such as pulp and paper mills, municipal effluent outfalls, and petrochemical facilities, and non-point sources such as sewer overflows, urban runoff and storm-water drainage, agriculture, forestry, and aquaculture. In addition, some pollutants such as PCBs, DDT and other chemicals are transported through atmospheric processes and ocean currents, and may travel to the west coast of North America from as far away as Asia. Federal authorities said that the cities of Vancouver and Victoria currently release about 700 million litres of untreated and undertreated wastewater into the Salish Sea per day.

Disturbance / noise

An ECHO Program-commissioned desktop and modelling study filed by the VFPA estimated that overall, the time for SRKW foraging potentially lost due to behavioural responses and click masking totaled 20-23 per cent of each whale day (4.9-5.5 hours), with approximately two thirds of this time due to noise from large commercial vessels and one third due to noise from whale watching boats.

- Ferries (52-67 per cent) and tugs (12-27 per cent). The study stated that ferries undoubtedly contribute a large amount of noise due to their size, the large number of monthly ferry trips, and because their routes are widely distributed throughout the study area. Similarly tugs make a relatively large contribution due to the substantial volume of tug traffic in the study area.
- Other merchant ships (11-13 per cent). Along shipping lanes, deep sea commercial vessels were generally the largest contributors. Oil tankers, for example, contribute approximately 1 per cent of the sound regionally, but up to approximately 6 per cent in the Strait of Juan de Fuca.
- Whale watching boats contribute less than 1 per cent regionally in the summer (0 per cent in the winter) but up to 4.6 per cent in Haro Strait. Localized noise contribution from smaller vessels may therefore be important in critical habitat areas where their presence overlaps high-use areas for SRKW.

Likewise, a literature review by Dr. Burnham for the Province of B.C. said ferry routes contribute the greatest inputs into the cumulative noise maps of the Salish Sea, with additional seasonal routes added during the summer when SRKWs use the area for foraging.

A 2018 ECHO Program study stated that the commercial whale watching industry has developed into one of the fastest growing wildlife-based viewing industries in the world. DFO said that commercial whale watching in the Canadian and U.S. portions of the Salish Sea increased from a few boats in the 1970s to about 100 boats in 2016, and that SRKWs were observed to be within 400 m of a vessel most of the time during daylight hours from May through September, largely as a result of whale-watching oriented vessels approaching and following them. A 2017 paper by Lacy et al. states that, from the perspective of a foraging killer whale that emits high-frequency echolocation clicks to detect and capture salmon, high-frequency noise from small, outboard vessels that follow whales might cause a greater reduction in a killer whale's foraging success than low-frequency background noise from commercial shipping. DFO acknowledged that until further research is completed, it is difficult to quantify the relative impact of increased low frequency noise from large vessels compared to the higher frequency noise from non-AIS vessels, including whale watching boats that tend to travel much closer to the SRKW than the larger commercial vessels.

Strikes

DFO noted that its 2017 Whale Science Review identified ship strikes as an additional threat to the three main threats noted in the Recovery Strategy for SRKW. DFO said that the recent mortality of J34, a prime age male found to have died from large blunt force trauma, highlights this threat. The very small size of the SRKW population and the low numbers of prime age males and females that support the reproductive potential and genetic diversity of the population means that a threat that could remove one animal will have significant consequences.

Relative contributions to cumulative effects

Research on the cumulative effects of the multiple threats to SRKW suggests that, although prey limitation is likely the most important factor affecting population growth, both reductions in acoustic disturbance and increases in prey abundance are needed to achieve population growth. DFO said to date, the only published study comparing the relative contribution of individual anthropogenic threats on SRKW is the cumulative effects analysis of Lacy et al. (2017). DFO stated that while the model predictions have not been tested, the outcomes of its population viability analysis (PVA) model suggest that there are several configurations of threat reduction that could lead to increased population growth of SRKW. For example, Lacy et al. (2017) predicts that a 50 per cent noise reduction plus a 15 per cent increase in Chinook would allow the SRKW population to reach a 2.3 per cent growth target.

SRKW population

The Board heard that the population of SRKW has fallen to 74. DFO acknowledged there is no evidence that the SRKW population is recovering. Federal authorities noted that the competent ministers under the SARA determined in May 2018 that SRKW is facing an imminent threat to its survival and recovery.

A 2018 Threats Assessment Brief submitted by Musqueam stated there is reason to think that the current decline of SRKW since around 2010 is occurring under a unique set of conditions: the effects of climate change are stronger now than in previous decades; an increase in large commercial vessels and whale-oriented vessels has resulted in a noisier acoustic environment; major competitors on Chinook populations such as NRKW, transient killer whale, sea lions and seals have experienced significant population growth over recent decades; and there has been a dramatic increase in human population growth, development and industrialization around the Salish Sea over the past forty years. The Threats Assessment Brief said of particular concern is that the sex ratio at birth is becoming increasingly male-biased.

The evidence of Lacy et al filed by Raincoast asserts that their updated population viability analysis (PVA) for SRKW, incorporating the data from the past four years, confirmed that the population is fragile and perhaps in a slow decline, with no ability to withstand additional threats and an inability to recover unless current conditions are improved.

Raincoast said population levels of SRKW before 1960 are not known with any accuracy, but scientists estimate the minimum historical population size was about 140 animals (referencing NOAA). Commenter A.V. Walker referred to a presentation by Dr. Trites and said that, from DNA data collected, Dr. Trites does not believe that SRKW numbers have exceeded 100, at any time, in the past century.

A 2018 Threats Assessment Brief submitted by Musqueam said the abundance of the SRKW population has fluctuated over the last sixty years with a high of 98 individuals in 1995 and a low of 66 individuals in 1973. The Musqueam Brief said the current decline started around 2010, in which the number of SRKW individuals has dropped from approximately 85 to a current abundance of 74.

Contribution of Project tankers to cumulative effects

Trans Mountain asserted in its evidence that vessels calling at the Westridge Marine Terminal will continue to represent a comparatively small proportion of total marine transportation activity in the Salish Sea, travelling at speeds less than many other types of vessels in the region. As such, Trans Mountain argues that Project-related marine vessels will contribute a proportionately small component of the overall marine transportation sources of all underwater noise contributions.

Other toothed whales

Trans Mountain said that other toothed whales may be observed in the RSA, including Dall's porpoises, Harbour porpoises, Pacific white-sided dolphins and the other ecotypes of killer whales. It said that based on results of acoustic modelling, underwater noise will be detectable by toothed whales over large distances and may cause sensory disturbance within 4 to 7 km of the shipping lanes. Trans Mountain said that species, such as the Harbour porpoise, may have somewhat more pronounced responses to disturbance, but that acoustic modelling suggested that the extent of sensory disturbance is expected to be generally comparable across all toothed whale species found within the RSA. It said that in contrast to the Southern resident killer whale, Project-related residual effects will affect only localized portions of the overall North Pacific

(or Canadian) populations of toothed whales in the RSA. As such, and in consideration of the notable differences between population status, abundance, and occurrence of Southern resident killer whales versus the various other species of toothed whales in the RSA, effects of increased Project-related marine vessel traffic on toothed whales (other than Southern resident killer whales) are deemed to have a negative impact balance but are not significant. Trans Mountain also noted that no critical habitat has been identified for any species of toothed whale¹²⁷ (excluding the Southern resident killer whale) and that the RSA is considered a DFO Important Area for Harbour porpoise.

Trans Mountain said that according to strike event records obtained from DFO's B.C. Marine Mammal Incident Database (1973 to October 2012), there have been eight recorded strikes on toothed whales that were confirmed or deemed likely to have occurred in B.C.: one involved a Dall's porpoise calf; one involved a Harbour porpoise calf; and six involved killer whales with a maximum vessel size reported for a killer whale strike being a ferry in the Strait of Georgia. Trans Mountain said that killer whales are small, agile, and fast moving, and although no mathematical probabilities have been determined to calculate actual strike risk for this species, historical records suggest that the percentage of encounters that ultimately lead to collisions with killer whales is low. Trans Mountain said that DFO's Recovery Strategy for the Transient Killer Whale (*Orcinus orca*) in Canada recognizes collisions with vessels as a stressor with demonstrated causal certainty, but a low level of concern.

The 2018 RKW Recovery Strategy says the NRKW population has been increasing at a mean rate of 2.9 per cent per year since 2002, reaching approximately 309 individuals in 2017. The 2015 Report on Progress of Recovery Strategy Implementation for the Transient Killer Whale states that the population has been increasing since the mid-1970s when monitoring began. The 2018 Proposed Recovery Strategy for the Offshore Killer Whale in Canada includes a map of encounters showing that offshore killer whale's range is broad and includes the Salish Sea. The Proposed Recovery Strategy states that threats include chronic acoustic disturbance (e.g., from shipping traffic) and physical disturbance, both listed as medium level of concern. The Proposed Recovery Strategy states that disturbance due to vessel proximity is a concern for killer whales in B.C., especially given the growth of the commercial whale watching industry in these waters. The Proposed Recovery Strategy states the overall offshore killer whale population size appears to be stable, with high estimated survival each year, although it states that anything beyond natural mortality could jeopardize recovery.

Baleen whales

Trans Mountain indicated that the North Pacific Humpback whale is listed as Special Concern under Schedule 1 of the SARA. It said that a small portion of a much larger north pacific population of Humpback whales is found seasonally within the RSA. Trans Mountain said that activities identified by DFO's Recovery Strategy for the North Pacific Humpback Whale (*Megaptera novaeangliae*) in Canada as likely to destroy or degrade critical habitat include vessel traffic, toxic spills, overfishing, seismic exploration, sonar and pile driving. Trans Mountain said that no scientific study has established a causal link between increased vessel noise and population-level effects on Humpback whales. Trans Mountain said that based on results of acoustic modelling, underwater noise will be detectable by Humpback whales over large distances and may cause sensory disturbance within 4 to 7 km of the shipping lanes. Trans Mountain also identified that sensory disturbance would occur within North Pacific Humpback whale critical habitat, but said that the critical habitat within the RSA is only a small portion of the critical habitat identified in Canadian waters.

DFO said that Trans Mountain, in its assessment, did not consider the strong long-term site fidelity of Humpback whales to feeding areas within the RSA and the resulting repetitive exposure of these individuals to Project-related shipping noise levels that could result in behavioural disturbance. Trans Mountain disagreed with DFO and maintained that its assessment of effects on Humpback whales and subsequent significance determination accurately considered the localized areas of high Humpback whale abundance that occur within the RSA.

Trans Mountain and DFO both identified the North Pacific Humpback whale as the species at the highest relative risk of marine mammal vessel strike in the RSA, as the species is known to seasonally congregate in critical habitat along the western portion of the RSA. Trans Mountain said that in B.C., Humpback whales are the most commonly struck species, as reported to the B.C. Marine Mammal Response Network. Trans Mountain's encounter risk model predicted that Project-related marine vessels would encounter a North Pacific Humpback whale along the shipping lanes every 334.2 days. Trans Mountain said that only a fraction of these encounters will result in actual physical contact between a vessel and a whale, and out of the incidences of physical contact, only a fraction will result in fatal injuries.

Trans Mountain said that other baleen whales that frequent the RSA on occasion include Fin whales, Grey whales, and Minke whales. Trans Mountain said that while these other species of baleen whale are not altogether uncommon in the area, neither is considered particularly abundant, and that no critical habitat or DFO Important Areas have been identified within the RSA for any species of baleen whale other than Humpback whales. It further said that all baleen whales belong to the

¹²⁷ Potential critical habitat for transient killer whales was identified in the Regional Study Area.

same functional hearing group, and while species such as Fin whales may be somewhat more sensitive than Humpback whales to low frequency sounds associated with shipping, effects of sensory disturbance to the Humpback whale indicator are expected to be generally comparable to effects on all baleen whale species found within the RSA.

Raincoast Conservation Foundation said the increase in shipping associated with the Project creates an increased risk of ships striking marine mammals and, in particular, great whales such as Blue, Fin, Sei, Humpback, and Grey whales, as well as smaller cetaceans, such as killer whales, dolphins and porpoises. It said that many of these marine mammals are listed as species at risk in Canada, and that injury or death because of ship strikes are significant threats to recovering populations of marine mammals, posing the greatest risk to small or isolated whale populations, such as the Southern resident killer whales, where a single strike-related mortality could have population-level effects.

Trans Mountain said that based on the encounter risk model, the overall probability of a Project-related vessel encountering a Blue, Sei, Fin, or North Pacific right whale is considered very low.

New evidence filed in the MH-052-2018 hearing included the 2017 Action Plan for Blue, Fin, Sei and North Pacific right whales in Canadian Pacific Waters, which states that threats for these whales include vessel strikes and physical disturbance due to vessel presence and chronic anthropogenic noise. It states that as these whales re-inhabit Canadian Pacific waters, the likelihood of strikes is expected to increase, unless ship design and transit strategies are developed to minimize the likelihood and severity of strikes.

The evidence of Dr. Darling filed by Barkley Sounds Stewardship Alliance pointed out the highest densities of Humpback whales, up to 50-100+ animals in several square kilometres, are often found on Swiftsure Bank in the route of shipping traffic. DFO said Humpback whales, which are present primarily from May to October, aggregate in large numbers near the western entrance of the Strait of Juan de Fuca.

A 2017 paper by Nichol et al. filed by DFO states that baleen whales are at greater risk of being struck by ships because of their large body size, because they spend extended periods of time at or near the surface, and because most exhibit a limited ability to manoeuvre away from vessels, or do not attempt to avoid ships at all. Nichol et al. added that 20 Humpback whales were reported struck by vessels in B.C. during 2004-2011, representing an individual reported injured or killed approximately every 9 months, although it was noted that documented strike rates significantly underestimate the true impact of vessel collisions on whale populations. The study described in Nichol et al. predicted whale densities from the results of aerial surveys, and combined this with vessel traffic data to predict strike risk. The study concluded that the most likely areas for Humpback strikes are along the continental shelf break, the inshore approaches to the Strait of Juan de Fuca, and within the Strait itself, while Fin whales are most likely to be struck in the offshore approaches to Juan de Fuca and inside the western portion of the Strait.

Other large whales, such as Blue, Sei and North Pacific right whales, DFO noted, are seldom observed in the Salish Sea and are usually distributed more offshore to the west, northwest and southwest of the western edge of the RSA.

Thousands of migrating Grey whales have to cut across the western entrance of the Strait of Juan de Fuca, according to the evidence of DFO. Dr. Darling on behalf of Barkley Sounds Stewardship Alliance said this amounts to a very high density of whales crossing shipping routes day and night for several months. Dr. Darling said that a small number (about 200) spend time feeding around the central/south west coast of Vancouver Island including shorelines of the Strait of Juan de Fuca, and that this population is endangered. DFO said in 2017, COSEWIC reassessed the Eastern Pacific Grey whale population as three Designatable Units, two of which were assessed as endangered and under consideration for listing under the SARA.

Other marine mammals

With regard to pinnipeds, Trans Mountain's assessment said that there may be some sensory disturbance due to underwater noise, but that it would be of low magnitude and not significant. For Steller sea lion, Trans Mountain said they are expected for the most part to be habituated to regular traffic movements along the shipping lanes, a large part of the acoustic energy produced by Project-related is expected to be inaudible, individuals are likely to recover from the direct effects of sensory disturbance immediately, and large-scale disturbance around haulouts is not expected.

With regard to sea otter, Trans Mountain said it is only occasional in the area, most likely in westernmost portion of the RSA, and that although there may be some sensory disturbance due to underwater noise, it would be of low magnitude and not significant.

Mitigation: overarching considerations

Trans Mountain said that while it can actively enforce restrictions on tankers docked at the WMT to comply with its operating practices and standards, once the tanker departs from the WMT, the company has little direct control over the operating practices of the tankers or tugs as Project-related marine vessels are owned and operated by third parties. It said that marine transportation in Canadian waters is authorized and regulated through the *Canada Shipping Act, 2001*, related

legislation, and regulations administered by Transport Canada and the CCG. As such, no direct mitigation was proposed by Trans Mountain for effects associated with increased Project-related marine transportation. The Board requested a species-specific assessment for SARA-listed marine mammals that are likely to be impacted from Project-related marine transportation, which included a request for species-specific mitigation. Trans Mountain, for every species, recommended no mitigation. Trans Mountain reiterated that Project-related marine vessels are owned and operated by a third party, and marine transportation in Canadian waters is authorized and regulated through the *Canada Shipping Act, 2001* and related legislation and regulations are administered by Transport Canada and the CCG.

In the MH-052-2018 hearing, Trans Mountain observed that initiatives solely aimed at Project-related vessels would be inefficient and would have no material benefit to SRKW without also addressing the shipping industry in general. The Government of Alberta likewise argued that conditions and recommendations that apply solely to Project-related vessels will illogically subject the shipment of petroleum products from the Project to a different standard than any other commercial undertaking in the RSA, including those dealing with petroleum products unrelated to the Project or of cargoes of other potentially dangerous substances. In a VFPA letter summarizing the outcomes of an ECHO Program workshop, VFPA said workshop participants noted that a significant focus regarding potential mitigation seems to have been placed on the impact of shipping noise on the killer whales, that NOAA has undertaken much research in regards to whale watching vessels and other small boats, and workshop participants expressed a strong desire that there be equity in the distribution of responsibility for taking action to help recover the SRKW population.

VFPA noted that vessel related effects are a regional cumulative issue and the most effective way of addressing those cumulative effects is to work collaboratively with all stakeholders to better understand threats to at-risk whales, inform evidence-based solutions, and to trial and implement adaptive voluntary measures. The Chamber of Shipping said the ECHO Program navigational measures to reduce underwater noise were extremely complex to develop and implement and required a high degree of coordination with multiple federal departments in both Canada and the United States, scientific organizations, and ship owners and operators globally who call on ports in B.C. The management of commercial shipping traffic in coastal waters is complex, involves multiple jurisdictions, and deserves a deliberate approach. VFPA said ECHO Program partners and advisors have expressed a clear desire for the ECHO Program to remain the forum through which multiple parties continue to discuss the issue of managing vessel related threats to at-risk whales in this region.

Transport Canada pointed out that its paramount consideration is the safety and security of Canada's transportation system, including its waterways. It urges that identification and comprehensive assessments of measures to mitigate underwater vessel noise must consider not only the effectiveness at mitigating noise, but also navigational safety, economic and business impacts, unintended environmental consequences, and Canada-U.S. and international considerations. Further, certain navigation measures, such as modification of shipping lanes, would require adoption by the IMO before they can be fully implemented, and it should also be understood that any international adoption of measures within the Salish Sea may also first require agreement and cooperation of U.S. partners. The November 2018 Washington State Southern Resident Orca Task Force Report and Recommendations likewise highlighted the importance of coordination between Canadian and U.S. authorities.

Transport Canada commissioned a Greenwood Risk Assessment report which conducted a preliminary risk assessment of various potential mitigation measures proposed for SRKW. That report noted that two principal concerns recurred when considering certain measures: firstly, the prospect of small craft being forced into interaction with deep-sea vessels and the potential for collision, and secondly, creating circumstances where vessels not under pilotage would be forced to loiter and the potential for drifting, for example.

With regard to changes over time, DFO said the distribution of whales is highly linked to mechanisms that create local aggregations of prey. While these processes are mostly seasonal and predictable, ocean conditions, climate change and other factors influence their distributions over time and consequently areas and times where mitigation measures would be focused may also need to change over time. The Chamber of Shipping likewise noted the need for an adaptive management framework to allow for mitigation modifications. It noted, however, that commercial marine shipping prefers a predictable operational and regulatory framework in order to remain competitive, so any mitigation measure(s) considered should attempt to strike a balance between being suitably adaptable with a degree of predictability.

A number of participants argued that all mitigations should be in place, and demonstrated to be successful, before Project approval or Project operations commence. The Tsleil-Waututh First Nation and Living Oceans/Raincoast argued that because of uncertainties, such as the potential effects of increased duration of underwater noise with a vessel slowdown that proposed measures do not yet qualify as mitigation. The SRKW Imminent Threat Assessment acknowledged that actions to mitigate threats and support recovery of SRKW have been underway for many years, but that these efforts have yet to result in detectable signs of recovery of the population. It also stated that current actions such as with regard to prey (e.g., managing salmon fisheries) and disturbance (e.g., slowdown trials) are relatively new and their effectiveness in promoting survival and recovery for SRKW remains to be determined.

Trans Mountain argued that although many regional initiatives are ongoing and may not be completed for some time, these initiatives do not need to be completed before the Project can commence. Trans Mountain said that if additional mitigation or monitoring measures are identified in the future through these regional initiatives, they can be applied to all marine shipping at that time, including Project-related marine shipping.

Mitigation: Trans Mountain

Trans Mountain indicated that it would be interested in supporting and participating in a joint industry-government advisory group that would be charged with determining and/ or developing effective mitigation measures to reduce potential effects of underwater noise on marine mammals in the region.

Trans Mountain committed to developing a Marine Mammal Protection Program with a purpose of outlining Project-related tanker specific measures and regional collaborative initiatives that would be implemented by Trans Mountain and other operators along the marine shipping lanes to mitigate and manage potential environmental effects on marine mammals. Trans Mountain said that one of the objectives of the Marine Mammal Protection Program would include actively encouraging and participating in multi-stakeholder or independent initiatives that contribute to Southern resident killer whale recovery strategies.

Trans Mountain indicated that one of the strategies of the Marine Mammal Protection Program is to ensure that Southern resident killer whales have an adequate and accessible food supply to allow recovery. Trans Mountain said that it remains committed to supporting wild Pacific salmon and has indicated that it is willing to support the Pacific Salmon Foundation – Salish Sea Marine Survival Project, which it believes would contribute to better conservation and increased abundance of Chinook salmon.

Trans Mountain also committed to supporting the Port Metro Vancouver led Enhancing Cetacean Habitat and Observation Program (ECHO). Port Metro Vancouver said that ECHO has been established in collaboration with government agencies, First Nations, marine industry users, non-government organizations and scientific experts, to better understand and manage the potential impacts to cetaceans from commercial vessel activities throughout the southern coast of B.C. Trans Mountain said that it would be participating in Green Marine, a voluntary environmental program for the maritime industry as a whole to reduce its environmental footprint. Trans Mountain said that its Vessel Acceptance Standards require all accepted vessels to meet all applicable international and local rules and regulations. It further said that should future guidelines or standards for reducing underwater noise from commercial vessels come into force as international and local rules and regulation, Project-related marine vessels would meet those rules and regulations.

DFO said that its review has suggested that specific mitigation measures that Trans Mountain can feasibly implement to reduce Project-related effects do not appear to be available. DFO recommended that as the Marine Mammal Protection Program is further refined and developed, Trans Mountain explore the potential for having trained marine mammal observers on-board Project-related marine vessels. These observers may be staff on-board the vessels or potentially members of the Pacific Pilotage Authority that have undergone training to help them identify risks to marine mammals and make appropriate vessel navigation alterations to reduce effects on marine mammals species.

Tsawwassen First Nation argued that what is necessary is urgent regulatory action to reduce underwater noise in the Salish Sea. Tsawwassen First Nation argued that the results of the scientific studies undertaken as part of the Marine Mammal Protection Program have no guarantee that effective mitigation will be developed.

In the MH-052-2018 hearing, Trans Mountain said that should the NEB reissue a Certificate for the Project, Trans Mountain plans to commence a process to solicit and obtain feedback and comments from Indigenous Groups on a draft version of the Marine Mammal Protection Program no later than 18 months before the commencement of Project operations.

Trans Mountain explained that its Vessel Acceptance Standard includes a Master's Declaration that requires confirmation that the vessel's hull and propeller are not fouled excessively, and that the vessel will participate in all navigation initiatives designed to protect marine mammals in the region. With regard to the first, Trans Mountain said hull cleaning would always be part of a vessel's dry-docking cycle, but since it is well known that fouling leads to reduced fuel efficiency, individual tanker operators are typically arrange for cleaning between scheduled dry-dockings (often at 6 to 9 month intervals). With regard to the second, Trans Mountain confirmed that it expects all Project-related vessels to participate in all ECHO navigation trials, including slowdown and lateral displacement trials, provided it is safe and practicable for the vessel to do so.

Trans Mountain said there are only three new plausible mitigation measures available to it to potentially reduce the effects of marine shipping:

- Routing: If there is support for it from the appropriate federal authorities, Trans Mountain said it would request Project-related vessels skirt recently designated critical habitat for SRKW and NRKW off Southwestern Vancouver island by including a Deviation Point in the vessel's passage plan, and request that they proceed at not more than

12 knots between the Deviation Point and Buoy J, safe navigation permitting and if feasible to. Trans Mountain provided a conceptual map of the special routing and speed limit, which shows this routing and speed limit are predominantly outside the 12-nautical-mile boundary. Trans Mountain said the Federal Authorities that regulate marine transportation may be better placed to establish such requirements, but it would nevertheless include the information in its Westridge Marine Terminal Regulation and Operations Guide.

- **Minimize number of ships:** Trans Mountain said it would work with Project shippers to explore optimizing and reducing the number of Project-related vessel shipments by maximizing tanker cargo volume. Trans Mountain said it is not possible at this time to estimate the number of reduced transits, and that it will not include a commitment by shippers to maximize cargo volume and share loads in its Vessel Acceptance Standard because doing so would remove commercial and transportation flexibility, potentially make Canadian resources less competitive in the global market, and because export destinations will vary by shipper.
- **Tugs:** Trans Mountain said, when selecting a provider for the Strait of Juan de Fuca Escort Tug Service in conjunction with the shippers, that it will consider a number of means to abate underwater noise effects, if practical and feasible to do so.

A number of participants suggested additional requirements be placed specifically on Project-related marine vessels, such as requirements for quiet technologies or certification. Trans Mountain said it would not be appropriate to add these as requirements in its Vessel Acceptance Standard because, in general, certain requirements could significantly reduce the flexibility and access for shippers to a sufficient supply of vessels, and that additional requirements must be applied more broadly than just Project-related marine vessels in order to be both effective and fair across the shipping community. In addition, with regard to some specific suggestions:

- **Inspections:** Trans Mountain said it would not require physical inspections of vessels coming to call at WMT prior to their entry into Burrard Inlet, because it would lead to logistical complications, potential delays, and additional anchoring.
- **Incentives:** In response to a suggestion by VFPA that Trans Mountain implement an incentive program, Trans Mountain said it does not charge a fee to vessel owners for calling at the WMT, and the key incentive for vessels is to meet the requirements under the VAS and be accepted. With regard to the Port of Vancouver's incentives for underwater noise reduction, Trans Mountain said there are no Aframax tankers that Trans Mountain is aware of that meet the criteria to benefit from the underwater vessel noise performance criteria of the EcoAction Program.
- **Speed limits:** In response to calls for specific speed limits on Project-related vessels, Trans Mountain said that further reducing the speed of Project vessels would have limited environmental benefits, create safety concerns, and add to the shippers' overhead cost of transportation. Trans Mountain added that the typical speed profile for an outbound laden tanker between the Port of Vancouver and Buoy J is already relatively low, between 10 and 12 knots.

Mitigation: Broad initiatives

The Federal authorities said that since the NEB's OH-001-2014 Report, the Government has advanced a comprehensive strategy to protect ocean ecosystems and to support the recovery of SRKW, which has advanced in three stages:

- under the \$1.5 billion national Oceans Protection Plan (OPP) launched in late 2016;
- under the \$167 million Whales Initiative launched in June 2018; and
- an additional \$61.5 million for additional measures announced in October 2018 designed to further address the imminent threats to the survival and recovery of SRKW.

The Federal authorities said that various research and data collection projects are underway. These include a Coastal Environmental Baseline Program that will collect data at six pilot sites over the next four years, including in the port of Vancouver; and a national Cumulative Effects of Marine Shipping Initiative at six pilot sites, including one in South Coast B.C., which will include regional cumulative effects assessments at each pilot site and the identification of potential tools and strategies that can be applied to existing or future vessel movements.

Louis Bull Tribe recommended that a regional cumulative effects management plan for the Salish Sea should be developed.

The Board received information about a number of education and outreach initiatives, such as the Coastal Ocean Research Institute's 2016 Mariner's Guide to Whales, Dolphins, and Porpoises of Western Canada; an interactive training tutorial on the protection of at-risk whale species in Pacific Northwest waters that builds upon the Mariner's Guide; and the 'Be Whale Wise' guidelines.

Mitigation: Underwater noise

Reduce speed

A number of participants noted the potential multiple benefits of speed reductions. For example, the Board of Friends of Ecological Reserves said that reduced speed mitigates acoustic noise, GHG emissions and lowers the probability of marine mammal strikes. Washington State's Department of Ecology added that speed limits can potentially improve safety and limit air pollution. PPA said the slower speeds can reduce wash and wake effects and reduce impacts on private recreational vessels.

VFPA said between August and October 2017, the ECHO Program led a voluntary vessel slowdown trial in Haro Strait, a key summer foraging area for endangered SRKW. Commercial, piloted vessels were requested to reduce speed to 11 knots. A reported participation rate of 61 per cent for piloted vessels was achieved over the trial period. VFPA said mean speed reductions varied by vessel type from 2.1 knots for bulk/general cargo ships to as high as a 7.7 knot reduction in speed for container ships, resulting in reduced mean broadband vessel source levels of between 5.9 dB and 11.5 dB. VFPA said total ambient noise received at the near-shore Lime Kiln hydrophone was reduced by a median value of 1.2 dB, and that modelling of SRKW behavioural response indicated this could result in a 10.3-11.5 per cent reduction in affected foraging time when compared to baseline conditions. VFPA concluded that reducing vessel speeds is an effective way of reducing the underwater noise generated at the vessel source for all major deep sea vessel categories, as well as reducing total underwater noise in nearby habitats, which may in turn benefit the behaviour and foraging success of SRKW. Transport Canada said that the studies following the 2017 Haro Strait slowdown found that the total percentage of time below the noise threshold level (below which SRKW behavioural response is not anticipated) increased slightly, which suggests that the increased transit time did not increase the duration of impactful underwater noise for this trial.

VFPA said, as a result of these positive findings, in 2018 industry moved away from the concept of a trial and led the implementation of a voluntary slowdown action. A refined approach was proposed to address the reality that a single speed limit slowdown disproportionately affects faster vessel types more than slower vessels: commercial, piloted vessels were requested to slow to 15 knots or less for ships generally traveling at faster speeds (containerships, passenger/cruise ships, car carriers) and 12.5 knots or less for slower ships (bulkers, tankers, general cargo). Transport Canada said participation increased from 61 per cent in 2017 to 88 per cent in 2018. The 2018 slowdown action in Haro Strait also implemented dynamic start and end dates based on SRKW presence, commencing when SRKW were confirmed to be present in the area, and extending while SRKW were recorded each week. Analysis of 2018 data is currently underway and it is anticipated that results will be reported out in Spring 2019.

Transport Canada said the Haro Strait voluntary vessel slowdown will remain a stable, voluntary seasonal measure in the years ahead, subject to regular analysis of its effectiveness, results and socio-economic impacts. VFPA said it and its partners are intending to enter into a SARA section 11 conservation agreement with the Government of Canada for a five-year formalized commitment to maintain and build upon the current ECHO Program voluntary slowdown. Transport Canada said it is committed to providing ongoing financial support to the ECHO Program to support SRKW recovery.

A number of participants said they do not support voluntary measures as a long-term approach to managing species at risk, and they should be mandatory instead. VFPA noted a number of benefits of maintaining a voluntary approach, such as allowing for ongoing refinement and adaptation, and achieving both high participation rates and effective noise reduction measures whilst allowing for a small percentage of vessels who would otherwise experience significant economic impacts (e.g., missing a tidal window, exceeding 8 hour pilot shift time) to not participate on certain transits. Transport Canada added that current voluntary measures are in place in both Canadian and U.S. waters and with the cooperation of U.S. counterparts, whereas a mandatory Canadian measure would not be enforceable in U.S. waters and so would likely be significantly reduced. Transport Canada said should voluntary slowdowns prove ineffective, the government has tabled amendments to the *Canada Shipping Act, 2001* which would give the Minister of Transport the authority to implement mandatory measures, although additional analysis and efforts at coordination with the U.S. would need to be undertaken.

Lyackson First Nation said it is concerned that the ECHO slowdown did not encompass or identify future slowdown procedures for the Strait of Georgia and Boundary Pass. Transport Canada said based on the analysis of the 2018 slowdown and pending the outcome of safety and economic considerations, the 2019 slowdown will include consideration of an extension of the slowdown zone into Boundary Pass, which it noted is the only additional speed reduction location under consideration at this time. The Board heard there are a number of potential challenges with expanding the slowdown, including:

- *Some vessels get louder:* DFO said the broadband noise reduction is typically found to be between 0.5 and 1.5 dB per knot across all vessel classes, but there is significant variability between vessels, and that some ships (e.g., ferries with variable-pitch propellers) do not get quieter with reduced speed, and may actually show an increase in noise.
- *Safety considerations:* Transport Canada said that challenging navigational conditions and the impact of weather in certain areas will make effective implementation difficult, depending on speeds considered.

- *Unintended environmental side-effects*: DFO pointed out the need to account for potential vessel accelerations in other locations to maintain the shipping schedule, which could result in an overall increase in sound exposure and in ship strike risk for other whale species in other areas of the vessel route.
- *Cost and Port competitiveness*: VFPA said expanding the geographic extent of the slowdown will increase a vessel's transit time through that larger area, increasing the overall time delay and the potential for a vessel operator to experience operational and economic challenges, which could in turn result in an overall reduction in voluntary participation rates. VFPA said that increased time on water due to vessel slowdowns could also put increased pressure on pilots, and perhaps an overall requirement for more qualified pilots.

Dynamic slowdowns

A JASCO report filed with the Board suggested that dynamic speed limits based on real-time visual or acoustic detections of whales near shipping lanes could be an effective way to implement mitigations with less impact on schedules and less cost to the shipping industry. A number of potential ways that whales might be detected, and some the challenges involved, were identified to the Board in this reconsideration:

- *Whale report alert system*: VFPA said in 2018, the ECHO Program and Prince Rupert Port Authority partnered with Ocean Wise Coastal Ocean Research Institute to use the sightings reports obtained through the B.C. Cetacean Sightings Network to develop a system that will provide near-real time alerts of whale presence to select vessel operators on B.C.'s coast. Federal authorities said that Ocean Wise has completed an initial pilot of its Whale Report Alert system and Transport Canada will be providing funding to support further development and deployment.
- *Marine mammal observers (MMOs)*: DFO Science Branch said that trained marine mammal observers (MMOs) or video monitoring systems could be posted on the bows of ships, but are likely to be useful only when sighting conditions are good (low sea state, low swell, no fog, daylight sufficient to detect surfaced or barely-submerged animals, large or highly-visible target species).
- *Detection technology*: The federal authorities said that DFO researchers are developing and testing various acoustic and imaging technologies able to detect the presence of whales in near real-time. DFO said that technologies to detect marine mammals under low visibility conditions (e.g., at night, in fog) have undergone limited testing and have generally been found to perform poorly except for detecting large cetaceans at distances of several kilometres in calm sea states.

Transport Canada said there may be many circumstances when a master or pilot is able to take an action (slow down or alter course) in response to whale presence that will reduce the impact of physical and acoustic disturbance. A paper by Williams et al. filed by Trans Mountain states that ships are unlikely to be able to make rapid adjustments to course and speed in response to real-time whale detections. The authors state that the notion of a rapid response seems impractical in the confined waters of the Salish Sea, given navigational safety concerns, and they suspect that notices to mariners may be useful on the scale of a day (e.g., whales have or have not been seen on that day).

Likewise VFPA said some advance notice (on the order of 12-16 hours) would be required for implementation to alleviate shore-side impacts or pilotage timing, and that immediate action would be very challenging. The Chamber of Shipping also pointed out that ship owners and operators do require some degree of predictability, so advance notice would increase the probability of compliance in a voluntary framework. This could be as little as 96 hours but longer would be preferable for vessels with additional constraints, such as draft.

Reroute shipping

In its evidence, DFO identified the direct potential advantage of altering shipping routing is to decrease noise exposure levels and duration by increasing the distance between the vessels creating the noise and the whales occupying a given habitat, although such rerouting will result in an increase in the noise exposure levels in the area surrounding the new routing location.

Two different routes were discussed:

- *Rosario Strait*: Transport Canada said that the risk associated with redirecting traffic through Rosario Strait was found to be high as a result of the narrowness of the passage and its hydrography; that the Strait is entirely within U.S. waters; and that Transport Canada does not consider this particular rerouting a feasible mitigation measure. Trans Mountain noted the route is approximately 16 nm (30 km) longer, and it intersects with other traffic to and from the Port of Seattle.

- *North*: PPA said another alternative could be the Inside Passage north through Seymour Narrows and Johnstone Strait, but said this passage is subject to extreme currents, a number of unmarked dangers and a number of narrow passages, no radar coverage along the Inside Passage, extremely tight turns, and due to these many identified hazards there is a guideline restriction on tankers through this area. Trans Mountain added that while this route avoids the areas that have been identified to date as SRKW critical habitat, it passes through critical habitat for NRKW and past other environmentally sensitive areas.

PPA argued that, in its view, compared to alternatives, the present routing through Boundary Pass and Haro Strait is the safest and most practical, given it has a two way traffic separation scheme (TSS) along the entire route, the area is largely covered by radar monitored by Vessel Traffic Services, the average width of the TSS in Boundary Pass and Haro Strait is over a nautical mile wide with much of the safe navigational area exceeding this, navigational dangers along the route are well marked, and a special operating area has been established in the vicinity of Turn Point.

VFPA said an alternative to moving shipping lanes is to laterally displace shipping to one side within a shipping lane. VFPA indicated that the ECHO Program and Transport Canada conducted a voluntary lateral displacement trial from August 2018 to October 2018 in the Strait of Juan de Fuca to move vessels southward, further from SRKW feeding areas along the northern side of the Strait of Juan de Fuca. Transport Canada said JASCO modelling of this lateral displacement trial indicates that, while shifting commercial shipping towards the centre of the shipping lane has little effect, a shifting of offshore smaller vessel traffic (including tugs) towards the centre of the Strait produces important noise savings. DFO said it will be analyzing acoustic data from before, during and after the trial to evaluate the potential reductions in underwater ambient noise in the foraging area, and it is anticipated that results will be reported out in Spring 2019. VFPA said if the results are positive, the parties to the conservation agreement noted above intend to work collaboratively to consider the continued implementation of a similar seasonal lateral displacement measure annually for five years, where it is safe and operationally feasible to do so.

Two other potential lateral displacements, or shifting of shipping lanes, were discussed in the evidence:

- *Haro Strait*: The Board heard that SRKW heavily utilize the area along the west side of San Juan Island, raising the question of whether a westward shift within Haro Strait might be possible. VFPA said when the ECHO Program considered this, safety concerns were raised around inbound and outbound traffic coming into closer proximity in this narrower strait, as well around recreational vessels potentially redirecting into the Traffic Separation Scheme. Transport Canada said Haro Strait is a relatively narrow channel, at the south end there is a complex routing system that has connections to the waters of Puget Sound, there are strong tidal currents, the south end can be subject to strong winds, and there are several areas with shoals and areas dangerous to navigation. Transport Canada concluded that, while it may be possible to make some changes that might mitigate adverse effects on SRKW, they are likely to be very limited.
- *Victoria to Race Rocks*: The Board of Friends of Ecological Reserves asked about a possible lateral displacement of shipping to the south in the Victoria to Race Rocks area to move it further from shore. VFPA said the ECHO Program looked at a potential southward shift of the shipping lanes in this area, but said that a navigational risk assessment deemed it unacceptable for further examination, and that a similar risk assessment would be required to evaluate the feasibility of lateral displacement within the shipping lanes. Transport Canada said it will be conducting a feasibility study on potential amendments to the Traffic Separation Scheme in this area to explore what may be possible to reduce the impacts of underwater noise on SRKW.

The potential for alternative marine terminal locations (which would result in alternative shipping routes) is discussed in Sections 14.6.2 and 11.1.2.

Sanctuaries / acoustic refuges

In its evidence, DFO noted that it has recently commenced work examining the feasibility of SRKW sanctuaries to reduce physical and acoustic disturbance within key sub-areas of critical habitat, with a particular focus on foraging areas. Federal authorities said a sanctuary could, for example, be established as a Marine Protected Area under the Oceans Act and that activities such as fishing and commercial carrier vessels, ferries, whale watching vessels, and recreational boating could be restricted or prohibited when SRKW are present. DFO said candidate area discussions will be linked to discussions on potential future fisheries closures, given fishery closures also limit acoustic and physical disturbance of SRKW by reducing the number of fishing vessels in key foraging areas.

In various submissions, participants noted a number of potential challenges with sanctuaries, such as potential socio-economic concerns, impacts on Indigenous fishing rights, safety concerns if small craft operators are pushed closer to the Traffic Separation Scheme, potential enforcement difficulties for small recreational crafts, and the need to respond dynamically if SRKW foraging areas changes.

Whale watching boats

The Board heard about a number of measures in place to reduce disturbance on whales from whale watching boats, including voluntary guidelines and amendments to the Canadian *Marine Mammal Regulations* under the *Fisheries Act* that include a minimum approach distance of 100 metres for most whales, dolphins and porpoises, as well as a new mandatory requirement for vessels (except those in transit, such as tankers) to stay at least 200 metres away from killer whales in B.C. and the Pacific Ocean. The SRKW Imminent Threat Assessment filed by federal authorities states that DFO has identified the need for discussions with other sectors, including whale watching, to understand activity levels within key foraging areas and what potential additional voluntary measures may be taken to minimize physical and acoustic disturbance in identified killer whale foraging areas to the extent possible.

The Washington State November 2018 Southern Resident Orca Task Force Report and Recommendations included a number of recommendations aimed at decreasing disturbance and risk to SRKW from whale watching boats:

- Establish a statewide “go-slow” bubble (7 knots or less) for small vessels and commercial whale watching vessels within half a nautical mile of SRKW.
- Establish a limited-entry whale-watching permit system for commercial whale-watching vessels and commercial kayak groups in the inland waters of Washington.
- Increase the buffer to 400 yards behind the orcas in order to decrease the occurrence of chase-like situations.
- Suspend viewing of SRKW: establish a whale watching regulation that precludes SRKW viewing by all boats in Puget Sound for the next three to five years. The Pacific Whale Watch Association (PWWA) did not support this proposed moratorium, and instead proposed a plan that would include a goal of ‘near zero’ acoustic footprint from vessels in the vicinity of SRKW, establishment of a panel of scientists to issue recommendations on how best to achieve that goal, and a permit system to cap the industry and which could require adherence to restrictions in an adaptive manner such as quieter propulsion systems, ‘engine off’ zones, or silent electric propulsion only zones, as necessary over time.

In Canadian waters, DFO said that there are currently no limitations on the number of whale watching boat trips, and there is currently no permitting scheme for whale watching or commercial kayak vessels.

Quieter vessels

The Board received considerable evidence and submissions about the potential for wide-ranging and multiple benefits if ships are simply quieter. For example, a July 2018 JASCO report noted that ship design changes, vessel retrofitting, and regular ship maintenance could result in long-lasting change to underwater noise levels everywhere that these vessels operate. VFPA likewise cautioned against focusing too heavily on short-term operational measures such as reducing vessel speed to reduce vessel noise, saying it could have the unintended consequence of stifling innovation and progress towards the development of ship design and technology solutions, which will yield much greater conservation benefits regionally and globally in the longer term.

VFPA said a study conducted for the ECHO Program found that regular hull cleaning and propeller cleaning and repair was reported in literature as having measurable underwater noise reduction potential. DFO said that more information is needed to determine which types of maintenance are most important in reducing noise levels and how frequently maintenance must be performed to be effective. Federal departments said Transport Canada is supporting a project to evaluate the potential noise and fuel consumption reductions associated with vessel hull and propeller cleaning, and that trials have been completed and data analysis is underway.

In a letter from Canada to the Marine Environmental Protection Committee (MEPC) of the International Maritime Organization (IMO) filed by federal authorities, Canada said that ship design is likely to provide the best long-term solutions to the challenge of underwater noise, but can only be introduced gradually as new ships are built and existing ships refitted. In another such letter, Canada said there have been significant advances in quiet ship design, technologies, and understanding since the adoption of the 2014 IMO Guidelines for the Reduction of Underwater Noise. Canada provided an example: Maersk invested in ship design retrofits for 11 of its Panamax-size container ships, such as a new propeller with four fins and propeller boss cap fins to reduce cavitation. As well as a 10 per cent improvement in fuel efficiency and associated air and GHG emission reductions, noise reductions of 6-8 dB were observed and largely attributed to these retrofits.

Transport Canada in its evidence said it is undertaking a number of research initiatives to advance long-term, sustainable reductions in underwater radiated noise through the design of new, quiet vessels and the refit of existing vessels. For example, the department is funding a technology scan to identify mature and near commercial technologies with the greatest potential to reduce vessel URN. Transport Canada said it is also evaluating classification society noise criteria in

order to model the underwater radiated noise reductions that could be achieved in the Salish Sea, if commercial vessels complied with them (or alternative proposed silent notations).

VFPA said that in 2017 it became the first port in the world to offer financial incentives to vessel operators for underwater noise reduction. VFPA said vessels with a quiet notation from ship classification societies are eligible for a gold level (47 per cent) discount in harbour dues, and vessels with certain cavitation and wake flow reduction technologies are eligible for a bronze level (23 per cent) discount. VFPA said, however, that it has not been advised of any vessels installing the technologies for the purposes of underwater noise reduction, or for application to the EcoAction Program, although one commercial vessel achieved a quiet ship notation, anecdotally due to the introduction of the EcoAction program incentives. VFPA said the EcoAction Program underwater noise reduction incentives would be most effective if multiple ports around the world offered similar incentives, and Transport Canada said it has provided funding to ECHO to advance work with other ports towards aligning underwater noise incentives and programs.

Federal authorities pointed out that Canada is actively working at the Marine Environmental Protection Committee (MEPC) of the International Maritime Organization (IMO) with respect to underwater noise from shipping, in particular to promote the adoption of quiet ship design standards and technologies, and update the existing 2014 IMO Guidelines for the Reduction of Underwater Noise. Marine Advisor Mr. Clarkson encouraged the government of Canada to have maximum participation as possible with the appropriate IMO committee responsible for undertaking noise reduction study.

Mitigate the 'noisiest' first

Friends of the San Juans submitted a study that found that just 15 per cent of the vessels generate 50 per cent of the noise, and that removing such "gross polluters" would significantly reduce vessel noise impacts to SRKW and other marine species. Trans Mountain posited that since increased or atypical underwater noise could be symptomatic of a maintenance issue with a vessel, it agrees that regulatory agencies could track and monitor vessel underwater noise profiles to identify vessels with such issues so that they may be rectified through effective maintenance.

Transport Canada indicated, however, that there are challenges associated with implementing a program to target specific measures at the noisiest individual vessels, which would include the logistics of determining the noisiest vessels on an ongoing basis, ensuring all vessels throughout the SRKW critical habitat are being included, and developing regulations around that group. Transport Canada added that many of the deep-sea commercial vessels that visit the Port of Vancouver do so less than a handful of times per year, and the benefit of targeting measures at vessels that spend very little time in Canadian waters has not been ascertained. VFPA added that the source level of each vessel is not the only component to be considered, as time-on-water, or time in a specific area is also a component of cumulative noise. VFPA said an alternate option could be for ports in the region to provide recognition or incentives to the quietest vessels, and provide a report card to the noisiest vessels with a request to improve via maintenance, technology application or to potentially implement additional operational mitigation requirements through key areas of importance to SRKW for the vessel's return visit.

Underwater Noise Management Plans and ferries

DFO's suggested priority recovery measures for SRKW include implementing incentive programs and regulations that result in reduced acoustic footprints of the vessels habitually travelling in and near important SRKW habitat. Federal authorities informed the Board that Transport Canada is working to have policy and supporting materials in place so that Canadian fleet owners and operators will begin development and implementation of Underwater Noise Management Plans (UNMPs) to reduce noise by operational and technical means by summer 2019, at least for fleets operating in the Salish Sea. Transport Canada said elements under effective UNMPs could include underwater noise considerations in fleet renewal through quiet ship design, retrofitting ships to be quieter and implementing maintenance plans, as well as operational measures that could be used in the presence of whales to reduce a vessel's impact.

Federal authorities established that Transport Canada is pursuing a conservation agreement with B.C. Ferries on the development and implementation of an UNMP to reduce underwater noise from their fleet, and has signed an agreement with the Canadian Ferry Association to commit to work with other ferry operators on noise reduction targets and to research quiet vessel design and retrofit options for ferries. Transport Canada said these conservation agreements do not create legally enforceable requirements, but they do seek to obtain a commitment to collaborate on measures in the years ahead. In response to the Board's draft recommendations, the Chamber of Shipping said B.C. Ferries has been leading with voluntary measures to mitigate increases to underwater noise and strike risk. The Chamber of Shipping said explicit underwater noise reduction targets for ferries would be premature at this time.

Immediate actions directed by Washington State governor when setting up the Southern Resident Orca Task Force included developing strategies for quieting state ferries in areas most important to SRKW. The November 2018 Southern Resident Orca Task Force Report and Recommendations included a recommendation to reduce noise from Washington state ferries by accelerating the transition to quieter and more fuel-efficient vessels and implementing other strategies to reduce ferry noise when SRKW are present.

Quiet periods

With regard to the potential for creating 'quiet periods' by convoying vessels in the shipping lanes, DFO said that using convoys will increase the sound level and duration of a single transit event (several ships in line), but increase the duration of quiet times between them. DFO said, however, that little is known about the importance of quieter periods to SRKW. The July 2018 JASCO report modelled convoys, and concluded that convoys are not highly beneficial because the noise from non-convoyed vessels filled in the quiet times. Transport Canada added that convoys present a 'high risk' to navigational safety due to the proximity within which vessels would have to travel, and as a result, are not considered to be a feasible mitigation measure for large vessels.

Another potential method of creating 'quiet periods' identified to the Board involved restricting vessel traffic at night through sensitive critical habitat zones. DFO noted that while such an approach would make it quiet at night, it would inevitably increase the noise levels during daytime. DFO said the effectiveness of this mitigation measure would depend on whether SRKWs engage in feeding at night (noting it is logical to think that they do), but night-time foraging behaviour is currently subject to scientific study in both Canada and the U.S. Trans Mountain argued that as far as its applicability to Project-related vessels, this measure is both technically and economically infeasible: given the requirement that loaded tankers transit Second Narrows in daylight and appropriate tidal conditions, a night time restriction at Haro Strait may result in the vessel having to go to anchor, creating pressure on existing anchorages or requiring the creation of new ones. Further, concentrating all vessel traffic within daytime hours would create possible safety concerns due to bunching of vessels, and increase costs for shippers due to additional hours of charter hire. Marine Advisor Mr. Clarkson added that in his opinion, restricting marine traffic in Haro Strait at night is impractical, because it would cause traffic congestion and decrease the safety of vessel traffic. As well, he pointed out that agreements on the rights of passage with the U.S. would need to be considered since this is a shared waterway.

No net increase in underwater noise

T'sou-ke Nation said that its outstanding concerns include the need for a mitigation and impact offset plan for SRKW to address all adverse impacts of marine shipping on the whales as much as possible (e.g., noise, direct interference with habitat, collision risk, and oil spill risk). A paper by Williams et al. submitted by Trans Mountain said that some level of noise reduction will be needed to ensure that additional ship traffic does not cause a net increase in noise levels in SRKW critical habitat; in fact, some currently unspecified level of net reduction in noise will be needed to promote recovery. A July 2018 JASCO modelling report commissioned by Transport Canada found, for example, that an 11 knot speed limit in Haro Strait reduced SRKW-weighted noise levels, but a speed limit much higher than 11 knots would likely be insufficient to balance the additional noise produced by Project traffic.

Transport Canada testified that its current and planned mitigation measures aim for a net-zero increase in underwater vessel noise as a result of Project shipping. It said that net-zero or net-benefit could possibly be achieved by offsetting but more analysis is needed to determine what a reasonable scenario for each would be and to define an appropriate offset ratio. A 2017 DFO report on mitigation measures to reduce shipping-related noise noted that, in previously approving the Project, the Government of Canada committed to more than mitigate the impact of additional Project traffic on SRKW before any shipping associated with the Project begins.

Transport Canada said it has undertaken analysis of underwater noise in various areas of SRKW critical habitat and, through modelling, can determine acoustic baselines and mitigation impacts in both local areas as well as global averages for the entire SRKW critical habitat. DFO said acoustic information is being collected with hydroacoustic listening stations to measure the before and after acoustic signature in the Project area, and with ongoing collection of acoustic information via passive acoustic monitors, empirical data could be used in the future to determine the efficacy of offsetting measures pertaining to noise reduction.

A report by Green Marine prepared for Transport Canada reported that a Marine Strategy Framework Directive was adopted by the European Parliament and the Council of the European Union in 2008. As part of this initiative, the European Commission in 2010 defined two indicators for underwater noise, one of which is for continuous low-frequency sound (designed mainly as a measure of shipping noise) and which includes monitoring of continuous low-frequency sound with the aim of keeping the annual average ambient noise level below the baseline value of the year 2012.

Mitigation: Strike risk

Transport Canada noted the International Whaling Commission acknowledges that there is no universal solution to the problem of ship strikes but the most effective way to reduce collision risk is to keep whales and ships apart, and where this is not possible, for vessels to slow down and keep a look out. The Board heard that many of the mitigations discussed above to reduce underwater noise will also be relevant to reducing the risk of strikes.

Reduce speed

Trans Mountain testified that it has been shown that reducing vessel speed reduces both the relative likelihood of a vessel strike and the likelihood that a strike results in severe or fatal injuries. DFO said the probability of a lethal injury to a whale when struck by a vessel increases significantly above 9 knots and almost certainly results in whale death above 15 knots. DFO said that the potential to reduce the risk of lethal vessel strikes by reduced vessel speeds has been demonstrated for North Atlantic right whales following the 2008 implementation by the U.S. National Oceanic and Atmospheric Administration (NOAA) of a general speed limit of 10 knots in critical habitats and 20 nautical miles around major ports on their migratory path in U.S. waters.

DFO said mitigation measures will be most beneficial if they target areas where species of concern congregate and exhibit high overlap with shipping activity. For example, DFO said observations from recent surveys and current distribution models both highlight the Strait of Juan de Fuca as a potentially important habitat for Humpback whales and therefore as a site of high risk of collisions where mitigation measures would likely be beneficial. Likewise, recovery measures with regard to vessel strikes in the 2017 Action Plan for Blue, Fin, Sei and North Pacific right whales in Canadian Pacific Waters include identifying areas of high risk of interactions through the continued development of spatial analysis of potential whale distribution with respect to ship traffic data. With regard to timing, DFO said mitigation measures targeting periods when abundance of species is highest would likely be most beneficial.

As with dynamic slowdowns to reduce underwater noises, the Board also received evidence that there are challenges with respect to real-time dynamic slowdowns to reduce the risk of strike. For example, DFO said in critical habitat areas, such as the Strait of Juan de Fuca and Swiftsure Bank, the Project tankers are too large and moving at speeds too great to allow for much manoeuvrability should an animal be detected ahead of the ship, and many ship strike records indicate that the whales surfaced close to the front of the ship. Further, within the narrower waterways of the Salish Sea, the ability to manoeuvre the ship away from a whale is limited and likely poses a safety risk in those narrow waterways. DFO said therefore, it is unlikely that marine mammal observers posted on vessels will achieve a significant reduction in the risk of ship strike. DFO added that ships changing speed or direction could confuse the whales with consequent potential increase in strike risk due to lack of predictability of ship movement.

DFO pointed out the effort within the Federal Government's Ocean Protection Plan Whale Collision and Avoidance Initiative to evaluate methods and technology that could be useful for real-time ship alerts of whale presence, such as acoustic monitoring networks in areas of high collision risk, infrared automated detection in narrow waterways, and automated delivery of sightings via mariner sightings networks among other approaches.

Reroute shipping

Participants indicated that measures that alter vessel movements, such as speed restrictions or relocating shipping lanes to avoid marine mammal congregation areas, are effective at reducing impacts from marine shipping practices. Trans Mountain said that steps have been taken by some countries, primarily through government agencies, to reduce ship strike potential to endangered whale species through modifications to vessel operations, such as changing shipping routes. Trans Mountain said that in the Bay of Fundy internationally-mandated shipping lanes were shifted, from an area with high right whale densities to an area with lower right whale densities, which has reduced the relative potential for accidental collisions between right whales and ships by approximately 80 per cent.

DFO said that while the focus of the ECHO Program voluntary lateral displacement trial in the Strait of Juan de Fuca is on reducing noise for SRKW, strike risk could also be lowered by moving vessels away from foraging habitat. DFO noted, however, that ship strikes on marine mammals are not currently being assessed as part of the trial.

Pacheedaht First Nation raised concerns about Swiftsure Bank, and said the outbound shipping lane in the Strait of Juan de Fuca was moved in about 2005, and now goes through Swiftsure Bank. The Greenwood Risk Assessment commissioned by Transport Canada deemed a possible shift of the shipping lanes at the entrance to the Strait of Juan de Fuca further south to provide greater separation from Swiftsure Bank to be acceptable for further examination, although it noted this would be a regressive step towards where the lanes were prior to 2006.

Other mitigations

The 2018 RKW Recovery Strategy noted that personal watercraft (PWC) or 'jet skis' are capable of much more erratic or unpredictable manoeuvres than traditional high-speed vessels, and as a result pose a collision risk to killer whales and other wildlife. It notes that PWC have been banned in the San Juan Islands and in portions of the Monterey Bay National Marine Sanctuary, but they are not banned in the coastal waters of B.C., with the exception of the inner waters of Vancouver Harbour.

A 2017 paper by Nichol et al stated that active acoustic alarms intended to warn whales of approaching vessels have been tested but were unsuccessful, as these sounds caused diving right whales to return to the surface, which increased their exposure to ship strikes rather than reducing it.

Federal authorities said, under the Oceans Protection Plan, a national approach and capacity has been developed by DFO to better respond to marine mammal incidents such as collisions, entanglements and stranding. DFO added that the recently amended Marine Mammal Regulations, which came into force July 2018, include requirements for mandatory reporting on all accidental contact between a vehicle or fishing gear and a marine mammal. DFO said this will provide a more comprehensive data set regarding vessel strikes going forward.

Mitigation: Contamination

A number of mitigation measures aimed at reducing the contaminant loading of the Salish Sea were identified during this MH-052-2018 hearing, such as:

- Transport Canada said that discharges from vessels to water can occur during routine vessel operations, but that such discharges are governed under the *Vessel Pollution and Dangerous Chemicals Regulations* which implement requirements of the MARPOL Convention. Transport Canada described, for example, the treatment of bilge water, oily-water separators, and restrictions on the discharge of sewage. Transport Canada added that Canada is also party to the *International Convention on the Control of Harmful Anti-Fouling Systems on Ships*, which prohibits and/or restricts the use of harmful anti-fouling systems.
- The Federal authorities said that the Wastewater System Effluent Regulations (WSER) require wastewater treatment plants in Canada to upgrade to at least secondary treatment, which can remove approximately 90 per cent of contaminants such as flame retardants (PBDEs) and 95 per cent of conventional pollutants. Under the WSER, the Capital Regional District in Victoria and the Metro Vancouver Lions Gate must install or upgrade facilities to achieve secondary treatment by December 2020, and Iona Island wastewater treatment plants must upgrade to secondary treatment by 2030; and the two regional districts will receive up to \$423 million from the Government of Canada for upgrades at Lions Gate wastewater treatment plant and pump stations in Victoria, the latter where treatment will go beyond secondary.
- Federal authorities noted that in October 2018, ECCC published a Notice of Intent to strengthen controls for five persistent organic pollutants and by winter 2020 government will publish proposed amendments to the regulations.
- A new whale contaminant research program was identified by DFO that will concentrate on prey because they are the main route of entry of contaminants into whales.

Mitigation: Prey abundance (Chinook salmon)

A number of the mitigation measures noted below with regard to salmon mitigation in general are relevant to Chinook. Additional measures aimed specifically at SRKW prey abundance were identified by parties in this reconsideration, such as:

- Federal authorities noted that DFO intends to increase SRKW prey abundance and availability by increasing hatchery production at facilities which enhance stocks that most benefit SRKW, while minimizing potential effects of hatchery origin fish on naturally spawning populations.
- DFO reported that fishery management measures were introduced for the 2018 salmon fishing season to reduce the total harvest for Chinook salmon by 25-35 per cent. This included closures in portions of the Strait of Juan de Fuca and the Gulf Islands, as well as partial closures at the mouth of the Fraser River, with the aim of protecting key foraging areas for SRKW by reducing competition between fishers and whales. DFO said that a post-season review of the effectiveness of the closures is underway.
- DFO said, in December 2018, it struck an SRKW Prey Availability working group to provide specific recommendations on actions to be taken in 2019 to improve prey availability for SRKW, and proposals for initial longer-term actions will be developed by June 2019.

Musqueam expressed concern about potential fishery closures to support prey abundance for SRKW affecting their opportunities to fish, and presented a report arguing that there is very little evidence that decreasing fisheries results in an increase in prey availability to SRKW, considering the complicated interaction of other factors. Pacheedaht and Ditidaht First Nations said that their rights need to be respected in any measures that are implemented in relation to the protection of SRKW.

Mitigation: SRKW critical habitat

DFO said that SARA protects critical habitat from destruction, and that since shipping noise is identified as an activity likely to destroy critical habitat, any temporary loss of function should warrant very high priority for management action to reduce this threat, although it is very difficult to determine thresholds or measures of habitat quality. Federal authorities said the amended 2018 RKW Recovery Strategy identifies additional critical habitat for RKW encompassing waters off of southwestern Vancouver Island, including Swiftsure Bank which is an important area for both SRKW and NRKW and overlaps a small portion of the marine shipping lanes at the western end of the Strait of Juan de Fuca.

Views of the Reconsideration Panel

Permanent auditory injury, temporary auditory injury, and sensory disturbance

The Board accepts Trans Mountain's acoustic modelling and finds that permanent or temporary auditory injury is not expected to occur as a result of Project-related marine vessel traffic. The Board is of the view that the underwater noise modelling methods, including scenario locations, were appropriate for the scope of Trans Mountain's assessment. The Board acknowledges that Trans Mountain's underwater noise modelling is meant to be reasonably representative of various locations along the shipping lanes and understands that underwater noise levels could vary from the predicted values provided by Trans Mountain across locations along the shipping lanes according to a variety of factors. The Board recognizes the concerns raised by DFO related to Trans Mountain's underwater noise modelling; however, in the absence of any quantitative evidence to suggest that underwater noise levels would substantially vary from Trans Mountain's predicted values, the Board accepts Trans Mountain's underwater noise modelling. The Board also notes that Trans Mountain did provide a qualitative assessment of the cumulative effects of Project-related marine shipping on marine mammals.

The Board finds that underwater noise produced from Project-related marine vessels would result in sensory disturbance to marine mammals. The Board is of the view that sensory disturbance is expected to be a long-term effect as it is likely to occur intermittently for the duration of operations of Project-related marine vessel traffic. The Board finds this effect to be reversible and is of the view that once a marine mammal is no longer exposed to underwater noise from Project-related marine vessels, then behavior would likely return to normal. The Board accepts that some marine mammals may habituate to underwater noise associated with marine shipping. However, the Board recognizes that sensory disturbance and habituation would result in a variety of adverse effects on marine mammals. The Board also recognizes that the Regional Study Area (RSA) is a heavily utilized marine environment, which is predicted to increase in use, and that once exposure to underwater noise from Project-related marine vessels ceases, it is likely that marine mammals would be exposed to some form of disturbance soon after from another marine vessel. The Board is of the view that the magnitude of this effect would vary, according to biological and environmental conditions, and the species exposed. The Board has carried the above criteria (e.g., reversibility, temporal, and spatial extent) through to its species-specific assessment, which is provided below.

Vessel strikes

The Board recognizes that Project-related marine vessels have the potential to strike a marine mammal, which could result in lethal or non-lethal effects. The Board is of the view that the risk of a marine mammal vessel strike in the RSA would exist for the duration of operations of Project-related marine vessel traffic. The Board finds that the effects of a marine mammal vessel strike would range from reversible to permanent, depending on the severity of the strike (i.e., mortality would be permanent). The Board is of the view that the magnitude of a marine mammal vessel strike would vary according to the extent of the injury and the species struck. The Board has carried the above criteria (e.g., reversibility, temporal, and spatial extent) through to its species-specific assessment, which is provided below. The Board also recognizes that the RSA is a heavily utilized marine environment which is predicted to increase in use, and that the increase in Project-related marine traffic would contribute to the cumulative risk of marine mammal vessel strikes. The Board acknowledges Trans Mountain's commitment to include, as part of its Port Information and Terminal Operations, explicit guidance for reporting marine mammal vessel strikes and mammals in distress to the appropriate authorities to provide clarity around the frequency of marine mammal vessel strikes.

Southern resident killer whale

The Board is of the view that the Southern resident killer whale population has crossed a threshold where any additional adverse environmental effects would be considered significant. The Board is also of the view that the current level of vessel traffic in the RSA and the predicted future increase of vessel traffic in the RSA, even excluding the Project-related marine vessels, have and would increase the pressure on the Southern resident killer whale population. Trans Mountain's Summary of Existing and Future Vessel Movements at Five Locations in the RSA indicates that Project-related marine vessels would represent a maximum of 13.9 per cent of all vessel traffic in the RSA, excluding Burrard Inlet, and would decrease over time as the volume of marine vessel movements in RSA is anticipated to grow. While the effects from Project-related marine vessels will be a small fraction of the total cumulative effects, the Board acknowledges that this increase in marine vessels associated with the Project would further contribute to cumulative effects that are already jeopardizing the recovery of the Southern resident killer whale. The effects associated with Project-related marine vessels will impact numerous individuals of the Southern resident killer whale population in a habitat identified as critical to the recovery and classifies the effects as high magnitude. Consequently, the Board finds that the operation of Project-related marine vessels is likely to result in significant adverse effects to the Southern resident killer whale.

The Board recognizes that DFO's Recovery Strategy for the Northern and Southern Resident Killer Whale (*Orcinus orca*) in Canada identifies that vessel noise is considered a threat to the acoustic integrity of Southern resident killer whale critical habitat, and that physical and acoustic disturbance from human activities may be key factors causing depletion or preventing recovery of resident killer whale populations. The Board notes that mortality of a Southern resident killer whale from a Project-related marine vessel collision, despite the low likelihood of such an event, would have population level consequences. The Board acknowledges that Project-related marine vessels will encounter a killer whale relatively often. However, given the limited number of recorded killer whale marine vessel strikes and the potential avoidance behaviors of killer whales, the Board agrees with Trans Mountain and DFO that the probability of a Project-related marine mammal vessel strike on a Southern resident killer whale is low.

The Board acknowledges Raincoast Conservation Foundation's Population Viability Analysis, which indicates that the factor with the largest effect on depressing population size and possibly leading to extinction is a reduction of Chinook prey base, and that Trans Mountain has indicated its historical support for wild salmon, as well as support for potential projects such as the Pacific Salmon Foundation – Salish Sea Marine Survival Project, which Trans Mountain believes would contribute to better conservation and increased abundance of Chinook salmon.

The Board recognizes that Port Metro Vancouver and the RSA currently support a large amount of vessel traffic and that the level of traffic is expected to increase with or without Project-related marine vessels. This increase will place even greater burden on the Southern resident killer whale. In this context, and in light of all of the evidence, the Board finds that the operation of Project-related marine vessels is likely to result in significant adverse effects to the Southern resident killer whale.

Since the release of the Board's OH-001-2014 Report in May 2016, the SRKW population has fallen to 74. The Board heard evidence that the abundance of the SRKW population has fluctuated over the last sixty years with a high of 98 individuals in 1995 and a low of 66 individuals in 1973, and that population levels before 1960 are not known with any accuracy. The Board also heard that a particular concern is that the sex ratio at birth is becoming increasingly male biased.

The competent Ministers under the SARA formed an opinion in May 2018 that SRKW face an imminent threat to survival and recovery, and the abundance of Fraser Chinook salmon (SRKW's primary prey) has continued to fall. The Board heard that about 80 per cent of SRKW total diet comes from Chinook salmon, and that major competitors on Chinook populations such as NRKW, transient killer whale, sea lions and seals have experienced significant population growth over recent decades. The Board heard about the many sources of contamination potentially affecting SRKW, including untreated and undertreated wastewater from the cities of Vancouver and Victoria. The Board notes that vessel strikes have also been acknowledged as a threat to SRKW in addition to disturbance, reduced prey availability and contamination. A number of intervenors asserted that SRKW is not able to withstand any additional adverse effects.¹²⁸ This is consistent with the Board's finding that the Southern resident killer whale population has crossed a threshold where any additional adverse environmental effects would be considered significant.

¹²⁸ Dr. Veirs et al., for example, in a report submitted by Raincoast, concluded that SRKW cannot tolerate any additional anthropogenic stressors. Likewise, Lacy et al. in a report by submitted by Raincoast concluded that updated analyses incorporating the data from the past four years confirmed that the population is fragile and perhaps in a slow decline, with no ability to withstand additional threats and an inability to recover unless current conditions are improved.

The Board finds that routine operations of Project-related vessels would not materially add to decreased prey abundance or contamination. With regard to prey abundance, as detailed below with regard to marine fish and fish habitat, the Board is of the view that some form of adverse, short-term effect on marine fish is likely to occur from underwater noise produced by Project-related marine vessels, but it is unlikely to translate into larger, more substantial impacts. In addition, the Board notes that DFO pointed out there is no published source of information that identifies stocks of Chinook salmon that are impacted by marine shipping activities. With regard to potential contamination from routine operations of Project-related marine shipping, the Board notes national and international requirements such as the *Vessel Pollution and Dangerous Chemicals Regulations* and *the International Convention on the Control of Harmful Anti-Fouling Systems on Ships*, and the relatively small number of Project-related vessels, in contrast to the substantial contamination from other sources such as from surrounding cities and industry.

Project-related marine shipping would, however, overlap SRKW critical habitat along the shipping route, and add to both underwater noise and the risk of strikes throughout that route. The Board remains of the view that cumulative effects are already causing significant adverse effects on SRKW, and that Project-related marine shipping will add to those effects. The Board therefore takes the precautionary view that, absent further mitigation, the designated project is likely to cause significant adverse environmental effects on SRKW because of its addition to cumulative effects.

Other toothed whales

The Board is of the view that adverse effects from an increase in vessel traffic, including Project-related marine vessels, would be comparable within similar species (e.g., toothed whales, baleen whales). The Board agrees with Trans Mountain in that the disparity between habitat usage, occurrence, and abundance of other marine mammals within the RSA are important deciding factors in determining whether or not Project-related marine vessels are likely to cause significant adverse environmental effects.

In regards to other toothed whales, the Board is of the view that effects on other toothed whales from sensory disturbance are likely to be similar across species. Some species, such as the Harbour porpoise, are likely to show more pronounced effects as they are known to be more sensitive than other toothed whales to underwater noise, but the Board accepts Trans Mountain's acoustic modelling that suggested the extent of sensory disturbance is expected to be generally comparable across all toothed whale species found within the RSA.

The Board agrees with Trans Mountain that vessel strikes would be considered a low probability event. The Board recognizes that DFO's Recovery Strategy for the Transient Killer Whale (*Orcinus orca*) in Canada indicates that collisions with vessels are likely of low concern. The Board finds that Project-related marine vessels would result in impacts to a few or many individual toothed whales of much larger North Pacific populations and are unlikely to result in population level consequences. The Board also recognizes that no other critical habitat has been identified in the RSA for other toothed whales. Therefore, the Board finds that the effects from Project-related marine vessels on other toothed whales are not likely to be significant. The Board finds that the contribution from Project-related marine vessels on the other toothed whales to total cumulative effects is expected to be inconsequential.

Baleen whales

The Board heard that the low frequency peak power in ship noise overlaps baleen whale signals and that baleen whales are, in general, at greater risk of being struck than toothed whales. The Board heard that as baleen whale populations recover and re-inhabit Canadian Pacific waters, the likelihood of strikes is expected to increase unless mitigation measures are put in place. The Board agrees with Trans Mountain that vessel strikes would be considered a low probability event, although the Board acknowledges there is some uncertainty as to the level of threat that strikes pose to each species, and that documented strike rates underestimate the true impact of vessel collisions on whale populations.

Humpback whale: The Board recognizes that sensory disturbance resulting from any increase in vessel traffic, including Project-related marine vessels, would impact Humpback whales and a small portion of their critical habitat (identified when the species was listed under the SARA as threatened). While the Board acknowledges that Humpback whales have the potential to be struck and killed by Project-related marine vessels, DFO's Recovery Strategy for the North Pacific Humpback whale (*Megaptera novaeangliae*) in Canada indicates that given the current estimated population growth rate of Humpbacks in B.C., present levels of marine shipping activities do not appear to be negatively affecting population viability at this time. The Board is of the view that Humpback whales found seasonally in the RSA, and a small portion of their critical habitat, would be adversely affected from Project-related marine vessels. In light of this, the Board finds that adverse Project-related effects on the North Pacific Humpback whale are expected to be of moderate magnitude and not likely to be significant. The Board finds that the contribution from Project-related marine vessels on the North Pacific Humpback whale to total cumulative effects is expected to be inconsequential.

Other baleen whales: The Board acknowledges that other baleen whales, many of which are SARA-listed, could potentially be found within the RSA. However, given the limited abundance and occurrence of these species in the RSA, and that no critical habitat has been identified in the RSA for baleen species other than the North Pacific Humpback whale, the Board finds that adverse Project-related marine shipping effects on other baleen whales are not likely to be significant. The Board finds that the contribution from Project-related marine vessels on other baleen whales to total cumulative effects is expected to be inconsequential.

Other marine mammals

With regard to pinnipeds (including Steller sea lion) and sea otter, while there may be some sensory disturbance from Project-related marine shipping, the Board agrees with Trans Mountain's assessment that it would be of low magnitude. This is because of, for example, habituation and a large part of the generated underwater noise being inaudible to Steller sea lions, only occasional occurrence for sea otters, and generally rapid recovery from sensory disturbance from Project-related vessels.

Existing measures

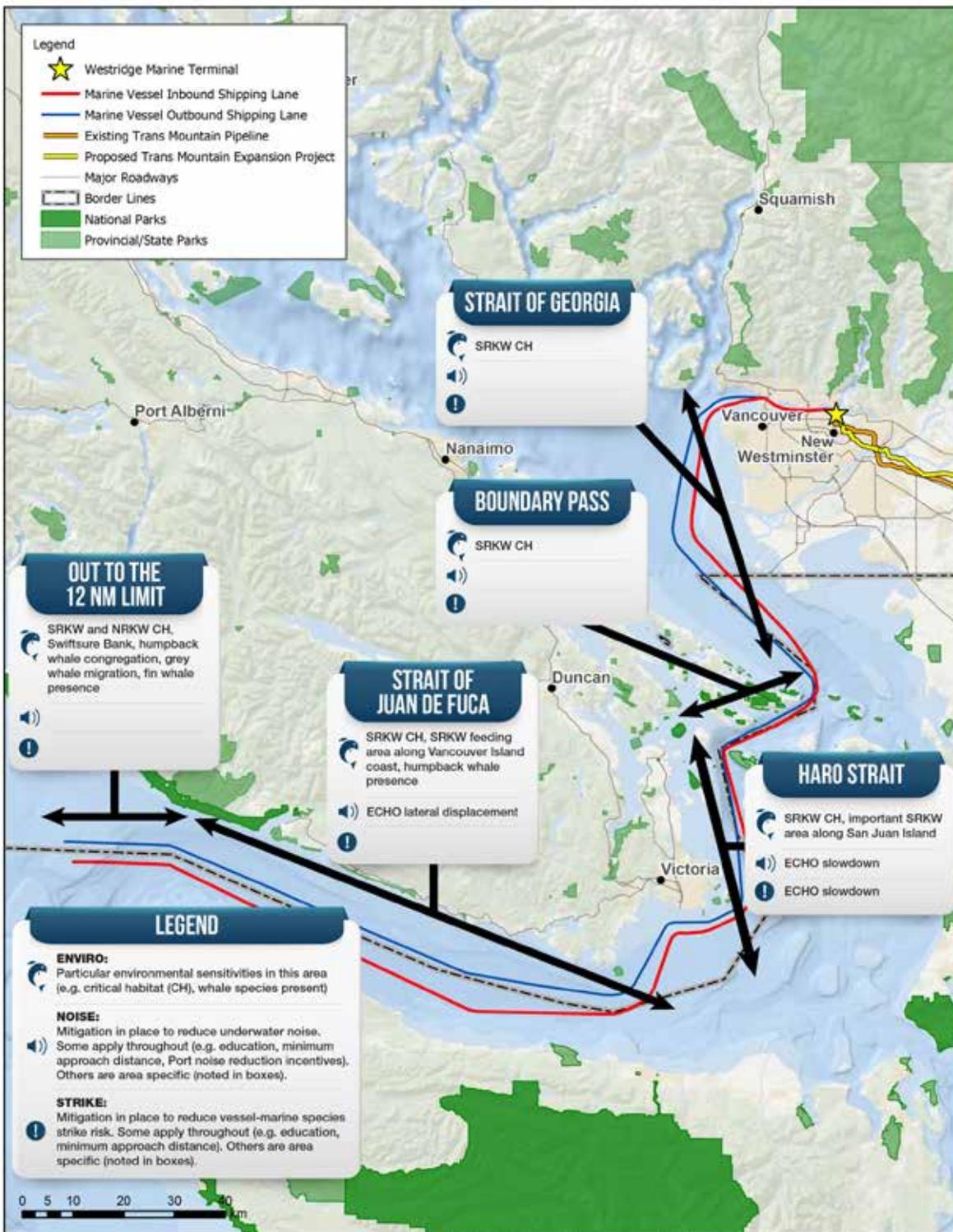
Given routine operations of Project-related marine shipping will add to underwater noise and to the risk of strikes to a number of marine mammal species, the Board's consideration of mitigation measures below focuses on these two threats. Mitigation measures for underwater noise and strike risk are considered together because often the same measure can address both. Contamination and diminished salmon abundance are also considered threats to SRKW and to other marine species, but as noted above, any contribution to these threats from routine operations of Project-related marine shipping is expected to be inconsequential relative to existing cumulative effects.

Measures already being implemented with regard to underwater noise and strike risk in Canadian waters in the Salish Sea include the following (listed in Table 26 illustrated in Figure 27).

Table 26: Existing initiatives

Measure	Application	Purpose	Notes
Education	All vessels	Inform mariners about marine mammals and how to decrease adverse effects on them	<ul style="list-style-type: none"> Examples include the 2016 Mariners Guide to Whales, Dolphins, and Porpoises of Western Canada, the online training tutorial developed to build on that, and the 'Be Whale Wise' guidelines for whale watching craft Extent to which this reduces underwater noise or strike risk is unknown.
Haro Strait slowdown (summer 2017 trial and summer 2018)	Voluntary for piloted vessels transiting Haro Strait shipping lanes	Reduce underwater noise in important SRKW habitat area Secondarily expected to reduce risk of strike	<ul style="list-style-type: none"> Implemented through the ECHO Program led by VFPA Under consideration for 2019 and beyond. Five-year conservation agreement under negotiation Expansion to Boundary Pass under consideration
Strait of Juan de Fuca lateral displacement (summer 2018 trial)	Voluntary for vessels transiting the Strait of Juan de Fuca	Reduce underwater noise in important SRKW feeding area	<ul style="list-style-type: none"> Implemented through the ECHO Program led by VFPA Results under review If deemed successful, under consideration for 2019 and beyond. Five-year conservation agreement under negotiation
Minimum approach distance for marine mammals	All vessels (e.g., whale watching boats) except those in transit (e.g., shipping)	To reduce noise, strike risk and other disturbance	<ul style="list-style-type: none"> 100 m minimum approach distance for most whales, dolphins and porpoises, 200 m for killer whale There are also non-mandatory whale watching guidelines Extent to which this reduces underwater noise or strike risk is unknown.
EcoAction underwater noise incentive (since 2017)	Voluntary for all vessels that pay Port fees	Reduce underwater noise	<ul style="list-style-type: none"> Implemented by the Port of Vancouver Only one ship known to have sought quiet certification as a result.

Figure 27: The marine shipping route showing certain environmental sensitivities and existing mitigation measures in each section of the route



Although Trans Mountain has little direct control over marine vessels other than when they are at Westridge Marine Terminal (WMT), Trans Mountain has nevertheless made a number of commitments as the operator of the Westridge Marine Terminal relevant to reducing underwater noise and strike risk. Subject to its limited control, these include the following (Table 27). The Board's conditions require Trans Mountain to implement what it has committed to.

Table 27: Trans Mountain commitments

Mitigation measure	Application	Purpose	Notes
Education	Project-related vessels	Inform mariners about marine mammals and how to decrease adverse effects on them	Information is shared, for example, via Trans Mountain's Westridge Marine Terminal Regulation and Operations Guide (WMTROG).
Hull and propeller not fouled excessively	Project-related vessels	Reduce underwater noise	Confirmation required in Master's Declaration as part of Trans Mountain's Vessel Acceptance Standard (VAS).
Participate in initiatives to protect marine mammals	Project-related vessels	Participate in the ECHO Program initiatives to reduce underwater noise	Confirmation required in Master's Declaration as part of Trans Mountain's VAS
Consider underwater noise when selecting escort tug	Strait of Juan de Fuca Escort Tug Service	Reduce underwater noise	Trans Mountain said it will, in conjunction with its shippers, consider certain underwater noise factors when selecting the escort tug service

Trans Mountain also mentioned two other possible mitigations (i.e., to request Project-related vessels follow an alternative routing to skirt the new critical habitat for SRKW and NRKW off Southwest Vancouver Island and an associated slowdown, and to explore the potential to minimize the number of Project-related vessels), but these are only at the stage of early consideration.

As noted above, a number of measures for underwater noise and strike risk are already in place. The Board in particular commends the ECHO Program participants for their efforts, and VFPA for its leadership. However, it is evident from the above tables and Figure 27 that only an initial and partial set of mitigation measures are currently in place or being tested, and in a number of cases the effectiveness of a measure has not yet been demonstrated.

Mitigation specific to Project-related vessels

In the MH-052-2018 hearing, Trans Mountain referenced a framework for the Marine Mammal Protection Program (MMPP) it filed in the OH-001-2014 hearing, in which it said it was not proposing specific measures to mitigate the effects of increased marine vessel traffic, but since other components of the Project (such as salmon-bearing watercourse crossings and the construction of Westridge Marine Terminal (WMT) in Burrard Inlet) have the potential to contribute to cumulative effects on marine mammals in the Salish Sea, Trans Mountain believes there is merit in developing a MMPP that addresses both potential Project-specific effects on marine mammals and combined stressors on the endangered SRKW population. The following discussion is therefore focused on the MMPP with regard to effects from Project-related marine shipping.

As noted in the Board's OH-001-2014 Report, the Board would impose Condition 132 requiring Trans Mountain to develop a Marine Mammal Protection Program and undertake or support initiatives that focus on understanding and mitigating Project-related effects. The Board would expect Trans Mountain to develop the program in consultation with appropriate government authorities, species experts, and Indigenous groups. The Board would require Trans Mountain to file the initial Program with the Board prior to commencing Project operations, with any further iterations being developed and implemented in consultation with the appropriate regulatory authorities for marine shipping. The Marine Mammal Protection Program is meant to ensure Trans Mountain fulfills its commitments to participate in the development of industry wide shipping practices in conjunction with the appropriate authorities. The Board recognizes that the Marine Mammal Protection Program offers no assurance that effective mitigation would be developed and implemented to address Project-related marine shipping effects on marine mammals, but the Board is encouraged that Trans Mountain is supporting initiatives to do so. The Board also recognizes a commitment by Trans Mountain to require Project-related marine vessels to meet any future guidelines or standards for reducing underwater noise from commercial vessels as they come into force.

Beyond Condition 132, however, the Board would not impose additional mitigations aimed only at Project-related marine shipping. There are many other vessels impacting marine species in the area, and the Board finds that it would not be effective to attempt to address the cumulative effects on these species by attempting to disproportionately focus mitigations on just one subset of marine traffic. Project-related marine vessels would be a small fraction of large commercial shipping in the area, and an even smaller fraction of total vessel traffic. In addition, Project-related vessels are at the slower end of large commercial shipping vessels in the area and so would be expected to create less overall noise and strike risk compared to faster vessels. Further, the Board heard that regularly operating ferries, tugs, and whale watching boats make substantial contributions to underwater noise, well beyond what will be added by Project-related vessels. The Board concludes that focusing mitigations just on Project-related vessels would not be effective, because the disturbance from all other vessels would remain. The Board therefore recommends additional mitigations be applied to all appropriate vessels (which would include Project-related vessels) as described below.

The Board has kept its previous Condition 132, but has made a few amendments to more accurately reflect what Trans Mountain can control given that it does not own or operate Project-related marine vessels, to reflect the fact that this MH-052-2018 hearing has explored the range of potential mitigations for marine vessels, and to be consistent with the recommendations to government below. Therefore, Condition 132 encompasses mitigations to reduce or offset the contribution to cumulative effects from the Project (e.g., construction at watercourse crossings and at the Westridge Marine Terminal), and, although the Marine Mammal Protection Program does not constitute immediate mitigation for Project-related marine shipping effects, the Board has included reference to shipping in Condition 132 given Trans Mountain's commitments. The Board also has taken into account that Trans Mountain said it will commence a process to solicit and obtain feedback and comments from Indigenous groups on a draft version of the Marine Mammal Protection Program no later than 18 months before commencement of Project operations.

Mitigation recommended for all appropriate vessels

Offsets

As explained above, given the cumulative effects involved, the Board does not expect further mitigations that are applied only to Project-related marine shipping to be effective. Nevertheless, routine operations of Project-related marine shipping will add to both underwater noise and the risk of strikes in each section of the shipping route, and these are identified as threats to a number of the SARA-listed species. In Recommendation 5, the Board therefore recommends that the additional underwater noise and strike risk created by Project-related marine vessels be offset by applying measures to all appropriate vessels, including Project-related marine vessels. Despite some uncertainty in the relative contribution of underwater noise and strike risk to the cumulative effects on SRKW and other species at risk, the Board is taking a precautionary approach and recommending full offsets for the additional underwater noise and strike risk caused by Project-related marine vessels.

While the Board maintains its recommendation that there are likely significant adverse effects on SRKW as described above, this offset approach could allow for a reduction in that finding to non-significant if and when Project-related shipping effects have been effectively reduced to net-zero in each section of the shipping route. The Board has made this recommendation to the GIC because its implementation is beyond the Board's regulatory authority and Trans Mountain's control.

The Board notes existing government commitments appear to be consistent with this recommended approach: Transport Canada said it is aiming for a net-zero increase in underwater vessel noise as a result of Project shipping, while DFO said that, in approving the Project, the Government of Canada committed to more than mitigate the impact of additional Project traffic on SRKW.

This approach is also consistent with guidance in the Board's Filing Manual which states that once all feasible and effective mitigations have been applied to avoid or reduce adverse effects on species at risk, any residual and non-negligible contribution to cumulative effects should be offset. Indeed, the Board took this approach for this Project in a number of cases, such as:

- caribou (see Conditions 37, 128, 149 and 150);
- rare plants (see Conditions 40(c), 40(e) and 155);
- wetlands (see Conditions 41(f), 41(h) and 156);
- grasslands (see Conditions 42(e), 42(g) and 157);
- riparian habitat (see Conditions 71(e), 71(h) and 154); and
- GHG emissions (see Condition 142).

The Board's Recommendation 5 to offset the additional underwater noise and strike risk provides a goal, but it does not prescriptively say exactly how to reach that goal via specific mitigations that apply to specific vessels in specific places and at specific times. The Board considers it imprudent to attempt to do so at this time. The Board heard from participants intimately involved in marine shipping, such as Transport Canada, VFPA, PPA, and the Chamber of Shipping, that marine shipping is complex; that any new mitigation measure must be carefully consulted upon, planned and tested; and that safety must come first. Other important factors must be considered, such as the potential impacts of mitigation measures on Indigenous rights and interests, shipping schedules, port competitiveness, other marine users, U.S. and international coordination, unintended side-effects, and other socio-economic effects.

The Board is nevertheless confident that a technically and economically feasible mitigation mix can be developed to offset the additional underwater noise and risk of strikes due to Project-related vessels given the evidence submitted during the MH-052-2018 hearing. This included, for example, positive experiences with the ECHO program slowdowns in Haro Strait, the ability of slowdowns to reduce both noise and strike risk, the experiences in other parts of the world in reducing strike risk via slowdowns and reroutes or displacements, the multiple technical and operational mitigations that can be applied to regularly operating vessels in the area such as ferries and whale watching boats, and the potential for long term reductions in underwater noise via vessel retrofits and design.

A number of participants focused on the uncertainties of potential mitigation to reduce effects on SRKW, such as the fact that slowdowns can increase the duration of vessel transits and thus of noise. The Board notes that studies following the 2017 Haro Strait slowdown showed a reduction in mean broadband vessel source levels, a reduction in ambient noise received at the Lime Kiln hydrophone, and a slight increase in the total percentage of time below the noise threshold level (below which SRKW behavioural response is not anticipated), suggesting that the increased transit time did not increase the duration of impactful underwater noise.

A number of participants also questioned whether voluntary measures are appropriate as long-term solutions. With regard to the voluntary ECHO program initiatives, the Board heard that voluntary measures can allow for ongoing refinement and adaptation to improve effectiveness and participation rates, can avoid the more severe economic impacts by allowing a small percentage of vessels to not participate when necessary, and can include participation of vessels on both sides of the Canada-U.S. border. Thus, based on the evidence to-date, voluntary measures do appear to offer the potential of effective mitigation. However, as noted in Recommendation 5, monitoring is necessary to track progress, and changes should be made if voluntary measures prove ineffective over time, including consideration of mandatory measures.

In developing the offset program under Recommendation 5, the Board recommends the general principles for offsets outlined in Section 10.1.4.5 of this MH-052-2018 Report be considered. The Board notes that a number of details will also need to be determined. For matters within its regulatory control, the Board typically requires a proponent to submit a 'pre-construction offset plan' and a 'post-construction evaluation of offset implementation' report (see the above referenced conditions for examples). For the Recommendation 5 offset program, details will include the following:

- Specific offsetting objectives will need to be defined spatially and temporally.
- Offset ratios will need to be set.
- A quantification of the additional underwater noise and strike risk in each section of the route added by Project-related marine shipping will need to be estimated – this will likely require monitoring and/or modelling, and may change over time if ship design or operational parameters change (which may result from mitigation measures that apply to vessels generally, including Project-related vessels).
- The specific measures to be undertaken will need to be determined.
- Monitoring programs will be needed to determine the effectiveness of measures taken and the extent to which they are offsetting the additional Project-related underwater noise and strike risk in each section of the route.

With regard to transparency and accountability, the Offset Program recommended in Recommendation 5 includes periodic reporting on progress and results, and the Board recommends it should include each of the above details at the appropriate time. The annual reporting recommended in Recommendation 2 would also be relevant given that it includes a description of progress on each of the other recommendations, as well as a description of consultation activities related to each.

The Board notes that some work has already been undertaken that may be of relevance to the above details. For example, with respect to underwater noise, Transport Canada commissioned modelling by JASCO that predicted future noise conditions including Project-related shipping, both with and without the application of various mitigations

strategies. With respect to strike risk, Trans Mountain filed an encounter modelling study in the OH-001-2014 hearing, and the federal authorities submitted a 2017 report by Nichol et al. on strike risk in this MH-052-2018 hearing. Further, Transport Canada and DFO described the collection of acoustic information to measure the before and after acoustic signature in the Project area, and explained that modelling can be used to estimate the efficacy of mitigations.

With regard to timing, the Board heard from a number of participants that the Project should not be approved, or operations begin, until mitigations are in place and demonstrated to be successful. However, given the above-noted necessities of safety first, taking a careful, deliberative, and collaborative approach, and the potential need for international coordination, the Board considers it likely that it will take some years to plan, test and implement a full suite of measures and to demonstrate ongoing offset success. Thus, the Board has not suggested a time limit for the recommended offsets, but the Board does note that DFO said that, in approving the Project, the Government of Canada committed to more than mitigate the impact of additional Project traffic on SRKW before any shipping associated with the Project begins.

Particular mitigation measures for further consideration

As noted above, the Board considers it imprudent, at this time, to attempt to identify specific mitigations that apply to specific vessels in specific places and at specific times. Nevertheless, of the broad range of mitigation measures the Board heard during the MH-052-2018 hearing, the following five appear to warrant further examination in particular:

1. Slowdowns in each section of the marine shipping route.
2. Limits on the impacts from whale watching boats.
3. Accelerate and confirm the schedule for noise reduction efforts for regularly operating ferries in the area.
4. Identification of specific congregation and migration areas for SARA-listed species, and consideration of mitigations in those areas.
5. Further incentives and requirements for quiet vessel design and refits to address underwater noise over the long term, including maximal international participation.

In Recommendation 6, the Board recommends that each of these five mitigations be further considered and their feasibility be publicly reported on. The Board notes that some mitigations will work with some vessels and not with others. For example, the Board heard that some vessels may not produce less underwater noise, and may even produce more noise, at slower speeds. Navigational safety considerations may also be different for different types of vessels for the same mitigation, affecting the feasibility of which vessels a mitigation measure can be applied to. Thus, in Recommendations 5 and 6, the Board notes that each mitigation measure should apply to all “appropriate” vessels, which will need to be determined on a case-by-case basis. The tables below provide discussion on each of the five mitigation measures the Board recommends for particular further study, including a description of some of the potential benefits and challenges associated with each, some notes on what has been done already, and some of the different ways each might be implemented.

Regarding the other potential mitigation measures discussed during the hearing, the evidence on them is summarized above. The Board has not flagged these as particularly warranting further examination. For example, some do not appear feasible due to navigational safety reasons (e.g., rerouting through Rosario Strait, rerouting north through Johnstone Strait, convoys, and prohibiting night-time transits); some seem to have limited effectiveness, although they may be useful in specific circumstances (e.g., marine mammal observers, identification and mitigation of the ‘noisiest’ vessels first); and some seem to have the opposite effects as intended (e.g., emitting warning signals to whales that can have the unintended consequence of bringing them to the surface and increasing strike-risk).

Slowdowns	
Benefits	Challenges
<p>Can reduce both underwater noise and strike-risk</p> <p>Could benefit numerous marine mammal and fish species (e.g., Humpback, Fin, Grey and killer whales, Basking shark, Leatherback sea turtle, etc.)</p> <p>May also reduce air and GHG emissions, wash and wake effects, and impacts on smaller vessels</p>	<p>Potential costs due to increased shipping time, additional pilotage, etc., with potential impact on port competitiveness</p> <p>Increased duration of underwater noise (although studies from the ECHO slowdown trial suggest the duration of impactful underwater noise did not increase)</p> <p>Not all vessels are quieter when slower</p> <p>Safety considerations, such as areas where weather is harsher, affecting safe speed</p> <p>Need for coordination across the Canada-U.S. border</p> <p>Potential 'speed ups' elsewhere to make up lost time could increase noise and strike risk in other areas (presumably, however, if slowdowns become routine/predictable they could be factored into revised schedules)</p>
Notes and Variations	
<p>Two seasons of experience has been achieved with the ECHO Program voluntary Haro Strait slowdowns, to be extended for five years via a non-binding conservation agreement</p> <p>Each section of the route is important to one or more SARA-listed species (see Table 25), and reducing speed is one of the key operational mitigations to reduce both underwater noise and strike risk. Thus, consideration should be given to potential slowdowns in each section of the route.</p> <p>The Board heard that real-time slowdowns (e.g., in response to sighting a whale) are challenging, given the difficulty of detection and the limited ability of a large ship to make a quick response. If a species reliably occurs or migrates through an area during known months/seasons, that could be the appropriate duration for a slowdown. Alternatively, a dynamic slowdown that applies if the species of concern has been detected in the area in the past day(s) or week may provide an effective mitigation while not unnecessarily slowing traffic and providing a measure of predictability to shipping.</p>	

Limits on whale watching boats	
Benefits	Challenges
<p>Can reduce underwater noise, strike-risk, and physical disturbance</p> <p>Sustainably maintaining the species being watched in turn helps to maintain the whale watching industry</p>	<p>Socio-economic effects, such as potentially limiting the number of whale watching trips</p>
Notes and Variations	
<p>The Board heard that SRKWs have been observed to be within 400 m of a vessel most of the time during daylight hours throughout the entire summer, and of the time SRKW potentially lose for foraging due to disturbance, approximately one third was estimated to be due to noise from whale watching boats. The Board heard that when there are many whale-oriented boats in the vicinity of SRKWs, estimated total underwater noise can get close to the threshold assumed to cause permanent hearing loss. The Board heard there are a number of mitigations in place, some mandatory (e.g., 100 m minimum approach distance, 200 m for killer whales) and some voluntary (e.g., whale watching industry guidelines). However, there is currently no limitation on the number of whale watching boat trips, and no permitting scheme.</p> <p>The Washington State November 2018 Southern Resident Orca Task Force Report included a number of additional recommendations for SRKW (e.g., a go-slow 7 knot zone within half a nautical mile, a limited-entry whale watching permit system, incorporation of quieter technology over time, and increased buffer to 400 yards behind whales to decrease chase-like situations). The Board recommends GIC consider the feasibility of each of these, as well as other potential mitigations.</p>	

Noise reduction efforts for ferries	
Benefits	Challenges
Reduce underwater noise May also improve fuel efficiency, and thus reduce air and GHG emissions	Costs if requires new builds or retrofits
Notes and Variations	
<p>The Board heard that ferries are estimated to contribute 52-67 per cent of underwater noise due to their size, the large number of monthly ferry trips, and because their routes are widely distributed throughout the area. The Board heard there are additional routes in the summer which is also a time of primary SRKW presence.</p> <p>Transport Canada said it has entered into a non-binding agreement with the Canadian Ferry Association and is negotiating a non-binding agreement with B.C. Ferries concerning reductions in underwater noise.</p> <p>In Washington State, immediate actions from the Governor's office at the time of creating the Orca Task Force included developing strategies for quietening state ferries, and the Task Force's recommendations included accelerating the transition to quieter and more fuel-efficient vessels.</p> <p>The Board recommends GIC consider the feasibility of accelerating the reduction of impacts from regularly operating ferries in the area, and to publicly confirm the schedule for such reductions.</p>	

Mitigation in Species congregation and migration areas	
Benefits	Challenges
Focus mitigations on key areas for one or more species of concern	Requires a degree of site fidelity, otherwise mitigations would need to be moved (if e.g., location of key feeding areas change) Depending on the mitigation measures, a range of potential socio-economic effects
Notes and Variations	
<p>One or more mitigations (e.g., slowdown, moving shipping lanes, lateral displacement within shipping lanes, sanctuary/acoustic refuge designation, restrictions or prohibitions on e.g., fishing or whale watching boats, etc.) might be appropriate depending on the species of concern, the location, and the species' activities in that location.</p> <p>For example, the Board heard that Humpback whales are the most commonly reported species involved in vessel collisions, and that up to 50-100+ animals are often found on Swiftsure Bank in the route of shipping traffic. Swiftsure Bank is also within the newly designated critical habitat for SRKW and NRKW. The Board heard that a preliminary risk assessment considered a southward shift in shipping lanes at Swiftsure Bank to be acceptable for further study, and that slowdowns in the area may also be possible subject to local weather and other safety concerns.</p> <p>The Board heard that thousands of migratory Grey whales have to cut across the western entrance to the Strait of Juan de Fuca, amounting to a high density of whales crossing shipping routes for several months.</p> <p>Recovery measures with regard to vessel strikes in the 2017 Action Plan for Blue, Fin, Sei and North Pacific right whales in Canadian Pacific Waters include identifying areas of high risk of interactions.</p> <p>The Board heard that further information about the locations, movement and abundance of endangered whales in Canada is being pursued under the Oceans Protection Plan and to support the Whales Initiative.</p> <p>The existing ECHO Program slowdown and lateral displacement are targeting noise in two areas of importance for SRKW: Haro Strait and Juan de Fuca.</p>	

Quiet vessel design and refits	
Benefits	Challenges
Unlike an operational measure in a particular area and at a particular time, quiet vessel design or refit would reduce noise all the time everywhere the vessel goes Can also improve fuel efficiency and thus reduce air and GHG emissions	Up-front costs for both refits and quieter designs Can be slow to implement as new ships are built and existing ones retrofitted
Notes and Variations	
<p>The Board heard that quiet vessel design is the best long-term solution to underwater noise, and that it would ideally be led through the IMO to be global and long-lasting. Thus the Board recommends Canada encourage, support and participate to the maximal extent possible to accelerate international improvements.</p> <p>Given this may be slow to implement at the international level, the Board recommends GIC also further explore the potential for requirements and/or incentives to accelerate implementation.</p> <p>VFPA has implemented an EcoAction incentive to encourage quiet technologies and quiet certification, and noted it would be more effective if other ports did likewise. VFPA also suggested consideration of making underwater noise measurement a mandatory component of a new vessel's sea trial commissioning stage.</p> <p>The Board heard Transport Canada is funding a technology scan to identify mature and near commercial technologies with the greatest potential to reduce vessel underwater noise.</p> <p>The Board notes that operational mitigations such as slowdowns may still be required to reduce strike risk.</p>	

Mitigating cumulative effects

If Project-related marine shipping additions to underwater noise and strike risk are successfully offset, these two primary adverse effects of routine operations of Project-related vessels on marine mammals could be reduced to net-zero. However, although it appears feasible as discussed above, there remains some uncertainty as to how long it will take and whether it will be 100 per cent achieved over time. Thus, some residual effect will remain from the routine operations of Project-related marine shipping, at least for a while, adding to existing and future cumulative effects.

The Board heard that cumulative effects are already having substantial effects on a large number of marine species, including SARA-listed species. These effects come not only from other marine vessels, but also from surrounding populations and urbanization, such as contamination from untreated and undertreated municipal wastewater, industrial runoff and agricultural activities; habitat degradation; fish farms; bycatch; and broader processes such as climate change and warming oceans. The Board heard about some of the initiatives and measures to address this broad range of impacts.

The Board heard from DFO that, in approving the Project, the Government of Canada committed to more than mitigate the impact of additional Project traffic on SRKW, and that the objective of federal authorities is to go beyond mitigating the impacts of the Project to address more fully the cumulative effects that are threatening SRKW.

The Board has therefore included two recommendations that seek to address the broader issue of cumulative effects on the marine ecosystems through which Project-related vessels will pass:

- In Recommendation 1, the Board recommends GIC develop and implement a regional cumulative effects management plan to assess the overall environmental state of, and cumulative effects on, the Salish Sea, including a long-term strategy to manage those cumulative effects.
- In Recommendation 2, the Board recommends GIC annually report on the oversight, progress and status of initiatives and measures to address cumulative effects on, and to support the health of, the Salish Sea.

The Board notes that sections 73 and 74 of the CEAA 2012 provide for the development of regional studies, and that once completed, the results of such studies are used to inform environmental assessments under that Act. The Board recommends that GIC consider whether such a study, as part of the recommended regional cumulative effects management plan, would be advantageous.

Some participants suggested that these recommendations concerning the overall health of the Salish Sea should be subsumed under an overarching shared management structure or marine use planning process. The Board has included consultation in each of its recommendations, and would recommend consideration of the most appropriate means to manage or plan the process.

With regard to marine vessels, Recommendation 1 includes a recommendation to consider the feasibility of reducing total underwater noise and strike risk over time. The Board refers GIC to the European Marine Strategy Framework Directive which includes an aim of keeping the annual average ambient noise level below the baseline value of the year 2012, which may provide precedent and learnings for such an approach.

As with offsets above, some participants argued that the cumulative effects management plan referred to in Recommendation 1 should be developed prior to the Project's approval and construction. The Board does not consider this necessary. As explained throughout this report, the Board has found that it has sufficient evidence on cumulative effects for the purposes of conducting an environmental assessment of Project-related marine shipping. Further, the Board expects it will take some considerable time to develop an effective and comprehensive plan under Recommendation 1, and it is recommended to be an iterative process of improvement over time. Thus, as further discussed in Chapter 2, the Board is not persuaded that the Project be further delayed.

Significance evaluation: adverse effects on Southern resident killer whale (SRKW)

	Criteria	Rating	Description
Project effects	Temporal extent	Long term	Sensory disturbance and the risk of strike will occur for the duration of operations.
	Reversibility	Reversible to permanent	With regard to sensory disturbance, once a marine mammal is no longer exposed to underwater noise from Project-related marine vessels, then behavior would likely return to normal. The effects of a marine mammal vessel strike would range from reversible to permanent, depending on the severity of the strike.
	Geographic extent	RSA	Underwater noise and strikes will originate in the shipping lanes, but noise spreads underwater, and if threats have population level consequences, they would impact across the range of SRKW.
	Magnitude	High	Underwater noise produced from Project-related marine vessels is not expected to result in permanent or temporary auditory injury, but would result in sensory disturbance which is considered a key threat to SRKW. A strike, although of low probability, could result in lethal or non-lethal effects, and mortality would have population level consequences.
Cumulative effects	<p>With regard to sensory disturbance, the Regional Study Area (RSA) is a heavily utilized marine environment, which is predicted to increase in use. Once exposure to underwater noise from Project-related marine vessels ceases, it is likely that marine mammals would be exposed to some form of disturbance soon after from another marine vessel. With regard to potential strikes, the increase in Project-related marine traffic would contribute to the cumulative risk of marine mammal vessel strikes.</p> <p>The SRKW population has crossed a threshold where any additional adverse environmental effects would be considered significant. While the effects from Project-related marine shipping will be a small fraction of the total cumulative effects, and the level of traffic is expected to increase with or without the Project, the increase in marine vessels associated with the Project would further contribute to cumulative effects that are already jeopardizing the recovery of SRKW.</p>		
Recommendation	<p>Absent further mitigation, likely to result in significant adverse effects. See Chapter 2 for discussion of justification.</p> <p>If the Board's recommendation to offset the additional underwater noise and strike risk from Project-related marine shipping is implemented, then adverse effects from Project-related marine shipping would reduce to net zero if and when offsets are successful, at which time effects would not likely be significant.</p>		

Significance evaluation: adverse effects on other marine mammals

	Criteria	Rating	Description
Project effects	Temporal extent	Long term	Sensory disturbance and the risk of strike will occur for the duration of operations.
	Reversibility	Reversible to permanent	With regard to sensory disturbance, once a marine mammal is no longer exposed to underwater noise from Project-related marine vessels, then behavior would likely return to normal. The effects of a marine mammal vessel strike would range from reversible to permanent, depending on the severity of the strike (i.e., mortality would be permanent).
	Geographic extent	RSA	Underwater noise and strikes will originate in the shipping lanes, but noise spreads underwater, and mortality from a strike could have population level consequences on a small population endangered species.
	Magnitude	Low to high	Underwater noise produced from Project-related marine vessels is not expected to result in permanent or temporary auditory injury, but would result in some sensory disturbance to marine mammals. The magnitude of a marine mammal vessel strike, although unlikely, would vary according to the extent of the injury and the species struck. Mortality of an individual of a low-population SARA-listed endangered species could be of high magnitude (although the Board notes DFO's evidence that endangered Sei, Blue and North Pacific right whales are seldom observed in the Salish Sea and are usually distributed more offshore).
Cumulative effects	With regard to sensory disturbance, the Regional Study Area (RSA) is a heavily utilized marine environment, which is predicted to increase in use. Once exposure to underwater noise from Project-related marine vessels ceases, it is likely that marine mammals would be exposed to some form of disturbance soon after from another marine vessel. With regard to potential strikes, the increase in Project-related marine traffic would contribute to the cumulative risk of marine mammal vessel strikes. Nevertheless, the contribution from Project-related marine vessels on marine mammals (other than SRKW) to total cumulative effects is likely to be inconsequential.		
Recommendation	Not likely to cause significant adverse environmental effects.		

14.7.3 Marine fish and fish habitat

Trans Mountain described the RSA as a productive marine environment, home to hundreds of different marine fish, including nine SARA-listed species or populations (Table 28). Trans Mountain said that no critical habitat has been identified for marine fish species at risk within the RSA; however, portions of the RSA have been classified by DFO as Important Areas for Pacific herring and Pacific salmon. Participants identified that marine resources within the RSA had over time been reduced in abundance (e.g., Pacific salmon).

DFO said that Leatherback sea turtle might also be affected by Project-related marine shipping. Throughout this section, 'marine fish' includes marine invertebrates and reptiles.

Table 28: Marine fish species (including invertebrates and reptiles) listed under Schedule 1 of the Species at Risk Act potentially found within the Regional Study Area

Species	SARA Status
Basking shark	Endangered
Bluntnose sixgill	Special Concern
Longspine thornyhead	Special Concern
Northern abalone	Endangered
Olympia oyster	Special Concern
Tope	Special Concern
Yelloweye rockfish (outside and inside population)	Special Concern
Rougheye rockfish type I and type II	Special Concern
Green sturgeon	Special Concern
Leatherback sea turtle	Endangered

In the MH-052-2018 hearing, Trans Mountain referenced its previous individual assessments for eight of the above SARA-listed marine fish species. Trans Mountain provided new individual assessments of potential residual effects of Project-related marine shipping on Longspine thornyhead and on Leatherback sea turtle. For each species, Trans Mountain noted either no critical habitat identified in Canadian waters, or (for Northern abalone) no spatial overlap with identified critical habitat. Trans Mountain's assessments concluded that residual effects of routine operation of Project-related vessels on each SARA-listed marine fish are predicted to be negligible or low in magnitude, low in probability, and not significant.

DFO maintained its position that potential effects on marine fish and fish habitat from Project-related marine shipping are likely to be low risk (excluding potential accidents or malfunctions). DFO said, given that there have been no significant changes to the proposed marine shipping component of the Project, it does not anticipate any meaningful changes to its assessment of effects on marine fish and fish habitat, including potential effects on Chinook salmon and species that have seen a change in designation, since the filing of its written evidence in the OH-001-2014 hearing.

Participants raised several issues related to effects of Project-related marine shipping on marine fish and fish habitat. In this section, the Board focuses on:

- effects of Project-related vessel wake waves on intertidal habitat and marine fish;
- sensory disturbance to marine fish from underwater noise;
- introduction of aquatic invasive species from Project-related marine vessel ballast water;
- vessel strikes; and
- cumulative effects on salmon and Steelhead.

Effects of marine vessel wake waves on intertidal habitat and marine fish

Trans Mountain indicated that wake waves produced from Project-related marine vessels could result in impacts to intertidal areas and the associated biota. Trans Mountain conducted predictive wake wave height modelling for Project-related marine vessels travelling at various speeds and depths. Trans Mountain concluded that Project-related marine vessel wake wave heights at the shoreline would be well within the range of natural conditions and that wake waves generated from Project-related marine vessels are unlikely to result in any measurable changes to the biophysical characteristics of intertidal habitats. Trans Mountain said that marine organisms that occupy intertidal areas are regularly exposed to waves that are greater than the predicted wake wave heights and would have adapted to the physical forces imparted by Project-related marine vessel wake waves. As such, Trans Mountain said that the Project's contribution to total cumulative effects would be low.

The Board requested a species-specific assessment for all SARA-listed marine fish from Project-related marine vessels, which included a request for species-specific mitigation. Trans Mountain identified that the frequency of occurrence within the LSA and the RSA for SARA-listed marine fish ranged from patchy, uncommon, to rare (Appendix 11 provides a description of the spatial boundaries). For each species, Trans Mountain identified that effects from Project-related marine vessel wakes would be of negligible magnitude and recommended that no mitigation measure be implemented for effects of vessel wakes on marine fish and fish habitat.

Numerous participants raised concerns related to wake waves impacting intertidal habitats and the associated biota. Metro Vancouver's evidence highlighted various ways that shoreline invertebrates and marine fish could potentially be impacted from Project-related marine vessels, including higher invertebrate detachment rates, reduced growth and energy storage of native invertebrates, increased energy expenditure, dislocation of suitable habitat, and decreased feeding efficiency.

The Tsawout First Nation Marine Use Study indicated that molting crabs are susceptible to vessel wakes. It said that when crabs molt, they change their shells and during this time they are very light, and get disturbed and damaged by sudden changes in wave action, such as vessel wakes.

DFO said that potential effects on intertidal fish habitat from Project-related vessel wake are unlikely to differ substantially from current conditions in the RSA, and it considered the likelihood and magnitude of such occurrences to be of low risk to intertidal habitat and associated biota.

A number of participants highlighted the importance of eelgrass beds as marine fish and invertebrate habitat, as well as providing beneficial ecosystem services. Tsawout First Nation said that eelgrass beds at James Island and Sidney Island are being lost due to all the wake waves from vessel traffic. As noted by Marine Use Study Respondents, it is fairly shallow in those areas and the waves are building up the sediment. The eelgrass then disappears and it affects all the crabs and other spawning fish that depend upon it. Trans Mountain said that although there are no mapped eelgrass beds within the Canadian portion of the LSA, any eelgrass beds that are present (i.e., within the eelgrass biobands) would be acclimated to both natural wave conditions and wake waves from existing vessel traffic. Therefore, it considers unlikely that any eelgrass beds would be adversely affected by the Project.

Sensory disturbance to marine fish from underwater noise

Trans Mountain said that it did not conduct a detailed effects assessment on the potential impact of underwater noise produced by Project-related marine vessels on marine fish as there are no standard criteria or thresholds to assess these effects against and there is a lack of data and knowledge surrounding the effects of underwater noise on marine fish. Trans Mountain did acknowledge that underwater noise from Project-related marine vessels could potentially trigger behavioral responses by marine fish ranging from small temporary movements to large scale change displacements. However, Trans Mountain further stated that there is no evidence in the literature that vessel traffic will result in the large scale displacement of fish or invertebrate populations from foraging, spawning, rearing or migrations areas, or will otherwise affect their distribution or abundance. Trans Mountain said that its conclusion is supported by the existing overlap of areas of high shipping activity and Pacific herring and Pacific salmon migration areas, such as the Haro Strait and the Fraser and Columbia Rivers.

Participants raised concerns over underwater noise impacting marine fish. Raincoast Conservation Foundation said that Trans Mountain failed to consider behavioral changes beyond large-scale displacements and that underwater noise produced from Project-related marine vessels may result in sub-lethal consequences, such as cardiovascular disturbances. It noted that the lack of inclusion of information regarding responses of fish to underwater noise could have served to minimize the potential Project-related effects.

Dr. A.L. Schwarz commented that Pacific herring, as well as other species, respond negatively to shipping sounds. Dr. Schwarz further suggested that short-term behavioral changes can lead to long-term significant changes in populations, spawning locations and extents, and feeding grounds.

DFO said that it would be difficult for Trans Mountain to conduct a detailed effects discussion on the potential effects of underwater noise on marine fish and invertebrates, given the limited information on species-specific behavioral responses to marine vessel noise and the absence of Canadian standards or thresholds established for assessing such impacts. It noted that the presence and magnitude of a residual effect from underwater noise generated by Project-related marine vessels, in addition to the existing underwater noise environment in the RSA, is uncertain.

In the MH-052-2018 hearing, Trans Mountain said that Project-related vessels will produce underwater noise that may result in temporary disturbance of individual Leatherback sea turtles in the vicinity, but such disturbance is of low magnitude and not-significant.

Cheam First Nation, Chawathil First Nation, Kwantlen First Nation, Seabird Island Band, and Stó:lō Tribal Council, referred to a 2018 review by Weilgart which overviewed studies that found evidence that fish use sound to perceive the environment, for mating, for communication, and for predator avoidance; and that noise can cause adverse behavioral, physiological, anatomical and development effects. Trans Mountain said the Weilgart metadata study contained no new information that would change the conclusions reached in its Application.

DFO said that it is not aware of any direct evidence of mortality or unrecoverable injury to salmon from shipping noise.

Dr. Schwarz suggested three mitigations with respect to potential effects of shipping on herring:

- *Slowdown*: mandate slower vessel speeds to reduce shipping noise.
- *Nighttime*: minimize nighttime transits in corridors used by migrating fish to avoid physical interference with Pacific herring which rise to the surface at night to feed.
- *Lighting*: reduce vessel lighting to as low in intensity as acceptable for safety and do not position it to shine straight down into the water, to reduce effects on herring and their euphausiid prey. Trans Mountain said tankers already mask or cloak unnecessary lights at sea and typically operate in complete darkness except for navigation lights that are required for navigation safety reasons.

Stz'uminus and Snuneymuxw expressed concerns about increased use of anchorages by tankers and other ships in the southern Gulf Islands, and expressed concerns about underwater noise and other adverse effects negatively affecting fish and marine mammals. Trans Mountain said it expected that tankers will anchor at the three anchorages east of Second Narrows, and pressure on anchorages will be reduced by holding tankers at the dock whenever a berth is available. PPA said for project vessels, if an inbound vessel misses the Second Narrows tidal window, it will anchor in English Bay to await the next tide to transit; and that outbound vessels, once clear of Second Narrows, head straight out through the Strait of Juan de Fuca. Transport Canada said it has launched a National Anchorages Initiative and is developing a Best Practices Manual for ships at anchor, to mitigate adverse effects of anchorage.

Introduction of aquatic invasive species from Project-related marine vessels ballast water

Trans Mountain said that the release of ballast water in Canadian waters is regulated by the Ballast Water Control and Management Regulations pursuant to the *Canada Shipping Act, 2001*. Both Trans Mountain and DFO noted that compliance with this regulation will minimize the likelihood of aquatic invasive species being introduced during ballast water exchange.

Participants raised concerns regarding the introduction of aquatic invasive species to Canadian waters through Project-related marine vessel ballast water. Cowichan Tribes said that no form of mitigation measures can eliminate the risk of aquatic invasive species introductions. It further recommended that ballast water discharge should include mandatory treatment of ballast water to standards recommended by the IMO.

In the MH-052-2018 hearing, the Board heard that the 2004 International Convention for the Control and Management of Ships' Ballast Water and Sediments, which Canada acceded to in 2010, entered into force on 8 September 2017. Transport Canada explained that the Convention envisions a transition by the existing global commercial fleet from ballast water exchange to the use of ballast water management system between September 2019 and 2024, and that Transport Canada is developing regulations that will, *inter alia*, require Canadian ships to make this transition.

Cowichan Tribes repeated its previously submitted proposed condition that Trans Mountain must file with the NEB proof that it requires all tankers calling at the Westridge Marine Terminal to conduct ballast water treatment in accordance with the standards of the International Maritime Organization (IMO). In response, Trans Mountain noted that ballast water management is a requirement for all vessels under the *Canada Shipping Act, 2001*; all arriving vessels are required to submit a Ballast Water Reporting Form to Transport Canada prior to entering Canadian Waters; compliance is routinely checked by Transport Canada as part of Port State Control for all vessels; and ballast water management is a requirement under Trans Mountain's Vessel Acceptance Standard.

Commenter Mr. Nelson said there is well documented research on the significance of residual bottom communities or "hull fouling" or "biofouling" (spores and resting stage) on invasive species transportation which is not addressed by the ballast water regulations. Transport Canada said that anti-fouling compounds like paint and surface treatments are very effective at keeping sea-life off the bottom of vessels, that Canada has supported the development of the IMO's 2011 *Guidelines for the Control and Management of Ships' Biofouling*, and that an IMO review process is underway focusing on, for example, degree of application and effectiveness of the guidelines.

Vessel strikes

The 2018 Report on the Progress of Recovery Strategy Implementation for the Basking shark in Canada classifies the threat of collision between vessels and Basking sharks as medium level of concern, given that Basking sharks often feed by slowly moving along the surface. It states, however, that there are no recent reported vessel strikes of Basking sharks in Canadian Pacific waters or elsewhere in their range, and the extent and population consequence of vessel collisions is unknown. Trans Mountain said that residual effects on Basking shark would be negligible in magnitude, low in probability, and not significant.

The 2017 proposed Action Plan for Leatherback Sea Turtle states that the Pacific population has experienced particularly precipitous declines over the last two decades, and that major worldwide threats include vessel strikes. Trans Mountain noted that there is critical habitat for Leatherback sea turtle in U.S. waters west of the entrance to the Strait of Juan de Fuca, and acknowledged that a collision between a Project-related vessel and a turtle is possible but of low probability. The 2016 *Mariners Guide to Whales, Dolphins, and Porpoises of Western Canada* states that the endangered status of Leatherback sea turtles make vessel strikes a particular concern, as mortality of even a few individuals can have a significant impact on their population status. Leatherback sea turtles are a slow-moving species, and spend a significant amount of time at or just below the surface when feeding and travelling, making them particularly vulnerable to vessel strikes.

Cumulative effects on salmon and Steelhead

The Board heard broad concerns over the status of many salmon stocks in the area. For example, Coldwater Indian Band said that recent Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessments have found that interior Fraser Coho salmon, and more than 60 per cent of the sub-populations of Fraser sockeye salmon examined, are all at risk. The Board heard concerns about the many cumulative impacts affecting salmon and other fish species, such as over-fishing, pollution, fish farms, climate change, vessel traffic, and habitat degradation.

DFO said Thompson River and Chilcotin River Steelhead underwent an emergency assessment by COSEWIC in January 2018. COSEWIC assessed both Steelhead populations as Endangered, and they are now being evaluated for potential listing under the SARA through an emergency listing process. Stk'emlupsemc te Secwepemc said it is concerned that Project-related marine shipping will further disrupt their migratory routes. The COSEWIC assessment summary for these populations states that bycatch mortality in commercial Pacific salmon fisheries and declines in marine and freshwater habitat quality are the key factors driving the declines. With regard to marine survival, the summary notes ocean warming

and predation by harbour seals and possibly other predators; there is no mention of shipping. Trans Mountain said recent changes to the COSEWIC status of Steelhead and salmon stocks do not affect its conclusions of the original assessment (i.e., not significant).

The Board heard about a diverse array of efforts for the protection and restoration of west coast salmon and Steelhead species, such as salmon habitat restoration projects under the Coastal Restoration Fund; a new 10-year conservation and harvest sharing arrangement under the Pacific Salmon Treaty; the 2018-2022 Implementation Plan under Canada's Wild Salmon Policy; the completed 2018 Cohen Response Status Update; and proposed amendments to the *Fisheries Act* that would strengthen the protection of fish habitat.

The Board further discusses Chinook salmon with regard to SRKW prey abundance in the section on marine mammals above.

Views of the Reconsideration Panel

Given the threats raised during the hearings have the potential to impact a number of individual marine fish species, the following focuses on those threats. Although individual species are not always named in what follows, the Board has considered each individual SARA-listed marine fish species (including invertebrate and reptile species) potentially affected by Project-related marine shipping.

Wake waves

The Board recognizes the concerns presented by participants in regards to potential impacts to shorelines and associated biota from Project-related marine vessel wake waves. The Board notes that evidence provided by some intervenors, such as Metro Vancouver, was generic in nature and was not specific to the assessment areas for Project-related marine vessels. In the context of Project-related marine vessels, the Board finds Trans Mountain's predicted wake wave height modelling to be adequate and concurs with Trans Mountain's conclusion that Project-related marine vessel wake wave heights at the shoreline would be within the range of natural conditions. The Board generally concurs with Trans Mountain and DFO in that Project-related marine vessels are unlikely to result in any measurable changes to the biophysical characteristics of intertidal habitats. The Board acknowledges the evidence provided by Tsawout First Nation, and agrees that some impacts to intertidal habitat could occur from Project-related marine vessel wake waves, such as increased sedimentation. However, the Board is of the view that these effects would be localized to very small portions of the Local Study Area (LSA).

Therefore, the Board is of the view that effects from Project-related marine vessel wake waves on intertidal habitat and marine fish, including eelgrass beds, would be of low magnitude. The Board finds that the effects would occur for the duration of operations (long-term) and would be reversible. The Board also finds that the contribution from Project-related marine vessels to total cumulative effects on marine fish and fish habitat within the RSA is expected to be inconsequential. Therefore, the Board finds that the adverse effects on marine fish and fish habitat from Project-related marine vessels are not likely to be significant. The Board recognizes that SARA-listed marine fish species are present within the LSA and RSA. The Board is of the view that effects on these species would be similar to other fish species. Given their limited abundance, and absence of critical habitat within the LSA and RSA, the Board finds that adverse effects on SARA-listed marine fish from Project-related marine vessels are not likely to be significant.

With regard to Musqueam's suggestion to add marine shipping to Condition 92 (updates under the SARA), the Board notes that Condition 92 applies to Trans Mountain and so is focused on the Project rather than Project-related marine shipping. As described in more detail above in relation to marine mammals, the Board is directing a number of recommendations focused on marine shipping to the GIC, given federal authorities have regulatory control over that shipping. In response to Musqueam's suggestion, the Board has added a recommendation for updates under the SARA to its recommendation to the GIC concerning reporting on initiatives and measures to support the health of the Salish Sea (Recommendation 2).

Underwater noise

The Board agrees with DFO and Trans Mountain in that a detailed assessment of underwater noise produced by Project-related marine vessels on marine fish is not practicable due to lack of Canadian standards and the limitations in data to support such an assessment. The Board acknowledges the evidence provided by participants and agrees that some form of adverse, short-term effect (e.g., small behavioral changes) is likely to occur from underwater noise produced by Project-related marine vessels. However, the Board was not convinced that these short-term effects would translate into larger, more substantial impacts. Given lack of Canadian standards and the limitations in data to support such an assessment, the Board finds that the exact nature of the effect of underwater noise produced by Project-related marine vessels on marine fish is uncertain.

In the MH-052-2018 hearing, the Board heard there have been a number of new studies showing various effects of underwater noise on fish in recent years. Nevertheless, the Board remains of the view expressed in its OH-001-2014 Report that it is unlikely that short-term effects from Project-related marine shipping on marine fish species will translate into larger, more substantial impacts, because:

- There will only be approximately two transits per day of Project-related vessels along the route.
- The Board accepts DFO's position that potential effects on marine fish and fish habitat from Project-related marine shipping are likely to be low risk (excluding potential accidents or malfunctions), and that there is no direct evidence of mortality or unrecoverable injury to salmon from shipping noise.
- The COSEWIC emergency assessment for Thompson River and Chilcotin River Steelhead (2018), as well as the COSEWIC assessment and status reports for the Interior Fraser population of Coho salmon (2016) and for 24 Fraser River Designatable Units of Sockeye Salmon (2017), list numerous threats and limiting factors. These include habitat degradation, fishing, bycatch, industrial effluent, pathogens, predation, ocean warming, and climate change, but not routine operations of marine shipping.

The Board does not therefore consider it necessary to impose a condition, as requested by a number of First Nations, to require Trans Mountain to carry out further assessment of the effects of underwater noise on fish.

With regard to Dr. Schwarz's proposed mitigation measure for vessels to slowdown to reduce underwater noise, this is discussed in detail with regard to marine mammals above, and is included in the Board's recommendations (see Recommendation 6(a)). With regard to the proposal to minimize nighttime transits, the Board heard about numerous challenges to this approach: for example, it would increase noise for all species during the day, it could increase the need for vessels to go to anchor, and it could create traffic congestion during the day with associated safety concerns (see discussion of 'quiet periods' with respect to marine mammals above). As a result, the Board considers limitations on nighttime transits could create more risk than benefit. With regard to the proposal to reduce vessel lighting to reduce disturbance to fish, the Board heard that tankers operate at low lighting when at sea subject to navigational safety, and so the Board expects that light disturbance from Project-related marine shipping on fish is already likely to be negligible.

The Board heard concerns about anchorages in the southern Gulf Islands and their use by vessels.¹²⁹ Federal authorities responded that they have initiatives underway to mitigate adverse effects due to the use of these anchorages, and the Board heard that Project-related tankers use anchorages in other locations.

Invasive species

The Board acknowledges the evidence provided by participants and agrees that ballast water from commercial marine vessels can promote introduction of aquatic invasive species. However, the Board shares the opinion of Trans Mountain and DFO which indicates that compliance with Ballast Water Control and Management Regulations of the *Canada Shipping Act, 2001* would effectively minimize any potential introduction of aquatic invasive species from Project-related marine vessels. Therefore, the Board has not provided a detailed assessment of the potential effects on marine fish from the introduction of aquatic invasive species from Project-related ballast water.

With regard to Cowichan Tribes proposed condition that Trans Mountain should file proof that it requires ballast water treatment, the Board is satisfied that requirements under the *Canada Shipping Act, 2001* including the upcoming transition from ballast water exchange to the use of ballast water management system, as well as under Trans Mountain's Vessel Acceptance Standard, are sufficient.

The Board heard some evidence on the potential for invasive species to be transferred via hull fouling. The Board notes measures such as anti-fouling compounds, that tanker operators typically arrange for hull cleaning on a regular basis, a requirement for confirmation that a vessel's hull and propeller are not fouled excessively in Trans Mountain's Vessel Acceptance Standard, as well as international attention via the IMO's 2011 *Guidelines for the Control and Management of Ships' Biofouling* and associated IMO review. The Board is therefore satisfied that potential adverse effects related to invasive species transfer via hull fouling from the relatively small number of Project-related marine vessels is likely to be minor.

¹²⁹ This was raised, for example, in a report entitled "Vessel Anchorages – Potential Environmental Effects in the Southern Gulf Islands" by PGL Environmental Consultants for the Snuneymuxw and Stz'uminus First Nations.

Vessel strikes

The Board heard evidence that vessel strikes are a threat to both Basking shark and Leatherback sea turtle, and that strikes often go undetected and are thus underreported. Although the likelihood of a strike between a Project-related vessel and a SARA-listed species appears to be low, the loss of an individual of a SARA-listed endangered species in an already small population could have population-level effects. Mitigation measures to reduce the potential for strikes are discussed in detail with regard to marine mammals above, and Basking shark and Leatherback sea turtle are included in the Board's recommendations concerning vessel strikes (see Recommendations 1, 5, and 6).

Salmon and Steelhead

As noted above, the Board's assessment of the adverse effects of Project-related marine shipping on fish and fish habitat (including invertebrates and reptiles) from wake waves, underwater noise, invasive species and vessel strikes, is likely to be of low magnitude. However, the Board heard evidence of extensive concerns about the declining status of numerous west coast salmon and Steelhead species, and about the many and varied cumulative effects on them. The Board received evidence from Federal authorities that there are a wide variety of initiatives and measures currently underway or planned to help address such concerns. The Board also received submissions from parties challenging the adequacy of such initiatives and measures.

While existing cumulative effects on fish and fish habitat do appear to be significant in a number of cases, the Board finds that the contribution from Project-related marine vessels to such cumulative effects is likely to be inconsequential. The Board used the same cumulative effects methodology described in Section 10.1.4.4. The Board concludes that Project-related shipping is not likely to cause significant adverse environmental effects. Nevertheless, the Board's recommendations to government concerning the overall cumulative effects on the Salish Sea (see Recommendations 1 and 2) include consideration of the cumulative effects on, and initiatives and measures for, salmon and other fish stocks.

With regard to Musqueam's suggestion to expand Condition 132 (marine mammal protection plan) to include fish and fish habitat, the Board notes that Condition 132 is focused on measures that Trans Mountain can undertake with regard to marine mammals. The Board has instead included consideration of broader cumulative effects on fish and fish habitat in its recommendations concerning the overall health of the Salish Sea (Recommendations 1 and 2).

In response to suggestions from intervenors for additional mitigation at pipeline watercourse crossings, such as the call for trenchless directional drilling rather than trenching at critical salmon habitat watercourses as suggested by PIPE UP, the Board notes that watercourse crossings were the subject of extensive deliberation during the Board's OH-001-2014 hearing. The Board agrees with the findings in Sections 10.2.3 and 10.2.5 of the Board's Report. The Board also notes that the evidence provided by Dr. Rosenau on behalf of PIPE UP raises comparable issues and is substantially similar to what was provided to the Board in the OH-001-2014 hearing from PIPE UP and Salmon River Enhancement Society.

Significance evaluation: adverse effects from vessel wake on marine fish

	Criteria	Rating	Description
Project effects	Temporal extent	Long term	Effects would occur for the duration of operations.
	Reversibility	Reversible	Localized and short term effects are expected to be reversible.
	Geographic extent	Local Study Area	Localized to small portions of the Local Study Area.
	Magnitude	Low	Some impacts to intertidal habitat could occur from Project-related marine vessel wake waves, such as increased sedimentation. However, wake wave heights at the shoreline would be within the range of natural conditions, and are unlikely to result in any measurable changes to the biophysical characteristics of intertidal habitats. Effects on SARA-listed species and their habitat would be similar, and such species have no critical habitat within the LSA and RSA.
Recommendation	Not likely to cause significant adverse environmental effects.		

Significance evaluation: adverse effects of underwater noise on marine fish

	Criteria	Rating	Description
Project effects	Temporal extent	Long term	Effects would occur for the duration of operations.
	Reversibility	Reversible	Some form of adverse, short-term effect is likely to occur from underwater noise produced by Project-related marine vessels, but the Board was not convinced that these short-term effects would translate into larger, more substantial impacts.
	Geographic extent	Local to Regional Study Area	Project-related vessels would generate underwater noise within the shipping lanes, although underwater noise can extend into the regional study area, albeit attenuated.
	Magnitude	Low	Despite some uncertainties, the Board was not convinced that effects from the relatively small number of Project-related vessels would translate into larger, more substantial impacts.
Recommendation	Not likely to cause significant adverse environmental effects.		

Significance evaluation: adverse effects from invasive species on marine fish

Ballast water from commercial marine vessels can promote introduction of aquatic invasive species. However, compliance with the Ballast Water Control and Management Regulations of the *Canada Shipping Act, 2001*, and the upcoming transition from ballast water exchange to the use of ballast water management system, would effectively minimize any potential introduction of aquatic invasive species from Project-related marine vessels. Therefore, the Board has not provided a detailed assessment of the potential effects on marine fish from the introduction of aquatic invasive species from Project-related ballast water. Likewise, there is potential for invasive species to be transferred via hull fouling, but given measures such as anti-fouling compounds, that tanker operators typically arrange for hull cleaning on a regular basis, that Trans Mountain's Vessel Acceptance Standard requires confirmation that a vessel's hull and propeller are not fouled excessively, and the IMO's 2011 *Guidelines for the Control and Management of Ships' Biofouling* and associated IMO review, the Board is satisfied that the potential for invasive species to be transferred via hull fouling is being minimized.

Significance evaluation: adverse effects from vessel strikes on marine fish

	Criteria	Rating	Description
Project effects	Temporal extent	Long term	Effects could occur for the duration of operations.
	Reversibility	Reversible to permanent	At the individual level a vessel strike could range in severity from injury (reversible) to death (permanent). At the population level, effects would likely be reversible unless the population was small and could be permanently affected by one individual loss. This might be the case for Basking shark and Leatherback sea turtle, and although there is some uncertainty given that strikes are not always detected or reported, this is expected to be a low probability event.
	Geographic extent	Local to Regional Study Area	A strike would occur in the shipping lane where the vessel is present, although in the unlikely case of a population level effect, effects could extend to the range of the population.
	Magnitude	Low to High	Magnitude would depend upon the severity of the injury and the relative impact at the population level. Although unlikely, mortality of an individual of a low-population SARA-listed endangered species could be of high magnitude.
Recommendation	Not likely to cause significant adverse environmental effects.		

Significance evaluation: cumulative effects on marine fish

Cumulative effects	<p>Despite some uncertainties, the above effects of Project-related marine shipping on fish (i.e., wake effects, underwater noise, introduction of invasive species, and vessel strikes) in combination are not likely to cause significant adverse environmental effects, given each is of low magnitude or (in the case of a high magnitude strike) of low probability.</p> <p>There are, however, substantial existing cumulative effects from other sources on some species, ranging from inland degradation of spawning habitat, to bycatch, to global processes such as climate change and ocean warming. Some species are, as a result, at-risk and listed under the SARA. Nevertheless, the contribution to such cumulative effects by Project-related marine vessels is likely to be inconsequential.</p>
Recommendation	Not likely to cause significant adverse environmental effects.

14.7.4 Marine birds

In both the OH-001-2014 and MH-052-2018 hearings, participants, including Indigenous communities, outlined concerns related to effects on marine birds, and marine bird species at risk, from Project-related marine shipping including sensory disturbance from noise and vessel presence and mortality risk from collisions with Project-related marine vessels. Participants also raised concerns about effects of large and chronic spills on marine birds, including species at risk. Effects of accidents and malfunctions on marine birds is outlined in Section 14.8.1.

Several participants, including BC Nature and Nature Canada, NS NOPE, Cowichan Tribes and the District of North Vancouver, noted the importance of the southern coast of B.C. and in particular, Burrard Inlet and the Fraser River Estuary, to marine birds during winter, and during fall and spring migration.

In the OH-001-2014 hearing, Trans Mountain said the RSA encompasses many marine bird breeding and staging areas that are in close proximity to the shipping lanes. Trans Mountain noted that out of a total of 124 marine bird species in the RSA, 19 species of waterfowl and coastal seabirds of conservation concern have been identified as potentially occurring within the RSA. Table 29 lists the species that are listed under Schedule 1 of the SARA, with the addition of Western grebe and Horned grebe (western population): two species which have been listed under Schedule 1 of the SARA since the OH-001-2014 hearing.

Table 29: Marine bird species at risk potentially affected by Project-related increase in marine vessel traffic

Species	Status
Marbled murrelet	Threatened
Pink footed shearwater	Threatened
Red knot (<i>roselaari</i> type)	Threatened
Short-tailed albatross	Threatened
Ancient murrelet	Special concern
Black-footed albatross	Special concern
Great blue heron	Special concern
Long-billed curlew	Special concern
Western grebe	Special concern
Horned grebe	Special concern

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Newly listed marine bird species at risk

Trans Mountain and BC Nature noted that, since the issuance of the OH-001-2014 Report, Western grebe and Horned grebe (western population) have been listed as Special Concern under Schedule 1 of the SARA (as noted in the updated Table 29) and have the potential to be affected by Project-related marine shipping. Trans Mountain said that there are no species-specific Recovery Strategies, Action Plans or Management Plans for either species; however, both are included in the Multi-Species Action Plan for Gulf Islands National Park Reserve of Canada.

Trans Mountain said that effects on Western grebe and Horned grebe (western population) from Project-related marine shipping are the same as was assessed for marine birds, including marine bird species at risk, in the OH-001-2014 hearing, such as sensory disturbance, and injury or mortality events.

ECCC and BC Nature said that Barn swallow and Bank swallow are likely to be affected by the Project and have been listed under Schedule 1 of the SARA as Threatened since the OH-001-2014 hearing. ECCC also said that Common nighthawk was listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Special Concern in March 2018 from its COSEWIC listing of Threatened in 2015. ECCC noted that Common nighthawk's SARA Schedule 1 listing of Threatened remains unchanged. Parks Canada listed a number of non-aquatic bird species that are known to occur in the Gulf Islands National Park Reserve or Pacific Rim National Park.

Trans Mountain said that it does not predict adverse environmental effects related to mortality risk or sensory disturbance in relation to Project-related marine shipping transportation for Common nighthawk, Bank swallow, or Barn swallow, or other non-aquatic birds identified, because those species are not marine species.

New Recovery Strategies and Management Plans for SARA-listed marine birds

ECCC and BC Nature both stated that, since the OH-001-2014 hearing, Management Plans have been finalized for each of Ancient murrelet, Black-footed albatross, Peregrine falcon, and Great blue heron. ECCC and BC Nature also noted that Recovery Strategies have been finalized for each of Common nighthawk and Red knot since 2015. ECCC provided Recovery Strategies for each of Marbled murrelet, Pink-footed shearwater, Short-tailed albatross, and Red knot, and provided a Management Plan for each of Ancient murrelet, Black-footed albatross, Great blue heron, and Long-billed curlew.

ECCC said that Management Plans for Western grebe, and Horned grebe (western population) and Recovery Strategies for Barn swallow and Bank swallow are currently being prepared. In addition, draft Marine Critical Habitat for Marbled murrelet is being developed for the Salish Sea.

The Wilderness Committee, Barkley Sound Stewardship Alliance (BSSA), and NS NOPE refer to critical habitat of marine bird species, or habitat of critical importance in the area potentially affected by Project-related marine shipping.

Trans Mountain noted that no critical habitat has been identified in either a Recovery Strategy or Action Plan for SARA-listed marine bird species.

Marine bird effects assessment methodology

In its evidence, NS NOPE provided an expert report by Hartley and Hansen that asserted Trans Mountain did not address the unique risk to marine birds, including species at risk, presented by increased shipping in the Central Harbour of Burrard Inlet. Marine bird SARA-listed species noted by the expert report as located in Central Harbour include Great blue heron, Horned grebe, Long-billed curlew, Marbled murrelet, and Western grebe. The expert report stated that, since vessel traffic through the Central Harbour is at a relatively low frequency, Project-related shipping is an entirely new environmental effect in that area.

Trans Mountain replied that it conducted a full assessment of potential effects of Project-related shipping on marine birds and concluded that there would likely be residual effects but that such effects will not be significant.

Overview of effects of Project-related marine shipping operations on marine birds

ECCC said that vessel traffic is recognized as a low, current, and continuous threat that is increasing for Marbled murrelet, that the species' Recovery Strategy specifically identifies the Salish Sea as an area of particular concern, and that reduction of vessel-induced effects is in line with existing Recovery Strategies. ECCC said that the Recovery Strategy for Marbled murrelet recommends establishing information on the extent and magnitude of marine threats, including vessel traffic, that contribute to mortality of that species, as a strategic direction for recovery.

To address threats of marine industrial activity to Short-tailed albatross and Pink-footed shearwater, ECCC suggested supporting research on basic knowledge gaps on species distribution, assessing potential species' impacts as part of

environmental assessment processes, undertaking research to identify areas of habitat use by the species in Canada, and developing tools to explain to vessel operators the conservation issues facing the species. ECCC stated that the COSEWIC status report for Western grebe identifies the extent of human caused disturbance within the species' winter habitat (including the Fraser River Delta and Burrard Inlet) as an information gap.

As in the OH-001-2014 hearing, concerns were raised by various participants regarding effects of a Project-related increase in marine vessel traffic on marine birds, including injury and mortality and sensory disturbance. ECCC said that there is incomplete knowledge regarding population level-impacts to marine birds from routine shipping operations, and as such there is a high degree of uncertainty with regard to potential Project-related impacts and the effectiveness of mitigation measures is challenging to assess.

Trans Mountain considered the potential merits of light reduction, vessel speed and noise reductions, and the avoidance of high density use areas by marine birds, in terms of reducing potential adverse effects of Project-related marine shipping on marine birds.

Trans Mountain said that it believes that any mitigation or monitoring programs to address Project-related sensory disturbance and mortality risk (i.e., collisions) would need to be government led and applied industry

Injury and mortality

Trans Mountain noted that marine bird collisions with Project-related marine vessels are sporadic events that are highly dependent on location, weather and season. It said that vessel strikes are mostly due to attraction to light by nocturnally-foraging species that are naturally attracted to light as they feed on bioluminescent prey.

Trans Mountain said that species potentially sensitive to light (albatross, petrels, auks, murrees, and puffins) are generally in low number in the RSA relative to their overall populations. It said that given the relatively small number of individuals reported in the RSA and the fact that light attraction does not necessarily result in mortality, it is unlikely that a population level effect would result.

B.C. Nature and Nature Canada asked if Trans Mountain would include a low-lighting protocol as a condition of contracting with tankers, tugs and any other vessels associated with the Project. Trans Mountain said that it would explore options for reducing lighting on Project-related vessels, to the extent that it is feasible with respect to safety and industry regulations.

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Mitigation measures

In the MH-052-2018 hearing, participants including ECCC, Mr. R. MacVicar, and NS NOPE raised concerns about lighting and the resultant risk of mortality from marine birds colliding with Project-related marine vessels, similar to concerns raised in the OH-001-2014 hearing. Participants noted the need for light reduction to mitigate bird attraction and mortality from collisions with vessels. Trans Mountain considered the feasibility of timing of vessel transits to reduce effects on marine birds.

Light reduction

ECCC said that light reduction measures are in line with SARA recovery documents to reduce mortality of species at risk for which light pollution is a threat. ECCC noted that measures such as the use of the minimum intensity lighting, light shielding, use of LED lighting rather than incandescent lighting, and reduction of light use during inclement/foggy weather can help minimize the risk of migratory bird mortality due to human-induced light.

Regarding the technical feasibility of the light reduction measures proposed by ECCC, Transport Canada said ships' lighting is regulated by the Collision Regulations of CSA 2001. The regulations stipulate the number, placement and colour of lights as well as requirements for the distance from which these lights must be visible. Transport Canada said that vessels of the size that would be used for the Project are also required to illuminate their decks while in anchor.

Transport Canada noted that Chamber of Shipping of BC and Vancouver Fraser Port Authority have industry guidelines for vessels at anchor that encourage that deck lights be kept at a minimum consistent with the safety and security of the vessel, and that the deck lights are projected down onto the deck. However, Transport Canada noted that navigation light requirements must be in place as per the Collision Regulations and cannot be replaced with a non-compliant light. Transport Canada also noted that when a vessel 100 metres and more in length is at anchor, it is required to also use the available lights to illuminate its deck.

NS NOPE said that Trans Mountain (with the Port/Transport Canada) should be required to implement a program to safely reduce the use of moored vessel lighting in Burrard Inlet. NS NOPE also suggested that the regional cumulative effects management plan to be developed by the GIC (Recommendation 1) should also include new regulations for vessel lighting

and noise on moored ships and shipping traffic to mitigate risk to birds and other organisms. Trans Mountain said that Transport Canada and the Canadian Coast Guard would be best placed to create a mechanism (e.g., regulation, policy, guidelines) for vessel operators to avoid or reduce unnecessary lighting. Based on the measures provided by ECCC, it would likely be well placed to support Transport Canada and the Canadian Coast Guard.

The Vancouver Fraser Port Authority suggested that Trans Mountain's Vessel Acceptance Standard could be modified to require lighting management while at sea to minimize the risk of strikes by marine birds. In response to the Vancouver Fraser Port Authority, Trans Mountain noted it does not have the authority to enforce vessel operations once the vessel has left Westridge Marine Terminal. Trans Mountain said its Vessel Acceptance Standards already exceeds regulatory requirements and there are certain items in the Vessel Acceptance Standards, such as requiring use of deck lights to be kept to a minimum, consistent with safety and operational requirements that could be considered as operating best practices that are not typically implemented elsewhere. Trans Mountain said it will continue to work with the shippers' marine sub-committee to promote high technical and operating standards for vessels they charter to call at Westridge Marine Terminal.

BC Nature said that, even though ECCC presents mitigation practices to reduce effect on marine birds from Project-related lights, Trans Mountain did not propose mitigation because vessel lighting for safe navigation is unavoidable.

Trans Mountain said that it does not have direct control over lighting on vessels calling at the Westridge Marine Terminal because those vessels are operated by third parties and are regulated through the CSA 2001. As part of implementing Trans Mountain's Light Emissions Management Plan, however, Trans Mountain will request vessel operators to reduce the amount of exterior deck lighting wherever possible.

Sensory disturbance

Trans Mountain said that marine birds could alter their normal movement patterns to avoid sensory disturbances in the LSA associated with Project-related marine traffic. It also said that birds could avoid preferred sites within the LSA because of atmospheric and underwater noise during vessel operations. Trans Mountain said that the magnitude of effect varies by species and setting, as well as from the type and frequency of disturbance.

Trans Mountain said that existing atmospheric sound in the vicinity of the marine shipping lanes is a combination of natural and man-made sound, and no changes to the type or intensity of sound generated are expected as a result of the Project. It said that the only change expected is the number of pass-by occurrences from the increase in tanker traffic, which is expected to be, on average, one laden tanker and one empty tanker daily. Trans Mountain said that vessels associated with the Project represent a small portion of the total vessel traffic in the RSA.

Trans Mountain said that given there is already substantial amount of marine vessel traffic in the LSA and RSA, birds have likely become habituated to noise, and there is no evidence to suggest that the increase in Project-related marine vessel traffic could result in population level cumulative effects. Trans Mountain noted that intolerant marine birds would be displaced by marine traffic, so birds that continue to use this habitat have adjusted to accept this disturbance. Trans Mountain said that proving habituation is difficult in most cases, but especially so at sea where adequate baseline data are scarce. It said that, based on the reasonable assumption that habituation occurs, the cumulative effect on marine birds has been reduced relative to what it would be without habituation.

ECCC said that the continued presence of marine birds in the LSA and RSA where they are currently exposed to vessel traffic and industrial activity does not mean that they would continue to acclimate to increases in vessel traffic and industrial activity as a result of the proposed Project. It said that the response of marine birds can be expected to vary with volume and frequency of vessel traffic and industrial activity to such a point where birds abandon the area.

Trans Mountain said that it did not propose mitigation for Project-related marine vessel effects on marine birds from sensory disturbance or mortality because Project-related marine vessels would be operated by third parties acting under relevant shipping and piloting laws and regulations. It said that since it has little direct control over the actions of vessel owners and operators, mitigation is considered to include existing regulations and shipping standards that are monitored by several federal and international authorities. Trans Mountain said it expects that, through its tanker acceptance process, Project-related vessels would be maintained and operated to high industry standards. For example, all Project-related vessels would be fitted with exhaust silencers.

The Board requested a species-specific assessment for all SARA-listed marine birds from Project-related marine transportation, which included a request for species-specific mitigation. For each species, Trans Mountain recommended that no mitigation measure be implemented for effects on marine birds from Project-related marine vessels. Trans Mountain said that Project-related marine vessels will be operated by third-party subcontracting corporations acting under relevant shipping and piloting authorities, and that marine transportation in Canadian territorial waters is regulated through the CSA 2001 administered by Transport Canada and the Canadian Coast Guard.

ECCC recommended that certificate conditions include an Avian Monitoring Plan to assess the effectiveness of proposed mitigation measures to avoid harm (incidental take) to migratory birds that could arise from activities related to marine

transportation, or any other lighting sources. It said that this plan should include monitoring aboard tankers during shipping to assess the effectiveness of mitigation measures in avoiding incidental take through collisions and to identify the need for additional mitigation measures.

In response to ECCC's recommendation, Trans Mountain said that although it is not the owner or operator of tankers and cannot commit operators of Project-related vessels to report marine bird strikes/collisions with vessels in transit, it would include a section on marine birds in its Port and Terminal Book. Trans Mountain said the Port and Terminal Book would be submitted to the TERMPOL Review Committee a minimum of six months prior to commencement of operation, and would include a request for vessel operators to report any bird strikes/collisions to Marine Communication and Traffic Services.

Trans Mountain said that a bird strike notification system would be best developed by federal departments responsible for protecting the marine environment, such as ECCC.

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In the MH-052-2018 hearing, ECCC stated that several SARA recovery documents, including those for Marbled murrelet and Red knot, indicate that boat traffic can disturb species at risk on their marine foraging grounds. ECCC said that, in particular, the Recovery Strategy for Marbled murrelet states that the species is easily disturbed by the passage of boats, highlights speed as a factor in the degree of disturbance, and notes that already high levels of traffic along commercial shipping routes as a threat.

ECCC also said that, depending on the sensitivity of response, marine birds, including species at risk, may be temporarily or permanently displaced from breeding, foraging, staging, or roosting habitats due to underwater noise.

ECCC said that, currently, neither the Province of British Columbia nor the Government of Canada has prescribed sound level criteria for assessing injury or behavioural responses of marine birds to underwater noise sources. ECCC suggested that Trans Mountain (alone or in partnership with others) conduct surveys on the presence, abundance, and distribution of marine birds within the area of Project-related marine shipping and conduct acoustic modelling to characterize the potential for interaction with Project-related vessel activities contributing to underwater noise.

Trans Mountain responded that ECCC would be best placed to conduct acoustic modelling and surveys within the area of Project-related marine shipping. Trans Mountain noted that acoustic modelling would likely be misdirected if focused only on Project-related vessel traffic, as birds would not likely exhibit unique responses to Project-related vessels compared to other vessels with similar characteristics (e.g., size, design, and transit speed). Trans Mountain said it would consider any invitation from ECCC (or their partners) to support these undertakings in a meaningful way.

ECCC suggested adherence to the Government of Canada's Guidelines to Avoid Disturbance to Seabird and Waterbird Colonies in Canada as an example of measures it considered to be technically feasible to avoid or reduce effects on marine birds.

Mitigation measures

Vessel design and maintenance procedures

Trans Mountain noted that possible regional mitigation measures requiring government and/or industry leadership for further investigation and implementation with support or participation from Trans Mountain, include vessel design and maintenance procedures to reduce underwater noise production. Trans Mountain said that responsible parties for this mitigation would be the shipping industry, ECHO, and itself. Mr. R MacVicar also noted that tanker design and better prop screw design could reduce underwater noise.

Vessel speed

ECCC suggested measures such as reducing vessel transit speeds to the extent feasible, consistent with recommendations that would support other marine wildlife expected to interact with Project vessels (e.g., whales). ECCC also suggested adhering to speed restrictions that may be established by Transport Canada or the Vancouver Fraser Port Authority, and adhering to any Project-specific Operational Management Plans, a Noise Management Plan, and/or a Marine Activities Plan that includes feasible measures to reduce vessel volumes and/or vessel speeds, which may be developed by Trans Mountain. ECCC said that reduction in vessel speed, if feasible, is in line with recovery documents for marine bird species at risk.

Trans Mountain also noted that possible regional mitigation measures requiring government and/or industry leadership for further investigation and implementation with support or participation from Trans Mountain include vessel speed restrictions.

Trans Mountain said that a reduction in vessel speed might change the response of some birds from a more energetic to a less energetic one, but regardless of vessel speed, marine birds in the path of an oncoming vessel will need to avoid the respective vessel. Trans Mountain, however, noted that slower vessel transit speeds would mean that the vessel is present at a given location longer, potentially extending the duration that an area of the marine environment would be unusable to marine birds.

Transport Canada said that prior to implementing speed reduction, the risks to navigation and safety would need to be considered to determine safe speeds within the geographic region, and challenging navigational conditions and the impact of weather would make effective implementation difficult, depending on speeds considered. Transport Canada noted that imposing a speed restriction specific to Project-related marine vessels would introduce further complexity due to safety issues caused by vessels travelling at different speeds in the same area where some vessels would not be free to increase or decrease speed based on the situation faced during a given transit.

Forage fish habitat enhancement

NS NOPE said the Board should require that Trans Mountain help mitigate the effects of disturbance from ship movement in Burrard Inlet by committing money to habitat enhancement for forage fish in Burrard Inlet (restore food supply for birds to compensate for energy spent flying away from ships). Trans Mountain stated that it made a \$50,000 contribution to the Pacific Salmon Foundation (PSF) in November 2014 to be used for salmon habitat restoration in Burrard Inlet. In 2017, Trans Mountain said it signed a Memorandum of Understanding with PSF for terrestrial and marine multi-year programs. The agreement committed up to \$3 million in funding to support grants to community groups for salmon conservation, coastal research as a part of the Salish Sea Marine Survival Program and Strategic Salmon Health Initiative.]

Application of marine bird mitigation to apply to all marine shipping

BC Nature said that Trans Mountain's argument that potential mitigation strategies would need to be universally adopted across all shipping for it to be effective, is made without supporting evidence and its scientific validity is questionable. BC Nature stated that actions that result in decreased mortality in species at risk or species with declining populations are likely to help conserve those species.

Marine bird monitoring

ECCC said that since there is limited information on the impacts to marine birds from vessel noise and other disturbances (e.g., lighting), monitoring stemming from an Avian Monitoring Plan coupled with adaptive management, could serve to improve the understanding of these impacts to marine bird species, including those federally designated as species at risk listed under the SARA. ECCC also said that monitoring for sensory disturbance with adaptive management measures where appropriate, are in line with recovery documents for marine bird species at risk. As in the OH-001-2014 hearing, ECCC continued to recommend that Trans Mountain develop the Avian Monitoring Plan, in consultation with ECCC, other relevant federal departments/agencies, the provincial government, and Indigenous communities.

NS NOPE proposed that the Avian Monitoring Plan be a separate condition of the certificate to monitor the actual effects of shipping on Marine birds in Burrard Inlet and along the entire shipping route.

Trans Mountain also noted use of vessel-based marine bird mortality and sensory disturbance monitoring. Trans Mountain said that for monitoring to be meaningful at the Project and cumulative scales, a government-led program supported by industry could be tenable. Trans Mountain said the program could initially be constrained to large vessels (e.g., cruise ships, bulk and cargo vessels, tankers and ferries), and be expanded to include smaller vessels if necessary. Trans Mountain did note, however, that there is likely no technically or economically feasible mitigation that could be implemented to mitigate observed effects. However, Trans Mountain said that, while it may be possible to obtain a relative measure of marine bird mortality across the shipping industry, mitigating an identified effect may be technically and economically impractical.

Trans Mountain identified two specific potential monitoring programs that could be government-led with financial support coming from vessel operators, that could provide some insight into the effects of marine transportation on marine birds: onboard marine bird monitoring during vessel transit along the shipping lanes; and use of satellite (i.e., GPS) or radio (i.e., Motus Wildlife Tracking System) transmitters to track real-time movement of individual birds in relation to the positions of vessels. However, Trans Mountain noted issues with the feasibility of each of onboard monitoring or use of transmitters.

Trans Mountain also noted that potential confounding, biasing, or limiting factors that could affect the results of such a study would be: other marine traffic, time of day or year in relation to species presence and being able to do the survey, and weather (i.e., fog or rain can impact viewing distance and species identification). Ship orientation relative to the sun's position could also affect the ability to detect birds, and might affect bird responses to approaching vessels.

Trans Mountain said that the use of satellite or radio transmitters to track real-time movements of individual birds in relation to the positions of vessels is technically, and probably economically, feasible, but the program itself would likely

cause stress to individual birds through capture and handling, and some birds may accidentally die or be more susceptible to predation because of capture or from having a tracker attached. In addition, to keep data 'fresh', new birds would need to be captured and tagged annually to account for bird movements out of the marine bird RSA and for loss over time (e.g., lost transmitters; bird mortality). Trans Mountain said that, for the Motus Wildlife Tracking System to work, infrastructure would need to be put in place so that the marine bird RSA, or at least an "area of interest," is adequately covered. A highly coordinated system of the spatial and temporal whereabouts of vessels and tracked birds would be needed to effectively assess potential sensory disturbance from vessel traffic.

ECCC stated that, with respect to onboard marine monitoring and the use of transmitters, it is of the perspective that both measures would be technically feasible, but the MOTUS and satellite transmitters are not likely to collect information on a fine enough scale to detect impacts from sensory disturbance related to marine shipping.

ECCC noted that it and other organizations administer a variety of monitoring and research programs related to marine bird sensitivities in the south coast region including surveys ECCC said that its current monitoring activities focus on tracking populations (e.g., generating population estimates, identifying bird use of important habitats or generating population trend estimates for migratory bird species and some SARA-listed Migratory Birds). ECCC said it was engaged in migratory bird inventory work and the results of past regional migratory bird inventories are available in ECCC technical reports. ECCC stated that it currently allocates approximately \$200,000 annually to marine bird research and monitoring programs in the Project area.

Trans Mountain said that it is committed to exploring ways to help collect monitoring data in cooperation with local communities, Indigenous groups, regulatory authorities, common marine users, and other stakeholders. Trans Mountain said that it would support an industry-wide marine bird monitoring program led, coordinated, financed (with industry support), and overseen for technical and scientific merit, by government agencies. Depending on the type of monitoring program adopted, and of the specific details required for implementation, Trans Mountain could provide support that might include, but not be limited to, financial support, technical expertise, and direct participation. Trans Mountain said that it remains interested in contributing if collaboration is through the OPP, managed by ECCC and/or TC, and with an emphasis on baseline monitoring on B.C.'s southern coast. Trans Mountain said it envisions that its contribution to the OPP would be directly linked to establishing and growing the capacity of a local group by providing a means for them to undertake a regional marine bird baseline monitoring program.

Views of the Reconsideration Panel

Trans Mountain and intervenors have filed conflicting evidence about the level of habituation that may occur with marine birds, including marine bird species at risk. The Board is of the view that habituation is species and context dependent. It is reasonable to expect that where marine birds have not already been displaced from busy marine waters that some level of habituation has occurred.

Newly listed marine bird species and marine critical habitat

The Board notes that Western grebe and Horned grebe (western population) have been listed under Schedule 1 of the SARA since the OH-001-2014 hearing and have the potential to be affected by Project-related marine shipping. Barn swallow and Bank swallow have been listed under Schedule 1 of the SARA as Threatened since the OH-001-2014 hearing, and Common nighthawk has been down-listed from Threatened to Special Concern by COSEWIC. While the Board considers effects of Project-related marine traffic on the grebe species, it is of the view that terrestrial species such as Barn swallow, Bank swallow, and Common nighthawk would not be affected by Project-related marine vessels, as these are not marine species.

The Board also notes that, despite reference to marine bird critical habitat by each of Wilderness Committee, Barkley Sound Stewardship Alliance (BSSA), and NS NOPE, no critical habitat has been identified for SARA-listed marine bird species potentially affected by Project-related marine shipping.

Marine bird effects assessment methodology

The Board gives low weight to the expert report from NS NOPE. The Board is of the view that, given there is currently shipping traffic from the existing Westridge Marine Terminal, shipping is not a new environmental effect in the Central Harbour. The Board finds that the species at risk found in Central Harbour, according to NS NOPE, are the same species for which Trans Mountain provided assessments on the effects of marine shipping, and whose location is not exclusive to the Central Harbour. The Board is of the view that Trans Mountain's assessment of Project-related marine shipping on marine birds in Burrard Inlet, including Central Harbour, is adequate, as it is consistent with the Board's filing requirements.

Mitigation measures for injury and mortality risk and sensory disturbance

ECCC, NS NOPE, and the Vancouver Fraser Port Authority proposed mitigation measures such as marine vessel light reduction, to mitigate or avoid effects of Project-related marine traffic on marine birds, including species at risk. The Board does not agree with BC Nature's and NS NOPE's assertion that Trans Mountain did not propose mitigation to reduce or avoid effects on marine birds.

The Board agrees with Trans Mountain that it has little direct control over vessels that are not at the WMT, and acknowledges the mitigation Trans Mountain has included in its WMT Emissions Management Plan, including a commitment to request that vessel operators reduce the amount of exterior deck lighting wherever possible after departing from the WMT.

Also with respect to lighting, the Chamber of Shipping of BC and the Vancouver Fraser Port Authority recommended industry guidelines on reducing lighting. NS NOPE requested that the regional cumulative effects management plan to be developed pursuant to Recommendation 1 to the GIC should also include new regulations for vessel lighting. It further requested conditions be applied requiring the reduction of moored vessel lighting. Transport Canada submitted that adequate navigation light is required under the *Collision Regulations of the Canada Shipping Act, 2001*. The Board is of the view that safe navigation is the first priority and finds that lighting reductions may only be applied as a mitigation measure if navigational safety concerns are addressed in a manner that is consistent with the *Collision Regulations of the Canada Shipping Act, 2001*.

ECCC and Trans Mountain both proposed speed reduction as a possible measure to mitigate effects of Project-related marine shipping on marine birds, including species at risk. Given the risk to navigation and safety that Transport Canada noted would come with a potential reduction in speed, especially if applied only to Project-related vessels, the Board finds that speed reduction could only be applied as a mitigation measure, if public safety concerns are addressed.

NS NOPE requested a condition requiring Trans Mountain to commit money to habitat enhancement for forage fish. This would provide a food supply for birds to compensate for energy spent flying away from ships in Burrard Inlet. The Board notes that Trans Mountain already funds habitat enhancement for fish in Burrard Inlet and finds that Trans Mountain's funding for habitat enhancement for fish in Burrard Inlet is sufficient.

Marine bird monitoring

In the OH-001-2014 hearing, ECCC recommended a condition for Trans Mountain to implement an Avian Monitoring Plan to assess effectiveness of mitigation measures proposed by it to reduce effects of Project-related marine vessel traffic on marine birds. The Board is of the view that given Trans Mountain would not own or operate the tankers that are related to the Project, and has limited control beyond WMT, such a condition would be inappropriate to impose on Trans Mountain. Trans Mountain did commit to requesting that vessel operators report any bird strikes to the Marine Communication and Traffic Services through its Port and Terminal Book. The Board agrees that federal departments, such as ECCC, may be best able to develop a marine bird strike notification system for all vessels.

During the MH-052-2018 hearing, the Board heard that there is uncertainty as to effects of marine traffic on marine birds at the population level and uncertainty as to what mitigation measures may indeed be technically and economically feasible. Given this uncertainty, the Board is of the view that a marine bird monitoring and protection program, if implemented, would allow a better understanding of impacts of vessel use within the Salish Sea on marine bird populations, including species at risk, and would inform implementation of mitigation measures through adaptive management, if warranted by the monitoring results.

While some Parties, including BC Nature, disagreed with Trans Mountain's argument that potential mitigation strategies would need to be universally adopted across all shipping for it to be effective, the Board is of the view that, since Project-related marine tankers are only a small fraction of the total vessels in the region, to be effective, a monitoring plan should apply more broadly.

ECCC and other organizations administer a variety of monitoring and research programs related to marine bird sensitivities in the south coast region including surveys, and ECCC allocates an annual budget toward marine bird research and monitoring programs in the Project area. As well, Trans Mountain has committed to explore ways to help collect monitoring data in cooperation with regulatory authorities and others. The Board is of the view that, given monitoring and research programs in which ECCC is already involved, that the Government of Canada is best placed to develop and implement a marine bird monitoring and protection program, with support of industry including Trans Mountain. The Board is of the view that this program, and any associated mitigation that follows from monitoring results, should ultimately extend to all marine shipping vessels in Salish Sea.

The Board therefore sets out Recommendation 3 to the GIC regarding the implementation of a marine bird monitoring and protection program for the Salish Sea.

The Board is of view that Project-related marine shipping effects (mortality and sensory disturbance) on marine birds are expected to be long-term and would vary in spatial extent from the Local Study Area to the Regional Study Area. However, effects are expected to be reversible at the population level, and of low magnitude and that population-level effects uncertain. Similarly, the contribution from Project-related marine vessels to total cumulative effects on marine birds from Project-related marine shipping is expected to be of long-term duration, reversible in the long term, and of low magnitude.

Taking the evidence from Parties into account, the Board's significance findings under the CEAA 2012 for Project-related marine traffic on marine birds, including species at risk, are as follows:

Significance evaluation: adverse effects on marine birds

	Criteria	Rating	Description
Project effects	Temporal extent	Long term	Sensory disturbance is likely to occur intermittently for the duration of operations of Project-related marine vessel traffic. The risk of a marine bird-vessel strike would exist for the duration of operations of Project-related marine vessel traffic.
	Reversibility	Reversible	With regard to sensory disturbance, it is reasonable to expect that where marine birds that have not already been displaced from busy marine waters, that some level of habituation has occurred. Population-level effects on marine birds from Project-related marine shipping are uncertain.
	Geographic extent	LSA to RSA	The effects associated with Project-related marine vessels could impact numerous species of marine birds found within the LSA and RSA.
	Magnitude	Low	Species of marine birds potentially sensitive to light (and therefore susceptible to collisions with Project-related vessels) are generally in low number in the RSA in relation to their overall populations. Strikes due to light attraction do not necessarily result in mortality. Regarding sensory disturbance, the Board is of the view that habituation is species and context dependent, and that it is reasonable to expect that where marine birds that have not already been displaced from busy marine waters, that some level of habituation to disturbance has occurred. Population-level effects on marine birds from Project-related marine shipping are uncertain.
Cumulative effects	Similar to the rationale above, the contribution from Project-related marine vessels to total cumulative effects on marine birds is expected to be of long-term duration, reversible in the long term, and of low magnitude.		
Recommendation	Not likely to result in significant adverse environmental effects.		

14.7.5 National Marine Conservation Areas/Marine Protected Areas

This section provides a discussion on marine park reserves, historic site, conservation areas under Parks Canada Agency's and DFO's responsibilities in the areas of Project-related marine shipping, and potential mitigation and monitoring measures to avoid, reduce, and/or offset the impacts of Project-related marine shipping on marine and shoreline ecosystem components.

Proposed Southern Strait of Georgia National Marine Conservation Area Reserve (SSG NMCAR)

Trans Mountain said that the SSG NMCAR has been proposed and would protect much of the Salish Sea used by a diversity of birds, marine mammals, and fish (Figure 28). Parks Canada said that approximately 108 km² of the proposed shipping route goes through the proposed SSG NMCAR as it goes parallel to Galiano and Mayne Islands and around Tumbo, Saturna, and Pender Islands as it goes through Boundary Pass and parallel to Sidney and D'Arcy Islands as it crosses through Haro Strait.

Parks Canada said that Canada and the Province of British Columbia signed a Memorandum of Understanding in October 2003, that committed the two governments to assess the feasibility of a national marine conservation area reserve in the southern Strait of Georgia, and a proposed boundary for a national marine conservation area reserve in the southern Strait of Georgia was announced on 13 October 2011. It said that a feasibility assessment study on the proposed SSG NMCAR was launched in 2004. It has included dialogue with Indigenous groups and consultations with key stakeholders, communities and the public. As part of the consultation process, Parks Canada hosted 35 public consultations, and over 300 meetings and presentations have taken place.

It said that for the purposes of the marine transportation assessment, it considered planning documents that were relevant to the Project, including Parks Canada's feasibility study for the Proposed SSG NMCAR.

Parks Canada said that the *Canada National Marine Conservation Areas Act* (CNMCAA) is the federal law that establishes National Marine Conservation Areas (NMCA). It said that NMCAs are marine areas that are managed to protect and conserve representative marine ecosystems while ensuring the ecologically sustainable use of marine resources.

Parks Canada said that Southern resident killer whale (SRKW) critical habitat has been identified within the boundaries of the proposed SSG NMCAR; however, these waters are not currently being managed by Parks Canada. The establishment of the SSG NMCAR would, however, make the Minister responsible for the Parks Canada Agency the "competent minister" under the SARA with respect to the individuals of listed species in the SSG NMCAR.

Parks Canada said that it has consulted the federal family, and will continue to work closely with Transport Canada to analyze regulatory options related to marine shipping in NMCAs, as Transport Canada remains the federal authority regulating marine shipping under the CNMCAA. Regulations specific to marine shipping under the CNMCAA would be considered only if there is a gap that cannot be filled using existing Transport Canada legislation and regulations.

Gulf Islands National Park Reserve (GINPR)

Parks Canada said that portions of the proposed shipping route is adjacent to GINPR as it goes through Boundary Pass and Haro Strait, and the entirety of GINPR is within the Marine Transportation Assessment Regional Study Area.

Pacific Rim National Park Reserve (PRNPR)

Parks Canada said that the southern section of the West Coast Trail unit from approximately Nitnat Lake (Clo-oose) to Port San Juan (Port Renfrew) is encompassed in the Marine Transportation Assessment Regional Study Area.

Fort Rodd Hill National Historic Site

Parks Canada said that Fort Rodd Hill is a National Historic Site, and the waters directly adjacent to Fort Rodd Hill is encompassed in the Marine Transportation Assessment Regional Study Area as indicated in the Project's Marine Transportation Assessment.

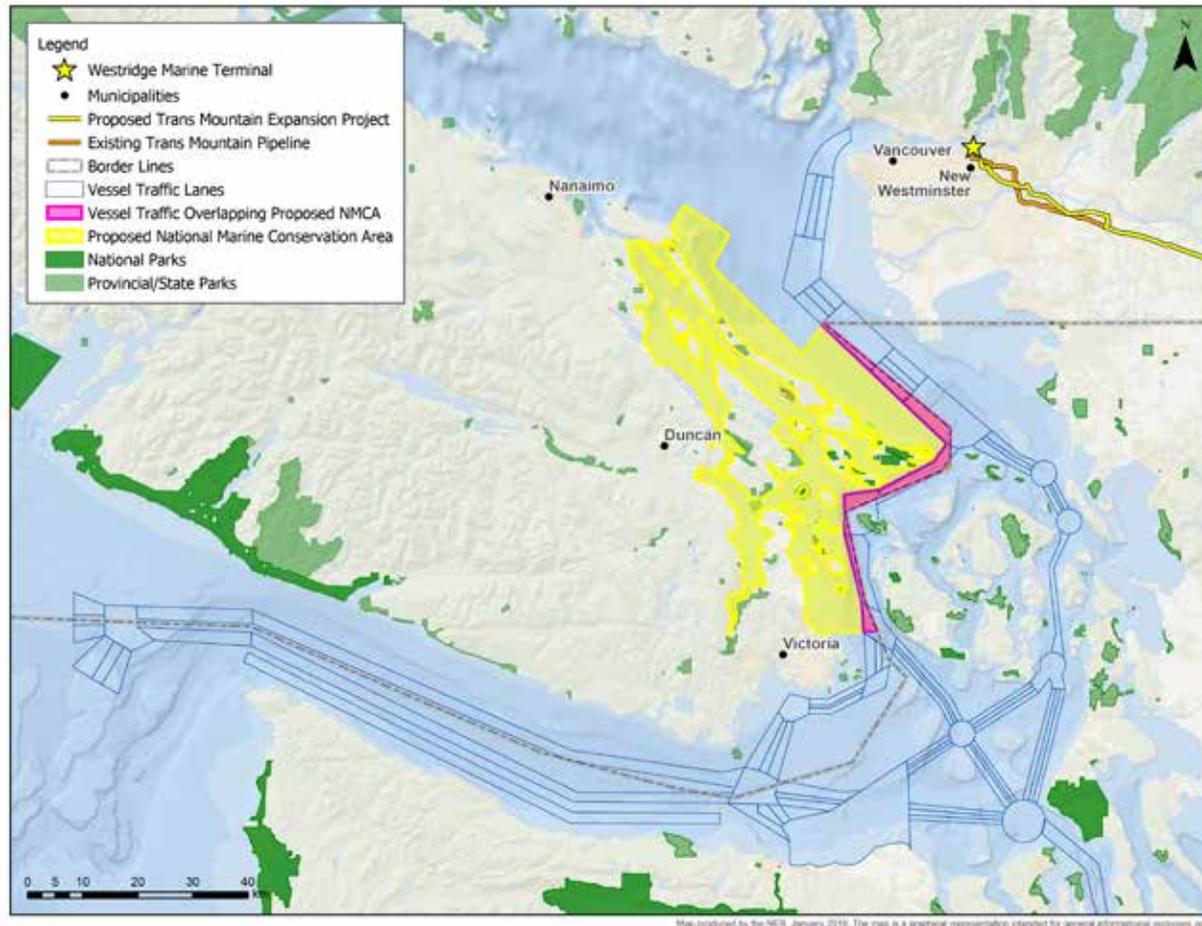
Marine Protected Areas and Ecological Reserves

DFO said that there are currently no Marine Protected Areas (MPAs) in the Marine Regional Study Area (RSA).

Pender Oceans Defenders said that the Federal and Provincial Governments have been working toward the development of a Marine Protected Area in the Haro Strait — Boundary Pass area and beyond to promote sustainability of the marine environment and the economy that depends on that environment. It urged the Board to recommend the completion of a Marine Protected Area as a necessary pre-condition for further consideration of any expansion of existing tanker traffic.

Board of Friends of Ecological Reserves said Race Rocks Ecological Reserves has been considered for over two decades to be worthy of status as a marine protected area. It said that the Province of B.C. knew the values at Race Rocks decades ago when it received ER status. It said that there has been interest in adding additional protection to Race Rocks by the Federal government but after two decades of talk, nothing has been achieved.

Figure 28: SSG NMCAR (Proposed) within the Marine Transportation Assessment Regional Study Area



The Board of Friends of Ecological Reserves said that change in shipping lanes can mitigate risk to other high value habitat and can be used to protect high value habitats in Ecological Reserves such as Trial Island, Oak Bay Islands and Race Rocks Ecological Reserves. It said that these reserves, just like SRKW habitat, have shipping lanes that could be moved further offshore to mitigate all shipping impacts. It said that moving shipping lanes is a practical mitigative strategy and when applied to all shipping, will reduce the risk to many high value sensitive ecosystems such as ERs and known high use SRKW areas in Haro Strait.

Indigenous Caucus of the Indigenous Advisory and Monitoring Committee for the Trans Mountain Expansion Project (Indigenous Caucus) filed a report from Compass which provided a preliminary review of First Nations involvement in marine use planning in B.C. and Canada along with some examples of First Nation co-governance models in other areas. This work also included a brief discussion on marine protected areas in the Salish Sea with reference to initiatives underway on the northern Pacific coast. Indigenous Caucus provided background information on marine protected area planning. It said that in 2016 Canada committed to (and directed Fisheries and Oceans Canada to) increase the proportion of Canada's marine and coastal areas that are protected to 5 per cent by 2017 and to 10 per cent by 2020 and this was supported through new programs and funding. It said that Canada has also made international agreements to meet a global target of at least 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services.

Indigenous Caucus said that given the threats to the ecological integrity and biodiversity of marine ecosystems in the Salish Sea there should be a lot of attention and efforts being directed towards the establishment of a network of MPAs, which has been repeatedly highlighted as the primary mechanism for protecting marine biodiversity on the scale of a bioregion by the federal government over the past twenty years. It said that with the development of a national framework in 2011, Canada committed to advance network planning in each of Canada's 13 bioregions which included the Strait of Georgia (Salish Sea). In 2015, Canada and B.C. reached an agreement on a strategy for developing MPA networks over the entire Pacific region (which included the Strait of Georgia).

DFO said that MPAs established under subsection 35(1) of the *Oceans Act* may prohibit or impose restrictions on classes of activities, such as marine shipping, for the purpose of marine conservation through regulations. For example, the Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs Marine Protected Areas Regulations (outside of the Marine RSA) enable navigation activities throughout the MPA, but no anchoring in the core protection zones. It said that no MPAs have yet been established in the Marine RSA, but under the *Oceans Act* the Minister retains the authority to recommend to the GIC that regulations be made to designate new MPAs at a future time.

Species at risk

Parks Canada said that given the size and spatial locations of both GINPR and PRNPR, most species at risk present have the potential to be affected by marine shipping should a spill occur. In addition, the shipping routes are close to Fort Rodd Hill National Historic Site. At that location, the only species that would be impacted is the Great blue heron (*fannini* subspecies) and Macoun's meadowfoam.

Parks Canada noted that the Multi-species Action Plans for GINPR, PRNPR and Fort Rodd Hill National Historic Site provide detailed information regarding critical habitat, and specific conservation and recovery methods that will be carried out on PCA managed lands and waters.

Parks Canada said that both GINPR and PRNPR will continue to protect individuals and suitable habitat on national park reserve lands and support partners where feasible on recovery and protection of these species. Additionally, GINPR and PRNPR will work with partners to conduct opportunistic surveys for under-surveyed species in the park reserve and adjust management approaches appropriately when new populations or threats are found.

Mitigation

Parks Canada said that it does not have any mitigation measures to "avoid, reduce, and/or offset the impacts of Project-related marine shipping on marine and shoreline ecosystem components." However, the GIC may make regulations governing marine shipping in marine conservation areas under the *Canada National Marine Conservation Areas Act* paragraph 16(1)(e) which allows for: restricting or prohibiting activities or regulating the use of facilities in marine conservation areas or in any zones.

Views of the Reconsideration Panel

The Board recognizes that approximately 108 km² of the proposed shipping route goes through the proposed SSG NMCAR. The Southern Strait of Georgia is rich in marine biodiversity and is home to many marine species. The Board notes that Parks Canada is responsible for setting up national marine conservation areas that are intended to protect and conserve representative marine ecosystems and key features, while ensuring the ecologically sustainable use of marine resources. NMCAs are established to represent a marine region and to demonstrate how protection and conservation practices can be harmonized with resource use in marine ecosystems.

The Board notes that in October 2003, Canada and the Province of British Columbia signed a Memorandum of Understanding that committed the two governments to assess the feasibility of a national marine conservation area reserve in the southern Strait of Georgia. A proposed boundary for a national marine conservation area reserve in the southern Strait of Georgia was announced on 13 October 2011. The Board understands that a feasibility assessment study on the proposed SSG NMCAR was launched in 2004, and since then there has been an ongoing dialogue with Indigenous groups and consultations with key stakeholders, communities and the public. The Board realizes the importance of establishing NMCAs, and hence recommends the GIC to expedite the work in completing the feasibility study for establishing a Southern Strait of Georgia National Marine Conservation Area, and publicly report on the outcomes of that study, and (if considered feasible) proceed to establish it (Recommendation 4). The Board also notes that Recommendation 2 would also be relevant in that it includes a description of the progress on each of the recommendations.

The Board received several comments from the intervenors supporting the Board's draft recommendation. Some intervenors advised the Board that work should proceed on other potential protected marine areas in the Salish Sea as well. The Indigenous Caucus recommended that the GIC, in addition to establishing the SSG NMCAR, identify other areas that could be given similar protections to create a network of marine protected areas.

The Board recognizes Canada's commitment to meet marine conservation targets established under the Convention on Biological Diversity to conserve 10 per cent of coastal and marine areas through effectively managed networks of protected areas and other effective area-based conservation measures by 2020. The Board notes that network planning has always been emphasized as one of the primary tools in fulfilling government mandates to protect conservation and the protection of the natural environment. The Board expects Government of Canada to consider the

possibility of identifying and creating a network of marine protected areas in the Salish Sea as part of its implementation of Recommendation 1.

Effects of the Project-related marine shipping on valued environmental components within the NMCAs and ERs are considered in environmental effects assessment sections for marine fish and fish habitat, marine mammals, and marine birds (Sections 14.7.2, 14.7.3, and 14.7.4 of this chapter).

14.8 Socio-economic effects of increased marine shipping (routine operations of the tankers)

This section focuses on the changes to the socio-economic setting caused by the routine operation of the Project-related marine vessels. The socio-economic effects of the spills from marine shipping are discussed in Section 14.10 of this chapter.

14.8.1 Marine commercial, recreational, and tourism use (socio-economic conditions)

In the OH-001-2014 hearing, Trans Mountain said that Indigenous and non-Indigenous people using marine waters may experience potential marine commercial, recreational and tourism use effects from increased Project-related marine vessel traffic.

Commercial fisheries

Trans Mountain said there are substantial commercial fishing activities throughout the RSA, including areas of the southern Strait of Georgia, Boundary Pass, Haro Strait and the Strait of Juan de Fuca. There are also aquaculture operations in the RSA, although none are proximal to the shipping lanes. Trans Mountain said that in 2011 commercial fisheries in B.C. harvested approximately 168,000 tonnes of fish, worth \$845.3 million. Targeted species, including salmon, herring, groundfish, crab, shrimp and prawn, are fished year-round. However, the location and timing of specific commercial fishing activities depends on a number of factors, such as the abundance and distribution of the species, the season, the value of the fishery and regulations determined by DFO. Although fishing vessels are permitted to fish in the shipping lanes as long as the passage of other vessels is not impeded, most fishing activity takes place outside of the shipping lanes.

Marine transportation

Trans Mountain said that marine transportation in the RSA includes commercial marine transport, such as passenger ferries, cargo ships, the CN Rail Bridge at the Second Narrows in Burrard Inlet, and marine transport services such as tugs and barges. There are about 475,000 vessel movements per year on the West Coast, and tankers accounted for about 1,500 movements (0.3 per cent) during 2009-2010. Most commercial vessels use the shipping lanes for transiting through B.C. coastal waters, although tugs engaged in barging activities may also use the most expedient route through smaller navigable channels, and ferries travel specific routes between terminals that cross shipping lanes.

Marine recreational use

Trans Mountain said that residents and visitors use the area for recreational activities including fishing, boating, sea kayaking and scuba diving, and marine tourism activities including cruise ship journeys, commercial sport fishing and whale-watching. It described specific characteristics of recreational use in the RSA in areas located in or near the shipping lanes, as well as near-shore locations such as river mouths, coastal campgrounds and marinas.

Marine tourism use

Trans Mountain said that tourism is a large contributor to the provincial economy, and contributed \$6.5 billion to the B.C. economy in 2011. Marine tourism within the RSA is diverse, and includes cruise ships calling from international and US ports, commercial sport fishing, fishing lodges, marinas, sea kayaking tours, dive charters, whale-watching and wildlife viewing tours, and marine cruising.

Project interactions and effects

In the OH-001-2014 hearing, Trans Mountain said that a disruption of marine commercial, recreational or tourism uses may occur due to increased transit of Project-related marine vessel traffic through the RSA. The company said there is a potential for increased marine vessel collisions between Project-related vessels and commercial, recreational or tourism vessels, but that such collisions are considered to be unlikely due to adherence to regulatory standards and navigational and safety measures by most marine vessels. A collision event could result in damage to vessels or gear or economic impacts for commercial marine users.

Trans Mountain said commercial fishers, marine transportation users, and some recreational marine vessels and tourism operators may alter their movement patterns to accommodate the increased presence of Project-related marine vessel

traffic, and that marine vessels in Burrard Inlet may be the most affected. The increase in tankers may be perceived to affect the quality of recreational or tourism experiences and this may lead to avoidance of certain recreational marine areas near the shipping lanes.

Indigenous and non-Indigenous participants, including Adam Olsen, Cowichan Tribes, the First Nations of Maa-nulth Treaty Society, Musqueam Indian Band, Tsawout First Nation, T'Sou-ke Nation, the Swinomish, Tulalip, Suquamish, and Lummi Indian Nations, Lyackson First Nation, and Unifor, raised concerns about the social and economic importance of commercial fisheries and seafood processing. They described their right to fish for commercial trade purposes, and the scope and extent of commercial fishing activities, including historical practices, frequented fishing areas, revenues and quotas. Many raised concerns that the increase in Project-related tankers, both in transit and while at anchor, may restrict the times and locations in which commercial fishing activities can take place or impede the ability of fishers to access fishing areas. Others expressed safety concerns about potential collisions with tankers and potential associated economic losses.

NS NOPE said that Trans Mountain understated the number and frequency of pleasure boat traffic in the vicinity of the WMT, and failed to include an adequate assessment of impacts to recreational boater traffic or the risks of a tanker accident related to recreational boater traffic, including incidents resulting in bodily injury or death. Several participants also raised concerns regarding the impact that increased Project-related traffic will have on congestion at the Second Narrows, resulting in unsafe conditions for recreational vessels and delays.

Trans Mountain said that it assessed the impact of Project-related marine traffic on the capacity of the Second Narrows Marine Restricted Area. It said there should be sufficient transit opportunities through the Second Narrows Marine Restricted Area to accommodate both Project-related marine traffic, as well as other foreseeable commercial and recreational traffic on most days of the year.

Trans Mountain said that there is potential for commercial fishers, and recreational and tourism users to experience increased sensory disturbance related to nuisance noise, visual effects and air quality associated with Project-related marine vessels transiting through the shipping lanes. However, once the tanker has passed, the nuisance effect will quickly decline.

Several participants noted that increased marine vessel traffic from the Project may indirectly contribute to a decrease in marine tourism, even during normal operations, resulting in economic loss. Some participants referred to the reputation of B.C. as an international ecotourism destination, and questioned whether increasing oil tankers in B.C. coastal waters would present an unfavourable image of B.C. to the world.

Trans Mountain said that any change in tourism patterns could have any number of contributing factors, and it is considered unlikely that increased Project-related marine vessel traffic under normal operating circumstances could be directly attributed to a decline in tourism, if one were to occur.

To mitigate these effects and concerns, Trans Mountain committed to, among other measures, provide regular updated information to fishing industry organizations, shipping associations, including the Chamber of Shipping and CN Rail, Indigenous communities and other affected stakeholders. It also committed to initiate a public outreach program prior to the Project operations phase to communicate information on Project-related timing and scheduling with affected marine users and Indigenous groups.

Trans Mountain said it supports the TERMPOL Report Recommendation 11, that Trans Mountain should provide input to the appropriate authorities for the development of an engagement and awareness strategy with respect to safety of navigation and prevention of collisions targeting recreational boaters, fishing vessel operators, and operators of small vessels. Trans Mountain also accepted Finding 20 regarding Trans Mountain's commitment to provide financial support for an enhanced education campaign for small vessel operators about safe boating practices.

Trans Mountain also said that Project-related marine vessels would be fully compliant with all applicable navigational, communications and safety regulations, including those of Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority (PPA) and Vancouver Fraser Port Authority.

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Many participants raised issues and concerns with respect to marine commercial, recreational and tourism use that were similar to those expressed in the OH-001-2014 hearing. Several Indigenous groups noted concerns that the increase in Project-related tankers would restrict the times and locations in which commercial fishing activities can take place or impede the ability of fishers to access fishing areas. Others expressed safety concerns related to the potential collisions with tankers or the effects of wakes on smaller vessels, and described potential interactions resulting in personal safety concerns, and damage or loss to fishing vessels and gear. Several participants raised concerns about the developments and increased tanker traffic in the Coast Salish Region limiting or restricting their ability to use the marine waterways to access preferred harvesting sites.

Musqueam Indian Band provided a report entitled "Impacts of Marine Vessel Traffic on Access to Fishing Opportunities of the Musqueam Indian Band," which assessed the contributing factors and cumulative effect of marine vessel traffic on the ability of Musqueam fishers to navigate on and access fishing opportunities within their territory. The report estimated the potential future impacts of marine vessel traffic on fishing access, and provided recommendations on how restrictions in access to fishing opportunities can be improved by addressing known data gaps and advancing methods for estimating effects today and into the future.

As part of their Oral Traditional Evidence, Musqueam Indian Band presented a video showing the kind of waves Musqueam fishers have to deal with on the Salish Sea and described the dangers associated with these encounters. Chief Wayne Sparrow from the Musqueam Indian Band said the following during OTE:

"...it becomes very dangerous out there with – you know, in the spring and winter months with the -- not just the traffic, but the weather and the tides. The tides are big tides, and the winter months you get the heavy winds and tides, so it makes even the bigger boats danger where you can't even go out on some days to access something on a bigger boat because it's too dangerous."

Trans Mountain said the information provided by Indigenous groups about commercial fishing and small vessel safety did not identify any potential effects that were not previously assessed in the OH-001-2014 hearing and the conclusions of these assessments of potential effects have not changed with the additional information provided.

Trans Mountain provided an assessment of Project-related marine shipping wakes with focus on the potential for negative effects of wakes on other vessel traffic, including commercial traffic and private recreational vessels, in four locations along the shipping route (Burrard Inlet, Strait of Georgia, Haro Strait and the Strait of Juan de Fuca). The study determined the height and period of wakes generated by Project-related vessels (both tankers and tug boats), and compared their magnitude and frequency of occurrence to vessel wakes caused by other vessel traffic already operating in the region. A comparison was also made with typical natural ambient wave conditions caused by winds. The study concluded that Project-related vessel waves are substantially smaller in height and substantially less in frequency of occurrence compared to existing and future commercial vessels (particularly ferries) operating along the same vessel routes and, therefore, Project-related wakes are insignificant compared to other vessel wakes already present. The study also concluded that vessel wakes from Project-related traffic are small or insignificant compared to naturally occurring wind waves that occur frequently in local waters and are considered routine by most experienced boaters.

The Pacific Pilotage Authority said that the resultant wake of an inbound Project-related tanker will be no more than that of any other slow moving bulk carrier transiting the area, and will be a lot less than a fast moving large container ship or a Cape size laden bulk carrier. It also said that the outbound tanker in the loaded condition will be restricted in its speed due to the requirement for a tug either in the vicinity (Georgia Strait and Juan de Fuca) or tethered (Haro Strait and Boundary Passage), and the maximum speed while tethered is 10 knots which will significantly reduce any wash and wake effect and minimize any impact on private recreational vessels.

Measures

Trans Mountain said that raising user awareness and knowledge amongst small vessel operators is of great importance to ensure safety of all waterway users, regardless of Project-related shipping. Trans Mountain noted that multi-party solutions with active collaboration between industry and government are required to ensure continued maintenance and advancement of the marine safety regime, and it supports the approach proposed under the OPP, whether or not the Project proceeds. Trans Mountain submitted that it has been working with the PPA to develop public education materials and promote safe boating around deep draft vessels as part of its development of the Marine Public Outreach program for Indigenous and non-Indigenous coastal communities. Trans Mountain submitted that it has also engaged directly with the VFPA, Royal Canadian Marine Search and Rescue, Boating BC and other marine safety organizations, to share information and better understand other existing public education initiatives and proactive public education for boat owners in Port of Vancouver and areas of B.C.'s south coast. Trans Mountain said that based on feedback from this engagement it will continue to share boating safety information that is available and look for ways to extend its reach to Indigenous and non-Indigenous communities along the shipping lanes.

Trans Mountain committed to provide financial assistance to smaller vessels registered in WCMRC's Vessel of Opportunity program to be fitted with Automatic Identification Systems and radar reflectors, which will aid in locating vessel assets during standard operations, as well as while undertaking response activities, and will enhance safety.

The Federal authorities said that the Oceans Protection Plan outlines several initiatives being undertaken to improve marine navigational safety and enhance sharing of marine traffic information with local communities in near real time, such as:

- Transport Canada's Enhanced Maritime Situational Awareness initiative will provide a web-based, near-real time common operating picture that will assist Indigenous and coastal communities with maritime awareness, preparedness and emergency response.

- Canadian Coast Guard's marine communications and traffic services centres will be modernized to ensure that Canada's marine safety system is better positioned to prevent and respond to marine safety and pollution incidents, and provide better information on marine traffic to both Indigenous and coastal communities.
- Canadian Coast Guard is constructing six new radar sites on the West Coast to provide marine communications and traffic services centres with greater capability to monitor marine traffic, improving overall marine situational awareness.
- Transport Canada's overall objective of the Proactive Vessel Management initiative is the development of a national framework to provide guidance and direction for the establishment of local Proactive Vessel Management forums to reduce conflicts on local waterways through a new, collaborative approach with Indigenous and coastal communities to the management of marine traffic issues, in support of improved marine safety and environmental protection, and partnerships with Indigenous communities.

The Federal authorities submitted that amendments are being proposed to the *Navigation Safety Regulations* to extend the requirement for Automatic Identification System to smaller passenger vessels to enhance navigation safety in terms of search and rescue efforts and collision avoidance.

The VFPA said that measures to avoid, reduce, and/or offset the impacts of Project-related marine shipping vessels on non-Project-related vessels, including private recreational vessels, included the establishment of Traffic Control Zones in both the First Narrows (TCZ-1) and Second Narrows (TCZ-2) facilitating the safe navigation and efficient movement of vessels in this area of the port.

The VFPA said that in addition to the relevant information published in the Port Information Guide, the VFPA publishes the safe boating guides for various parts of the ports jurisdiction, including the Burrard Inlet. The VFPA noted that the Burrard Inlet safe boating guide promotes safe boating practices, identifies hazardous navigation areas within Burrard Inlet, provides emergency contact information and other relevant information, as well as identifies the route of Project-related shipping vessels and other commercial marine shipping. The VFPA said that to support the safe and efficient movement of all vessel traffic within the Port of Vancouver, the VFPA issues annual media releases highlighting safe boating initiatives.

The PPA said that, in order to minimize any interaction between recreational and fishing vessels, it embarked on an awareness campaign providing information on the dangers of approaching too close to deep sea traffic. The PPA indicated that this included a pamphlet that has been distributed annually for the last three years to all marinas from Campbell River to Port Renfrew.

The PPA said that, in partnership with the Canadian Coast Guard and Transport Canada, it has been holding workshops over the last four years to communities all across B.C. in delivering the story of the "voyage of a vessel" and explaining the dangers of getting too close to deep sea vessels. The PPA committed to continuing the campaign with regular mail-outs to yacht clubs, marinas and fishing companies on an annual basis and offering to give presentations on small vessel safety.

Several intervenors raised concerns about the OPP initiatives to improve marine safety for smaller vessels. Some referred to the Proactive Vessel Management initiative noting that either no consultation has occurred or progress has been slow and it is uncertain if Canada's stated goal will result in meaningful improvements to marine safety and reduce accidents and impacts associated with shipping.

Heiltsuk First Nation described its experience of being given access to a marine traffic information system by Transport Canada and the CCG in order to access to real-time shipping information for certain vessels in Heiltsuk territory. Heiltsuk First Nation said that receiving access to the system was a delayed process that required Heiltsuk to follow-up numerous times to gain access, and once access was gained, it was apparent that system did not work reliably and did not contain the information that Heiltsuk requires in order to effectively manage their traditional territories.

Views of the Reconsideration Panel

The Board acknowledges the many ways in which Indigenous groups and other users enjoy the waters within the Project's marine setting. The Board recognizes that Project-related vessels would pass through areas of great significance to Indigenous peoples, community members, tourists, and recreational users, among others.

The Board is encouraged by Trans Mountain's support of the TERMPOL Report Recommendation 11, and notes that it is a key measure to minimize the potential disruption to recreational boaters, fishing vessel operators, and operators of small vessels as a result of increased Project-related marine vessel traffic. The Board is also encouraged by the initiatives being undertaken by the Federal authorities in the OPP, as well as those the VFPA and the PPA are currently carrying out to promote navigational safety. The Board acknowledges that many of these initiatives are being developed and implemented in consultation with marine users in Indigenous and coastal communities, including

Transport Canada's Enhanced Maritime Situational Awareness initiative which will be piloted by two Indigenous communities on the Strait of Juan de Fuca beginning in spring 2019.

The Board is of the view that the OPP contains several initiatives that will reduce accidents and impacts associated with Project-related shipping on smaller vessels once fully developed and implemented. The Board notes the concerns raised by intervenors that it is too early to determine the extent to which the OPP's initiatives will be effective in their stated goals to meaningfully improve marine safety and reduce accidents and impacts associated with shipping. As a result, the Board proposes Recommendation 2 that encourages GIC to report publicly and annually on the status of the OPP's initiatives and measures. The Board is of the view that this will create transparency and accountability of the work being conducted.

In Certificate OC-064, the Board imposed Condition 131 requiring Trans Mountain to develop a public outreach program prior to Project operations in order to ensure that the program is designed in consultation with the PPA and implemented in a manner that is appropriate to its intended audience. The Board has decided to revise Condition 131 into a recommendation to the GIC which has the necessary authority to address such matters. As such, the Board proposes Recommendation 12 that encourages GIC, in conjunction with the PPA and Transport Canada, to continue engagement and awareness activities targeting coastal Indigenous communities, recreational boaters, fishing vessel operators, and operators of small vessels with respect to safety of navigation and prevention of collisions with larger vessels. While some intervenors argued that the Board has authority to impose and assess compliance with conditions outside its regulatory authority, no specific authority was provided by intervenors to support that the Board can enforce marine shipping conditions not linked to WMT.¹³⁰

The Board acknowledges the concerns expressed by several intervenors regarding the proposed change of Condition 131 to a recommendation, including those which submitted that Trans Mountain would no longer be required to conduct marine safety engagement activities. The Board notes that in the OH-001-2014 hearing Trans Mountain committed to initiate a public outreach program prior to Project operations phase to mitigate the potential effects of disruption of subsistence hunting and commercial fishing activities due to increased Project-related marine vessel traffic. As such, the Board expects Trans Mountain to continue to collaborate and work in partnership with active marine authorities and organization, and coastal communities to provide information about Project-related marine vessels and associated marine concerns. The Board further expects the Trans Mountain will update its status on this commitment as part of Condition 6 (Commitments Tracking Table).

The Board acknowledges the safety concerns that were shared related to the potential collisions with tankers or the effects of wakes on smaller vessels. Many concerns raised by participants regarding marine shipping are under the jurisdiction of several federal and international authorities. The Board expects that Project-related marine vessels will be fully compliant with all applicable navigational, communications and safety regulations including those of Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority and Port Metro Vancouver (PMV).

The Board sees value in the work the Federal Authorities are doing to enhance sharing of marine traffic information with local communities and promote safer navigation, including the Enhanced Maritime Situational Awareness initiative and the proposed extension of the Automatic Identification System to smaller passenger vessels. The Board proposes Recommendation 13 that encourages GIC to accelerate the development and implementation of these programs.

The Board notes that the Salish Sea is a heavily utilized marine environment which accommodates vessels of varying sizes and speeds, and the concerns raised by Indigenous groups regarding the effects of Project-related vessel wakes on smaller vessels were not supported by any analysis disputing the quantitative assessment Trans Mountain conducted as part of the MH-052-2018 hearing. The Board accepts Trans Mountain's conclusion that wakes generated by Project-related vessels would be insignificant compared to both other vessel wakes already present and naturally occurring wind waves. The Board accepts the evidence of the PPA that Project-related marine shipping vessel wake would be no more than that of any other bulk carrier transiting the area, and would be less than other fast moving, large vessels transiting the area. The Board also agrees that the frequency of occurrence would be less than vessels currently operating along the same vessel routes.

The Board is of the view that increased marine shipping is not likely to have significant adverse effects on socio-economic conditions, including marine commercial, recreational and tourism use.

¹³⁰ The Federal Court of Appeal at para. 456 found that while the Board lacked authority to regulate marine shipping, GIC was not so limited. The Board is of the view that enforcement and regulation are tied together and therefore has provided Recommendation 2 to the GIC.

Significance evaluation: adverse effects on socio-economic conditions, including marine commercial, recreational and tourism use

	Criteria	Rating	Description
Project effects	Temporal extent	Short term to long term	Effects are expected to occur intermittently for the duration of operations.
	Reversibility	Reversible to permanent	Depending on the type of interaction, effects may be reversible to permanent.
	Geographic extent	RSA	Effects are expected to be mostly limited to shipping lanes, although alternation of movement patterns to accommodate or avoid Project-related vessels could affect adjacent areas.
	Magnitude	Low to moderate	Effects from the Project-related marine shipping would be limited to a few or many individuals and therefore be considered to range from low to moderate magnitude. Mitigation measures are expected to reduce the magnitude of effects.
Cumulative effects	The Regional Study Area (RSA) is a heavily utilized marine environment, which is predicted to increase in use. The contribution from Project-related marine vessels to total cumulative effects on marine commercial, recreational and tourism use is expected to be inconsequential.		
Recommendation	Not likely to cause significant adverse environmental effects.		

14.8.2 Heritage resources (cultural and physical heritage)

In the OH-001-2014 hearing, several Indigenous intervenors raised concerns regarding the impact to archaeological and cultural heritage sites as a result of increased Project-related marine vessel traffic. Pauquachin First Nation said that although the possible risk of Project-related vessel wake erosion is small, assuming the projected wake heights provided by Trans Mountain are accurate, it is possible that even small waves, combined with high tide and storms, may have a negative cumulative impact, particularly given the frequency and high volume of the predicted traffic. Several Indigenous groups recommended that sites at potential risk due to erosion be visited, mapped, assessed and monitored over time to determine the current extent and ongoing rate of erosion and its impacts, and that a specific spill response plan with mitigation be developed.

Trans Mountain said there are 81 previously recorded archaeological sites located in proximity to the marine vessel corridor. The combination of existing vessel traffic, Project-related vessel traffic and reasonably foreseeable vessel traffic will increase the frequency of wake waves interacting with the shoreline. Trans Mountain said that as wakes generated by vessels will be within natural wave size variation by the time they reach the shoreline, there is no discernible impact on shorelines associated with the shipping channel and, therefore, it did not complete an Archaeological Impact Assessment for the entire marine zone.

In the MH-052-2018 hearing, Indigenous intervenors raised concerns similar to those expressed in the OH-001-2014 hearing regarding the impact to archaeological and cultural heritage sites as a result of increased Project-related marine vessel traffic. Tsartlip First Nation said that instruments developed by Canada at the conclusion of the OH-001-2014 hearing to address monitoring have not materialized and establishing effective shore-based monitoring would require years of planning effort, baseline data, and training in order to prepare for meaningful monitoring and mitigation of adverse effects.

The Parks Canada Agency noted that portions of the proposed shipping route are adjacent to the Gulf Islands National Park Reserve.

Views of the Reconsideration Panel

Paragraphs 5(1)(c)(ii) and (iv), and 5(2)(c)(ii) and (iv) of the CEEA 2012 require consideration of the environmental effects that are likely to result from the designated project on physical and cultural heritage, or any structure, site or thing that is of historical, archaeological and paleontological or architectural significance, including with respect to Indigenous people. In its evaluation, the Board has considered the effects of the Project on heritage resources to include all of the effects described in paragraph 5 of the CEEA 2012, including those of the natural landscape.

The Board accepts Trans Mountain's evidence that Project-related vessel wake will not be detectable from existing wave conditions along the shoreline adjacent to the shipping lanes given vessel size and speed along with the channel depth and width. The Board notes that the concerns raised by Indigenous groups were general in nature and were not

specific to the assessment areas for Project-related marine vessels. As such, the Board is of the view that there will not be an impact to archaeological sites located on the shoreline due to an increase in marine traffic, and, therefore, an Archaeological Impact Assessment was not required.

The Board acknowledges that archaeological sites are of significance and value to Indigenous groups. The Board encourages Indigenous groups to share information regarding potential archaeological and cultural heritage sites with the B.C. Ministry of Forests, Lands & Natural Resource Operations.

Significance evaluation: adverse effects on heritage resources

	Criteria	Rating	Description
Project effects	Temporal extent	N/A	The Board is not convinced that effects from the Project-related vessels would translate into impacts on heritage resources
	Reversibility	N/A	
	Geographic extent	Shipping lanes	The Board is of the view that Project-related vessel wake will be localized to the shipping lanes and within natural wave size variation by the time they reach the shoreline
	Magnitude	N/A	
Recommendation	Not likely to cause significant adverse environmental effects.		

14.8.3 Traditional marine resource uses, cultural practices, and activities

Trans Mountain conducted traditional marine resource use (TMRU) studies to evaluate the potential effects of Project-related marine vessel traffic on traditional resource use. The spatial and temporal boundaries used for the TMRU assessment are described in Appendix 11.

Methodology and scope of assessment

In the OH-001-2014 hearing, Trans Mountain said the TMRU studies took place in coastal and international waters to provide information regarding the marine-based activities that participating Indigenous communities undertake.

The company said that the information collected in the TMRU studies was used to assess potential Project effects on travelways, plant gathering sites, hunting, fishing, gathering places and sacred areas.

Trans Mountain said the results of the TMRU studies, and desktop analysis and literature review, indicate that Indigenous groups have historically used and presently use the RSA to maintain a traditional lifestyle, and that they continue to use marine resources throughout the RSA for a variety of purposes. Trans Mountain said that this includes, but is not limited to fish, shellfish, mammal and bird harvesting, aquatic plant gathering, and spiritual/cultural pursuits, as well as the use of navigable waters within the RSA to access subsistence resources, neighbouring communities and coastal settlements. As part of its assessment, Trans Mountain prepared and submitted a supplemental TMRU report incorporating information from traditional marine resource use reports and related evidence filed directly with the Board by Indigenous intervenors, or that were provided directly to Trans Mountain. Trans Mountain stated that the TMRU result and concerns raised by these Indigenous communities are summarized in these reports.

Trans Mountain said that the two indicators used to assess potential effects from increased Project-related marine vessel traffic on TMRU were subsistence activities and cultural sites. The company said that subsistence activities and sites represent the extensive land and water bases on which activities take place, and provide a broad view of where and how people move in the landscape, how they use it and where they inhabit it. The company said that cultural sites represent people's long-term connection to the land and water, and include the ability to participate in and continue practices and activities conducted by past generations, and the ability to pass on the collective knowledge and use of the environment according to tradition. Trans Mountain noted that access to and continued use of cultural sites promotes cultural continuity, and that gathering areas and sacred areas are collective terms used to incorporate all types of sites unrelated to the acquisition of environmental resources.

Indigenous groups raised a number of concerns about Trans Mountain's approach to assessing potential effects to TMRU, including cumulative effects. These included:

- failure to conduct an effects assessment specific to each Indigenous group's areas of interest;

- that the level of site-specific mitigation for TMRU was not sufficient, and should be developed in consultation with Indigenous groups;
- flaws in spatial scope identified for the Project;
- failure to include the potential effects of increased Project-related marine vessel traffic on coastal habitation and cultural sites; and
- Trans Mountain's conclusion that there would be no significant adverse effects to traditional marine resource use, except potential adverse effects to traditional use of Southern resident killer whale populations.

In response to the concerns raised by Indigenous groups regarding its approach to assessing potential effects to TMRU, determination of significance, and proposed mitigation measures, Trans Mountain said that its assessment addresses the potential interactions identified by Indigenous groups through the assessment of the likely effect of the Project on the environment and TMRU. Trans Mountain said it reviewed the findings of each TMRU report submitted by Indigenous groups in the context of the assessment and determined that the significance conclusions with regard to TMRU remain unchanged by this evidence. In addition, Trans Mountain said that, where feasible, it identified mitigation to reduce the magnitude and duration of potential TMRU effects.

Trans Mountain said that with respect to the size of the study areas that were used in the assessment, the spatial extent of the RSA represents a trade-off between choosing too large an area that would mask Project effects, versus choosing an area too small where the effects on the population under consideration might no longer be meaningful at a landscape scale.

Several Indigenous groups raised concerns regarding potential damage or erosion to coastal natural habitats/harvesting areas such as kelp beds and reefs, and culturally or spiritually sensitive shoreline areas as a result of Project-related vessel wake. Squamish First Nation said that Trans Mountain's lack of assessment regarding these coastal sites represents an error in assessment scoping because it fails to consider the profound connections between land, sea, and culture of the Squamish Nation that are potentially affected by the Project.

Trans Mountain said that due to the average channel width, and the relatively rapid rate at which wake waves decrease in height away from the transiting tankers and escort tugs, vessel wake is not expected to be detectable from existing wave conditions along most of the shoreline in the RSA. Therefore, it did not include the potential effects of Project-related marine vessel traffic on coastal habitation sites since it was not considered to interact with land-based activities.

Effects of Project-related marine vessel traffic on traditional marine harvesting and cultural activities

In the OH-001-2014 hearing, Trans Mountain said that resources used and activities associated with TMRU are located within the RSA and situated along or near shipping lanes. Based on the results of the TMRU studies and the desktop analysis, travel corridors are essential for conducting traditional activities and accessing locations for traditional harvesting, and the shipping lanes must be traversed to access TMRU sites. Trans Mountain noted that subsistence harvesting and associated travel can occur within the RSA year round.

Trans Mountain said that the potential effects of Project-related marine vessels on TMRU include the disruption of subsistence hunting, fishing, plant gathering activities, the disruption of use of travelways, and the disturbance of gathering places and sacred areas.

Trans Mountain said that a disruption of subsistence activities may occur due to increased transit of Project-related marine vessel traffic through the RSA by restricting access to traditional use areas particularly if the resource users' travel occurs at the same time and in the same location as the Project vessel's transit. The company said that this could result in limiting the ability to harvest in certain areas, missed harvesting opportunities, or an increase in travel time to reach a destination, all which could reduce access to marine resources. Trans Mountain stated the magnitude of the effect is considered to be low, since it is expected that subsistence activities may be interrupted due to Project-related marine vessel traffic but the Project-related disruption would only be temporary and activities are likely to be resumed in most cases once the vessel has passed, and the frequency of Project-related marine vessels would be once a day.

Trans Mountain said that sensory disturbance as a result of increased marine vessel traffic may deter resource harvesters from using areas or could influence the focus of the activity, particularly if the Project-related marine traffic occurs at the same time and place as the subsistence activities. Trans Mountain said that sensory disturbance due to increased marine vessel traffic may also result in disruption to cultural activities (e.g., gathering places, sacred areas), as well as influence the focus and intent of ceremonial activities. The company said this could result in choosing other locations for their traditional activities, and increased travel time to reach a destination.

Trans Mountain said that there is a potential for increased disruption of traditional marine resource user activities from Project-related marine vessel wake, and increased potential for marine vessel collisions between Project-related vessels and traditional marine vessel traffic. The company said that such disruptions and collisions are considered to be unlikely due to

adherence to regulatory standards and navigational and safety measures by most marine vessels. A collision event could result in lost opportunities for traditional resource harvesting may result if an incident occurs. Trans Mountain also said damage or loss to fishing vessels or fishing gear may result from interactions between Project-related marine vessels and traditional marine resource users' fishing vessels. Trans Mountain said lost economic opportunities to marine users could result from: damage or loss of marine vessels; damage to fishing gear; injury; or physical displacement of marine users from the presence of Project-related marine vessels in transit or occupying anchorages.

Trans Mountain said that changes to the distribution and abundance of resources could result in loss or alteration of harvesting areas, which could result in indirect effects such as harvesters having to spend more time and money to travel further for subsistence activities. The results of effects assessments for marine mammals, marine birds and marine fish and fish habitat indicate that although there may be residual effects due to the increase in Project-related marine vessel traffic the effects are considered to be not significant, with the exception of Southern resident killer whales. Trans Mountain said it has been determined that there is a currently-existing significant adverse cumulative effect on this population and that while the endangered status of the Southern resident killer whale prohibits the current hunting of this species, historical data indicates that Southern killer whale populations were once, and may in future be, a traditionally harvested resource within the RSA.

With the exception of effects on the Southern resident killer whale, Trans Mountain said the Project's contribution to broader Indigenous cultural effects related to change in traditional marine use patterns is considered not significant. Trans Mountain noted that some traditional resource use vessels may only be temporarily inconvenienced by the presence of Project-related marine vessels (low magnitude), but for others, fishing activities may be delayed (medium magnitude) since routes to fishing grounds may need to be altered, or fishers may not be able to fish in preferred locations due to increased Project-related marine vessel traffic.

Trans Mountain said the combined effects from Project-related marine vessel traffic on TMRU are long- term and with a low to high magnitude given the predicted residual effects on the Southern resident killer whale population. It said effects are considered in the context of existing high-volume vessel activity within the RSA and an existing regulatory framework. Trans Mountain also said this takes into account the context of the availability of a traditionally harvested resource to meet the cultural and subsistence needs of potentially affected Indigenous peoples. Trans Mountain said the combined residual effects associated with Project-related marine vessel traffic on TMRU are considered not significant, with the exception of the expected residual effects on the Southern resident killer whale population, which are considered to be significant.

Trans Mountain said it assessed cumulative effects for marine transportation by considering projects that overlap with potential effects of Project-related marine vessel traffic. All components of the marine environment are understood to support the marine resource base and habitat conditions essential to the practice of traditional activities. As such, the potential cumulative effects on subsistence activities and sites were assessed in consideration of all pertinent biophysical resources known or assumed to be of importance to Indigenous communities for traditional use, as well as in consideration of the existing high volume of large vessel traffic within the RSA.

Trans Mountain said that increased marine vessel traffic is likely to increase congestion in areas that are geographically constrained and already experience high marine traffic volumes and may potentially cause some traditional marine users to avoid these areas or to alter their preferred routes due to sensory disturbance from transiting marine vessels. Trans Mountain said that a significant adverse total cumulative effect is predicted for traditional use of Southern resident killer whales due to existing marine shipping activities that will continue with or without the Project, however, total cumulative effects on other traditional marine resources and indicators, and the Project contribution to those effects, are concluded to be not significant.

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Impacts on traditional marine resource uses, cultural practices, and activities

Trans Mountain said that it considered the potential effects of increased Project-related marine vessel traffic on traditional marine resource use (TMRU) in the original Application. It said that the data used to inform its assessment of environmental effects and the environmental resources that underpin Indigenous rights is described in its original Application, and included desktop/literature reviews, TMRU studies completed and engagement feedback-to-date. As new information has been submitted, Trans Mountain said it has been reviewed to see if new issues, interactions or effects not previously anticipated are identified and whether conclusions of the assessment would be altered in light of the new information.

Trans Mountain stated that it had received traditional ecological knowledge/traditional marine resource use (TLU/TMRU) from 21 marine Indigenous communities. During ongoing engagement, Trans Mountain said that some of these 21 communities have provided further detailed information on their TLU/TMRU. Trans Mountain noted that the remaining marine Indigenous communities have chosen not to provide TLU/TMRU information to Trans Mountain or have chosen not to engage at all. Trans Mountain said that it respects the decision of these Indigenous communities to provide the

information or not, and is always open to and welcomes receiving TLU/TMRU information or studies for further analysis. Trans Mountain said that it welcomes such supplemental information at any time during the lifecycle of the Project, and will analyze it in the context of the stage of the Project that it was provided. Trans Mountain said that all TLU/TMRU information provided to date has been reviewed and it will continue to consider the information in the context of Project planning and mitigation as the Project is developed.

Trans Mountain said that it continues to receive updated TMRU information, formally and informally through engagement meetings, and continually reviews the information for specific impacts and mitigation measure opportunities that can be incorporated into Project plans prior and during the construction cycle, and into post-construction remediation plans.

With regards to concerns regarding Southern resident killer whales (SRKW) and traditional use by Indigenous peoples, Trans Mountain said that for those communities who presented evidence regarding this issue throughout the OH-001-2014 hearing (Ditidaht, Lyackson, Pacheedaht, Squamish, Stz'uminus, Tsawout, Tsawwassen, Tsleil-Waututh, T'Sou-ke), Trans Mountain followed up with each Indigenous community with a letter response addressing each of the specific concerns raised. Trans Mountain also prepared a detailed overview of issues, mitigation measures and resolutions, referred to as "Issues Summary and Resolution Tables," for each Indigenous group in response to the concerns identified.

Trans Mountain said that from 2014 to present, Indigenous communities continue to raise general concerns about the SRKW, but to date there has been no additional, specific TLU or TRMU feedback since the OH-001-2014 hearing. Trans Mountain responded to the general concerns by reaffirming its commitment to developing a MMPP with a purpose of outlining Project-related tanker specific measures that would be implemented by Trans Mountain as well as regional collaborative initiatives along the marine shipping lanes that are intended to mitigate and manage potential environmental effects on marine mammals. Trans Mountain said that it has received feedback from many Indigenous communities about the deep cultural ties they have with SRKW. Trans Mountain hopes that the efforts to mitigate effects will be viewed positively by all Indigenous peoples, including the Pacheedaht First Nation and Ditidaht First Nation, who have expressed a deep interest to Trans Mountain in ensuring the marine safety at Swiftsure Bank, a critically important offshore fishing area and a key harvesting area.

Trans Mountain also noted that Lyackson First Nation in particular provided it with correspondence regarding its concerns with Project-related marine shipping impacts on SRKW, including highlighting the gaps in knowledge with respect to understanding the threats to the deteriorating population of SRKW, as well as for understanding the mitigation strategies required to overturn the trend of the decline in population. Trans Mountain said that Lyackson recommended that Trans Mountain wait for the completion of research that informs scientifically proven mitigation measures prior to proceeding with the Project, so that the SRKW population can recover to sustainable levels.

Trans Mountain noted that to mitigate potential adverse effects associated with increased Project-related marine vessel traffic on traditional Indigenous use associated with marine mammals, it committed, among other measures, to:

- Provide regular updated information on Project-related marine vessel traffic to fishing industry organizations, Indigenous communities, and other affected stakeholders, where possible through the Chamber of Shipping of BC (COSBC); and
- Initiate a marine public outreach program prior to Project operations phase. Communicate any applicable information on Project-related timing and scheduling with fishing industry organizations, Indigenous communities and other affected stakeholders.

Trans Mountain also stated that it is of the view that multi-party initiatives are an essential approach to managing cumulative effects on the SRKW population, its critical habitat, and associated effects on traditional Indigenous use of the population.

Trans Mountain said that it is committed to continuing to build positive relationships with Indigenous communities and to meaningful engagement to address concerns. Trans Mountain said that its support for and participation in successful mitigation measures and joint programs that promote the survival and recovery of SRKW will address the main concerns raised by Indigenous groups.

Throughout 2016 to 2017, Trans Mountain said that it engaged with Indigenous communities with an interest in the marine environment regarding the concept of a Salish Sea initiative to understand concerns, remedies and mitigation with respect to the SRKW and the marine environment. Initial discussions focused on the possible role of this initiative and concepts with respect to collaboration to implement targeted priority stewardship projects that restore and enhance the environment, monitoring and assessing cumulative environmental impacts, supporting ecosystem research and knowledge exchange, and providing stewardship education and training.

Marine shipping impacts on TMRU, cultural practices, and activities provided by Indigenous groups

In the OH-001-2014 hearing, several Indigenous communities and Adam Olson expressed the importance of their continued ability to exercise their Indigenous rights to fish, harvest, and hunt throughout their respective traditional territories within the RSA. The information provided by Indigenous intervenors described the scope and extent of their activities, and focused on how communities and individuals use the lands, waters, and their respective resources to exercise their claimed or established Indigenous and treaty rights. This included information about food harvesting activities (primarily relating to fishing, but also hunting, trapping, medicinal herbs, and plant and berry gathering), as well as the cultural importance of these activities.

Indigenous groups described the traditional methods of fishing, the important role the harvesting sites and camps play in passing traditional knowledge on to future generations, how food is prepared and stored, and the sharing, trading, and feasting that comes after foods are harvested. They also described how their cultural systems, practices, and stewardship are inextricably connected to the traditional use of the lands and the waters. They included specific information on annual and seasonal harvesting locations and species used by Indigenous groups for the activities described, how the needs of that community continued to be met by these activities, as well as specific sites that are of cultural or spiritual importance to potentially affected Indigenous groups.

Several Indigenous groups, including Cowichan Tribes, Scia'new First Nation, Ditidaht First Nation, Esquimalt Nation, Pacheedaht First Nation, Lyackson First Nation, Tsawout First Nation, T'Sou-ke First Nation, Squamish First Nation, Musqueam First Nation, Tsartlip First Nation and Tsleil-Waututh Nation, said that existing levels of large ship traffic and industrialization have already reduced the ability to harvest in the certain areas, and reduced the frequency of interactions with mainland nations for cultural, ceremonial and economic reasons. They also raised concerns about the effects of existing development on the health of the ecosystems and resources harvested and their cultural and spiritual well-being.

Lyackson First Nation said that it estimates more than 50 per cent of their salmon harvest relies on transit of the Salish Sea and the Fraser River.

T'Sou-ke First Nation characterized the ongoing impact of cumulative effects in the T'Sou-ke territory as "death by a thousand cuts" or the "tyranny of small decisions" carried out over generations affecting the T'Sou-ke Nation's traditional mode of life, including its ability to maintain the sustainability of traditional marine resources to a level adequate to ground T'Sou-ke Nation's cultural connection to its territory.

Several Indigenous groups, including Esquimalt First Nation and Stz'uminus First Nation expressed concern that accessing marine harvesting, and cultural and spiritual sites will be further restricted as a result of increased Project-related marine traffic. Indigenous groups, including Tsleil-Waututh Nation, T'Sou-ke First Nation and Pacheedaht First Nation, described how a disruption or reduction to traditional travelways would represent a loss of cultural expression and identity, as well as a loss of teaching opportunities for youth.

Indigenous groups, including Tsleil-Waututh Nation, Scia'new First Nation and Lyackson First Nation, expressed concerns that noise from Project-related vessel traffic would impact cultural heritage and activities by disrupting ceremonial activities, alienating members from some parts of their territory, complicating ties with other First Nations communities, and exposing territory, including sacred sites, to Project-related risks. They said that the Project-related vessel traffic would create loss of privacy and quiet for cultural and sacred practices.

Indigenous groups noted concerns regarding marine safety. Indigenous groups, including Esquimalt First Nation, Pacheedaht First Nation and Ditidaht First Nation, said that increased tanker traffic would threaten marine safety, presenting increased risks of collisions between tankers and smaller traditional resource use vessels. They explained that a collision could result in damage to vessels or gear utilized to exercise harvesting rights. Tsleil-Waututh Nation said the increased shipping associated with the Project could physically curtail their ability to travel around the inlet in small vessels. Lyackson First Nation said they were concerned with the increased risk of accident and interference with small boat navigation including canoes and subsistence fishing boats.

Several Indigenous groups raised concerns with respect to the alteration of subsistence resources as a result of increased Project-related vessels. The Indigenous groups said that an increase in tanker traffic will alter subsistence hunting and fishing resources by changing wildlife behaviour and migration routes. This would have a negative impact on their ability to harvest these resources.

A number of Indigenous groups raised concerns about the increased tanker traffic at Swiftsure Bank, which has been a shared fishing area for centuries. These Indigenous groups said studies should look at weather extremes including full stochastic modelling of extreme wind and wave conditions.

In the MH-052-2018 hearing, Indigenous intervenors submitted evidence, both written and oral, regarding the impacts of marine shipping on their traditional marine resource uses, cultural practices and activities within the marine RSA. As in the

OH-001-2014 hearing, they noted the importance of marine resource use to their way of life, including resources for food, social, cultural and ceremonial purposes, and governance.

Indigenous communities continued to express the importance of their continued ability to exercise their Indigenous and Treaty rights to fish and harvest throughout their respective traditional territories within the marine RSA and shipping route. Indigenous intervenors described the scope and extent of their activities, including their travel routes, specific traditional use sites, fishing and food harvesting activities, as well as the cultural practices and activities associated with the exercise of their claimed or established Indigenous and Treaty rights. Indigenous communities noted the importance of marine fish and other resources for food, social and cultural uses, including trade, as well as ceremonial purposes.

Indigenous communities also expressed concerns about how Project-related marine shipping would impact their Indigenous and Treaty rights, not only due to interruptions to their physical ability to access the marine resources of the Salish Sea, but the impacts on their cultural and spiritual connection with these marine resources, including their ability to pass knowledge down to future generations, and their stewardship activities to protect the marine resources of the Salish Sea. For instance, Chief Harvey Underwood from the Tsawout First Nation said the following during OTE:

Just like that moth that needs that flower, we need that ocean, we need that land, in the same way that moth thrives on that to live for another time."

Ditidaht, Pacheedaht, T'Sou-ke, Tsawout and Tsartlip all filed new or updated traditional marine use studies as part of the MH-052-2018 hearing. These studies identified sites within the marine RSA and the shipping route where individual First Nations continue to practice traditional marine uses, including descriptions of the cultural connection associated with these areas and practices. Tsleil-Waututh Nation (TWN) provided new confidential information related to their cultural and spiritual connections within the area, and noted that lack of privacy caused by increased marine shipping would prevent their cultural practices.

Indigenous communities continued to raise concerns regarding marine safety, including the concern that increased tanker traffic would present increased risks of collisions between tankers and smaller traditional resource use vessels, as well as unsafe navigation due to wakes created by tankers.

Indigenous intervenors continued to raise concerns that increased Project-related traffic would impede travel routes and access to important traditional fishing grounds. Ditidaht and Pacheedaht once again expressed that Swiftsure Bank is a preferred location for exercising Indigenous rights to harvest marine resources, and expressed concerns that the increased traffic in Swiftsure Bank would impact the availability and abundance of marine resources. Ditidaht also suggested that vessel traffic should be rerouted to avoid Swiftsure Bank.

As in the OH-001-2014 hearing, multiple Indigenous intervenors also described the importance of their traditional use activities for cultural continuity. Indigenous communities noted that fishing and harvesting has always been a means of transmitting traditional knowledge, culture and way of life from generation to generation. For instance, Councillor Chris Lewis from the Squamish Nation said the following during OTE:

Everything we do as Squamish people is based in place. Our songs, our teachings, our ancestral names tell us of who we are and where we come from.

Indigenous communities upstream of the marine shipping areas described their traditional interaction with coastal Indigenous communities. They spoke of the interconnection of their waterways, such as the Fraser and Thompson rivers, with the Salish Sea, as well as the familial connections amongst Nations. Indigenous communities in Alberta described the trade and bartering that took place between coastal and inland Indigenous communities, which included, among other resources, plants, salmon, meats and medicines.

Southern resident killer whale

In the OH-001-2014 hearing, a number of Indigenous groups expressed concern about the social and cultural effects that would result from impacts of marine shipping on the SRKW. Tsawwassen First Nation stated it does not have a history as a whaling nation but has strong cultural ties to killer whale. The species figures prominently in the stories of Tsawwassen First Nation citizens and the Tsawwassen have adorned their ocean-going canoe with an image of the killer whale. Tsawout First Nation said there are clans and families that are connected to killer whales, and the impacts and loss of whales in their territories is a loss to those clans and families.

Pacheedaht First Nation said that increased tanker traffic will further impact the recovery of the killer whales. Given the importance of killer whales to their culture, this was a serious concern to Pacheedaht First Nation. T'Sou-ke First Nation said adverse effect on a key resource such as killer whale could have catastrophic ripple effects on their rights, title and sense of identity as Indigenous peoples of Canada.

Tsartlip First Nation said killer whales are culturally and spiritually important to Tsartlip people. Tsartlip First Nation described the profound spiritual importance of killer whales to their people, their relationship with them, and their obligation to protect them.

In the MH-052-2018 hearing, Indigenous intervenors submitted evidence, both written and oral, regarding the impacts of marine shipping on their traditional marine use, activities and practices associated with the SRKW.

TWN provided new information relating to its cultural relationship with the SRKW. In confidential oral and written evidence, TWN explained that its relationship with the SRKW are both a cultural relationship and an embodiment of its stewardship laws. TWN noted that the significant adverse environmental effects that marine shipping will visit upon SRKW will impair TWN's cultural relationship with them. Specifically, losing SRKW would impair TWN people's traditional identity, which is dependent upon their ability to maintain their connection with their community and ancestors. TWN noted that this connection includes the ongoing tradition of SRKW visiting Burrard Inlet upon the deaths of TWN chiefs and other leaders.

Multiple Indigenous communities, including Malahat, Tsawout, T'sou-ke, Snuneymuxw, Tsartlip, Tsawwassen, Pacheedaht and others, explained the importance of SRKW in their culture and spirituality. They explained that SRKW have prominent roles in their origin stories and that any reduction in their numbers, let alone their complete extirpation, would take an important and sacred piece of the culture of coastal Indigenous communities. Indigenous intervenors such as Makah Tribal Council and Snuneymuxw shared stories about the transformation of ancestors into killer whales, that these transformers would undertake spiritual matters of the sea or return to the community with lessons or messages from the whales. Elder Geraldine Manson, from the Snuneymuxw First Nation said the following during OTE:

To remove something that is so sacred to our communities, the killer whale ... it would be so devastating. It's like losing language. It's like losing culture. It's removing something, a part of us.

Indigenous intervenors such as Lyackson and Tsawout explained that their oral traditions and history include stories of SRKW accompanying their ancestors on fishing trips, or guiding them to important marine resources. Indigenous communities noted that the killer whales are considered to be their ancestors and that they play an important role in teaching younger generations. Several Indigenous communities also noted that because of the important role that the SRKW play in their cultural and spiritual practices, that the First Nations themselves have responsibility in the protection and stewardship of these whales. Elder Pearl Harris from the Stz'uminus First Nation said the following during OTE:

We believe that the killer whale is an ancestor of someone's ancestor, our ancestors. They come in many forms. And I believe that if we lose the killer whale, we lose some of our teachings, our teachers. We lose that spirit that is needed for our survival, just like we need seafood, we need the land, we need the animals. And I keep saying that they are our spirit, they are our people. We all have that strong belief.

Mitigation measures

In the OH-001-2014, in order to mitigate the effects and concerns regarding traditional marine harvesting and cultural activities, Trans Mountain committed to, among other measures, provide regular updated information on Project-related marine vessel traffic to Indigenous communities. It also committed to initiate a public outreach program prior to the Project operations phase to communicate information on Project-related timing and scheduling with Transport Canada, the Canadian Coast Guard, the Chamber of Shipping for British Columbia, commercial and tourism associations, and potentially affected Indigenous groups.

Trans Mountain said that Project-related marine vessels would be fully compliant with all applicable navigational, communications and safety regulations, including those of Transport Canada, the Canadian Coast Guard, the PPA and PMV.

Trans Mountain said it has identified mitigation to reduce the magnitude and duration of potential effects, where feasible. However, Trans Mountain said that as the shipping industry follows internationally and federally regulated guidelines and rules (such as the use of the international shipping lanes for routing and the use of pilots during transit), the company said there is limited ability for any tanker or vessel to alter route or schedule. Trans Mountain stated that all Indigenous groups will be invited to attend regional EPP workshops where mitigation measures and monitoring programs will be discussed.

With respect to the Southern resident killer whale, Trans Mountain committed to developing a Marine Mammal Protection Program with a purpose of outlining Project-related tanker specific measures and regional collaborative initiatives that would be implemented by Trans Mountain and other operators along the marine shipping lanes to mitigate and manage potential environmental effects on marine mammals.

With respect to Swiftsure Bank, Trans Mountain acknowledged its importance to Indigenous communities, and recognizes that the shipping lanes cross over Swiftsure Bank. Trans Mountain said it will raise awareness amongst Project tankers about conditions near Swiftsure Bank in its Port Information and Terminal Operations Manual.

In the MH-052-2018 hearing, Trans Mountain acknowledged the information provided by Indigenous communities regarding their use of the marine RSA for cultural and subsistence activities and noted the overall importance of marine resource use to Indigenous way-of-life. It also acknowledged that Indigenous communities' connection to the marine environment is profound. Trans Mountain noted that it had assessed potential residual effects related to Project-related marine vessels in regard to disruption of traditional activities, alteration of subsistence resources and alteration of vessel movement patterns and included consideration of effects related to sensory disturbances and changes in access.

Trans Mountain said that the types of impacts presented by Indigenous communities in their written and oral traditional evidence are consistent with those assessed in the original Application, and no new information was presented that changes any of the results from that assessment. Trans Mountain said that it has reviewed the new information provided by Indigenous communities as part of the MH-052-2018 hearing in the context of its original ESA and has determined that the significance conclusions of the ESA with regard to TMRU remain unchanged for both Project-related effects and the contribution to cumulative effects.

With respect to the SRKW, Trans Mountain said that it is of the view that multi-party initiatives are an essential approach to managing cumulative effects on the SRKW population, its critical habitat, and associated effects on traditional Indigenous use of the population. In its evidence, it provided an outline on those initiatives that were already underway, as described elsewhere in this Report, including:

- The Oceans Protection Plan (OPP)
- The Action Plan for the Northern and Southern Resident Killer Whale
- Pacific Salmon Foundation – Salish Sea Marine Survival Project
- ECHO Program
- Green Marine
- Chair in Cetacean Research at UBC

Trans Mountain noted that all of the multi-party initiatives also act in support of the requirements of Condition 132 - Marine Mammal Protection Plan (MMPP). Trans Mountain noted that its Condition 132 compliance filing is required three months prior to commencing operations on the Project, however, it said that it had plans to commence a process to solicit and obtain feedback and comments from Indigenous communities on a draft version of the MMPP no later than 18 months prior to the commencement of Project operations.

The Federal Authorities also pointed to these multi-party initiatives in their evidence. They noted that a key principle across all OPP activities is building Indigenous partnerships. They said that funding for Indigenous engagement and participation in the OPP gives recipients the opportunity to take part in developing and improving Canada's marine transportation system and contribute their knowledge towards tailoring marine transportation systems to local conditions and the environment.

The Federal Authorities also noted that during engagement on the OPP, as well as during Project-specific reviews and engagement activities, they heard from Indigenous communities that they want to be able to monitor real-time vessel traffic in a system that identifies areas of traditional use, as a potential means to mitigate impacts on this use. Further, Indigenous communities have indicated during this engagement that they may want sensitive areas, such as SRKW habitat, identified in the system. One of the potential sources of information to be displayed in the Enhanced Maritime Situational Awareness system is data relating to the current position of marine mammals, including the SRKW. The Federal Authorities noted that there are various potential sources of this data, which could be shared directly with British Columbia Coast Pilots and the commercial shipping industry to improve their situational awareness and minimize interference with the SRKW. Although the pilot project has not yet begun, the Federal Authorities said that they understand that Indigenous peoples want to be able to monitor real-time vessel traffic in an application that identifies areas of traditional use, as a potential means to mitigate impacts on this use.

The Federal Authorities said that meaningful collaboration on potential adverse effects of Project-related marine traffic could be enabled through Proactive Vessel Management forums between Indigenous communities, industry, Non-Governmental Organizations, and federal and other authorities. For example, they noted that Indigenous communities could raise their concerns in a Proactive Vessel Management Forum around the impacts of vessel traffic patterns on the SRKW populations in their local waterways. Forum participants would then work to gather information and evidence necessary to assess these concerns and identify potential, cooperative (i.e., non-regulatory) measures to address them. The Federal Authorities also noted that a contracted study on how to incorporate traditional knowledge into a proactive vessel management approach has been received and analyzed.

The Federal Authorities noted that one of the measures for the Species at Risk Action Plan for Northern and Southern Resident Killer Whale (*Orcinus orca*) in Canada (2017) is to incorporate Indigenous Traditional Knowledge on the behaviour

and distribution of SRKW and their prey into measures for the recovery of the species. Fisheries and Oceans Canada (DFO) said that Indigenous communities are being engaged through governance bodies such as the SRKW Indigenous and Multi-stakeholder Advisory Group, and the DFO-led SRKW prey availability working group.

More specific information regarding the measures being put in place by the Federal Authorities to reduce disturbances on the SRKW in the Salish Sea is found in Section 14.7.2 of this Report. Multiple Indigenous intervenors indicated that the proposed measures from the Federal Authorities and Trans Mountain aimed at mitigating effects of Project-related marine shipping on SRKW are not sufficient to adequately mitigate the threats Project-related marine shipping pose to the SRKW, nor do the measures adequately accommodate impacts from this shipping on Indigenous communities and their traditional Indigenous use associated with the SRKW.

Driftpile Cree Nation, for example, said that Trans Mountain should not proceed with the Project until results of their funded research produces scientifically sound and reliable recommendations, DFO's SRKW Recovery Strategy objectives have demonstrated more measureable progress, or Trans Mountain commits to implementing enhanced Project-specific mitigation measures.

Lyackson noted that Trans Mountain's support of collaborative, regional approach to development of mitigation options to reduce risk to marine mammals (such as the Oceans Protection Plan, the proposed Action Plan for the SRKW prepared by DFO and the Pacific Salmon Foundation's Survival Project) should not be considered a concrete mitigation measure. Lyackson said that the Project continues to present an enormous threat to the SRKW population and to date, no effective mitigation measures have been presented.

Views of the Reconsideration Panel

The Board acknowledges that uses, practices and activities such as hunting, fishing, harvesting, plant gathering and the use of cultural sites are very important for Indigenous groups along the coastal areas of B.C. These uses, practices and activities are undertaken for both subsistence and traditional cultural purposes, and are important for maintaining Indigenous cultures and transmitting these across generations. The Board acknowledges the effort undertaken by Indigenous communities who provided oral traditional evidence to the Board as part of the MH-052-2018 hearing to share additional information regarding their traditional marine use within the Salish Sea, as well as their deep spiritual connections with the SRKW, and the role these have in their cultural practices. The Board also acknowledges the significant and detailed evidence provided by Indigenous groups about their use of the marine environment where Project-related marine vessel traffic is proposed to take place. The Board considered all of the evidence provided by Indigenous groups, Trans Mountain and other participants on these matters.

The Board is of the view that, for the purposes of assessing the potential effects of Project-related marine traffic on traditional marine use, the methodology used by Trans Mountain was appropriate and effective for identifying and evaluating the Project-related potential effects. Trans Mountain identified components of the marine environment that are understood to support the marine resource base and habitat conditions essential to the practice of traditional use, practices and activities, and that potential residual effects were assessed in consideration of pertinent biophysical resources known or assumed to be of importance to Indigenous communities for traditional use. TMRU studies completed by Indigenous groups provided information on impacts of Project-related marine traffic in the shipping lanes on subsistence sites and resource use. In its supplemental technical reports on TMRU, Trans Mountain incorporated the results of TMRU studies filed by Indigenous groups, and described mitigation for the effects and concerns raised. In addition to the information regarding TMRU that Trans Mountain filed in the OH-001-2014 hearing and in the MH-052-2018 hearing, Trans Mountain also noted that it will continue to update its project plans and any appropriate mitigation based on additional TMRU information it receives from Indigenous communities.

The Board finds that Project-related vessel wake will not be detectable from existing wave conditions along the shoreline adjacent to the shipping lanes based on Trans Mountain's predicted wake wave height modelling, which the Board accepts. As Project-related vessel wake will be of the same magnitude as existing wave conditions along the shoreline adjacent to shipping lanes, the Board also finds that Project-related marine vessels are unlikely to result in any measurable changes to coastal habitats, harvesting and culturally sensitive areas.

The Board notes Trans Mountain's commitments to provide regular updated information on Project-related marine vessel traffic to Indigenous communities, and to initiate a public outreach program prior to the Project operations phase to communicate information on Project-related timing and scheduling with Transport Canada, the Canadian Coast Guard, the Chamber of Shipping for British Columbia, commercial and tourism associations, and potentially affected Indigenous groups. Trans Mountain committed to raise awareness amongst Project-related tankers about conditions near Swiftsure Bank in its Port Information and Terminal Operations Manual. The Board acknowledges the safety concerns that were shared by Indigenous communities. Therefore, the Board has included Recommendation 12 which would require the GIC to ensure that the Pacific Pilotage Authority and Transport Canada continue engagement and awareness activities targeting coastal Indigenous communities, recreational boaters, fishing vessel operators, and

operators of small vessels with respect to safety of navigation and prevention of collisions with larger vessels. This should include incorporating the resources and information that Trans Mountain has already provided or will provide to the Pacific Pilotage Authority, such as applicable information on Project-related vessel timing and scheduling. As noted in Section 14.8.1, the Board also sees value in the work the Federal Authorities are doing to enhance sharing of marine traffic information with local communities and promote safer navigation. The Board proposes Recommendation 13 that encourages GIC to accelerate the development and implementation of these programs.

Trans Mountain committed to support the multi-party initiatives that are being led by Transport Canada, the Canadian Coast Guard, DFO, the VFPA, all of which are working to better understand and manage the potential impacts of marine shipping activity throughout the south coast of B.C. The Board is of the view that, not only will the Federal Authorities learn from Indigenous communities, the communities themselves will have the opportunity to become more aware of the entirety of marine traffic activity as well as the government's proposed measures in the TMRU areas that are of importance to them.

With respect to the effects of Project-related marine vessel traffic on traditional marine resource uses, activities and sites, the Board finds that there will be disruptions to Indigenous marine vessels and harvesters, and that this may disrupt activities or access to sites. The Board is of the view that these disruptions will be temporary, only occurring during the period of time when Project-related tanker vessels are in transit. The Board is of the view that Indigenous marine vessel users will maintain the ability to continue to harvest marine resources and to access subsistence and cultural sites in the presence of these periodic and short-term disruptions. The Board therefore finds that, with the exception of effects on the Southern resident killer whale, the magnitude of effects of Project-related marine vessel traffic on traditional marine resource uses, activities and sites is low. Given the low frequency, duration and magnitude of effects associated with potential disruptions, and Trans Mountain's commitments to provide regular updated information on Project-related marine vessel traffic to Indigenous communities, the Board finds that adverse effects on traditional marine resource uses, activities and sites is not likely, and that overall, Project-related marine traffic's contribution to overall effects related to changes in traditional marine use patterns is not likely to be significant. The Board is also of the view that Project-related marine traffic's contribution to cumulative effects is of low to medium magnitude and reversible in the long-term. The Board therefore finds significant adverse cumulative effects associated with Project-related marine vessel traffic on TMRU are not likely to be significant, with the exception of effects associated with the traditional use of the SRKW, which are considered significant.

The Board acknowledges the concerns raised by Indigenous groups about marine safety, increased congestion of marine vessel traffic, and potential disruptions that may occur as a result of vessel collisions. This potentially includes damage to or loss of fishing gear, or vessel damage or loss in the event of a direct collision. While there is concern about interactions between Project-related marine vessels and traditional fishing vessels, the Board is of the view that disruptions that may result from interference or collisions with Project-related vessels are considered to be unlikely due to adherence to regulatory standards and navigational and safety measures by marine vessels. The Board is also of the view that any disruptions to Indigenous marine vessel users that would result from Project-related marine vessel traffic would be temporary, that the frequency of Project-related marine vessels would be one return transit per day, and that all other marine vessels, including Indigenous marine vessel users, would be able to continue their movements very shortly after the transit of the tanker. In the unlikely event of a collision or damage to or loss of fishing gear, a comprehensive scheme of compensation would be available. Further information on financial responsibility and compensation is discussed in Section 14.12.

The Board notes that, within the MH-052-2018 hearing, Indigenous communities provided additional evidence regarding their familial connections with the SRKW, including the role the SRKW have in their origin stories and the cultural teachings that have been passed down from generation to generation as result of their spiritual connection with the SRKW. The Board acknowledges that some of this evidence was passed on in confidence, and thanks the Tsleil-Waututh Nation in particular for providing this sensitive information.

The Board finds that, as described in its views in Section 14.7.2 on marine mammals, the increase in marine vessel traffic associated with the Project is likely to result in significant adverse effects on the SRKW. The Board finds that Project-related marine vessel traffic would further contribute to total cumulative effects which are determined to be significant, with or without the Project. Given these conclusions and recognizing the stated cultural importance of the killer whale to certain Indigenous groups, the Board finds that the increase in marine vessel traffic associated with the Project is likely to result in significant adverse effects on the traditional Indigenous use associated with the SRKW.

The mitigation measures to reduce adverse effects on SRKW are also described in Section 14.7.2. The Board notes that Indigenous intervenors have indicated that they were not satisfied with the mitigation measures that have been proposed by Trans Mountain or are currently underway as part of the Federal Authorities programs to reduce disturbances on the SRKW in the Salish Sea. The Board notes that embedded in all of these initiatives is consultation with Indigenous communities, with an aim to understanding where traditional marine use activities take place, as well as the incorporation of Indigenous traditional knowledge, where appropriate. The Board is of the view these increased

opportunities for Indigenous communities to provide input about their, traditional knowledge, TMRU activities and cultural practices, could, in time, lead to improvements in the mitigation measures. As a result, the Board has included Recommendation 1 which would require GIC to develop and implement a regional cumulative effects management plan implemented in consultation with Indigenous peoples, other marine users, the Province of British Columbia and local governments, VFPA, and other relevant stakeholders. The Board also refers to Recommendations 5 and 6, which are discussed further in Section 14.7.2.

Significance evaluation: adverse effects on traditional marine and resource use

	Criteria	Rating	Description
Project effects	Temporal extent	Short term to long term	Effects are expected to occur intermittently for the duration of operations.
	Reversibility	Reversible to permanent	Depending on the type of interaction, effects may be reversible to permanent.
	Geographic extent	RSA	Effects are expected to be mostly limited to shipping lanes, although alternation of movement patterns to accommodate or avoid Project-related vessels could affect adjacent areas.
	Magnitude	Low to medium	Effects from the Project-related marine shipping would be limited to a few or many individuals and therefore be considered to range from low to moderate magnitude. Mitigation measures are expected to reduce the magnitude of effects.
Cumulative effects	The Regional Study Area (RSA) is a heavily utilized marine environment, which is predicted to increase in use. The contribution from Project-related marine vessels to total cumulative effects on traditional marine resource use, practices and activities is expected to be inconsequential.		
Recommendation	Not likely to cause significant adverse environmental effects.		

Significance evaluation: adverse effects on traditional marine and resource use associated with the Southern resident killer whale

	Criteria	Rating	Description
Project effects	Temporal extent	Long Term	Sensory disturbance and the risk of strike will occur for the duration of operations.
	Reversibility	Reversible to permanent	With regard to sensory disturbance, once a marine mammal is no longer exposed to underwater noise from Project-related marine vessels, then behaviour would likely return to normal. The effects of a marine mammal vessel strike would range from reversible to permanent, depending on the severity of the strike.
	Geographic extent	RSA	Underwater noise and strikes will originate in the shipping lanes, but noise spreads underwater, and if threats have population level consequences, they would impact across the range of SRKW.
	Magnitude	High	Underwater noise produced from Project-related marine vessels is not expected to result in permanent or temporary auditory injury, but would result in sensory disturbance to marine mammals, including SRKW. A strike, although of low probability, could result in lethal or non-lethal effects, and mortality would have population level consequences.

Cumulative effects	With regard to sensory disturbance, the Regional Study Area (RSA) is a heavily utilized marine environment, which is predicted to increase in use. Once exposure to underwater noise from Project-related marine vessels ceases, it is likely that marine mammals would be exposed to some form of disturbance soon after from another marine vessel. With regard to potential strikes, the increase in Project-related marine traffic would contribute to the cumulative risk of marine mammal vessel strikes. The SRKW population has crossed a threshold where any additional adverse environmental effects would be considered significant. While the effects from Project-related marine shipping will be a small fraction of the total cumulative effects, and the level of traffic is expected to increase with or without the Project, the increase in marine vessels associated with the Project would further contribute to cumulative effects that are already jeopardizing the recovery of the SRKW.
Recommendation	Absent further mitigation, likely to result in significant adverse effects on the traditional Indigenous use associated with the SRKW. See Chapter 2 for discussion of justification. If the Board's recommendation to offset the additional underwater noise and strike risk from Project-related marine shipping is implemented, then adverse effects from Project-related marine shipping would reduce to net zero if and when offsets are successful, at which time effects would not likely be significant.

14.8.4 Human health

In the OH-001-2014 hearing, Trans Mountain estimated the potential effects on human health from the routine operations of marine transportation associated with the Project.

Trans Mountain said it followed a conventional risk assessment paradigm, which is an approach endorsed by a number of federal, provincial and regional regulatory health authorities, including Health Canada, Environment and Climate Change Canada (ECCC), the Canadian Council of Ministers of the Environment (CCME) and B.C. Ministry of Environment (BC MOE).

The spatial boundaries for Trans Mountain's assessment of human health effects of marine transportation are described in Appendix 11, and included the inbound and outbound marine shipping lanes, the area between the shipping lanes, where it exists, and a 5 km buffer extending from the outermost edge of each shipping lane. Trans Mountain said for the purposes of its assessment, the shipping lanes were divided into four distinct regions: Burrard Inlet; Strait of Georgia; Boundary Passage and Haro Strait; and Strait of Juan de Fuca. Trans Mountain said of these, only Burrard Inlet revealed some potential exceedances of contaminants that may affect human health and therefore this was the only region carried forward for detailed assessment.

Trans Mountain said specific consideration was given to Indigenous peoples because of the unique opportunities for chemical exposures that might occur through traditional Indigenous practices, including the consumption of traditional foods such as game meat, fish, beach food and wild plants.

Trans Mountain said it evaluated potential health risks that could result from exposure to the chemical emissions originating from Project-related marine vessel traffic. Trans Mountain considered the potential effects on people living within the assessed area boundaries, on those who might frequent these areas for recreation or other purposes, as well as how age, gender or health status may affect people's vulnerability to potential effects.

Trans Mountain said it used exposure limits to assess the potential health effects that could result from short-term and long-term exposure to the various chemical emissions associated with Project-related marine transportation. Reliance was placed on exposure limits developed or recommended by regulatory authorities or reputable scientific authorities for the protection of human health. These included, among others, those available from Health Canada, the BC MOE, the United States Environmental Protection Agency (US EPA) and the World Health Organization (WHO).

Trans Mountain said it assessed short-term (acute), long-term (chronic) and cumulative exposure scenarios, and considered the potential health risks associated with the chemicals of potential concern (COPC) acting either singly or in combination (i.e., chemical mixtures). Inhalation was considered the primary exposure pathway, but it also considered secondary pathways including food ingestion and skin contact. Trans Mountain said that due to strict regulations prohibiting the release of untreated bilge water and ballast water under routine operating conditions, releases to water were not considered.

Acute effects

Trans Mountain said the maximum predicted acute exposure to the COPC (acting either singly or in combination) were below their exposure limits, with the exception of short-term inhalation of nitrogen dioxide (NO₂) and the respiratory irritants mixture. For acute exposure to NO₂, Trans Mountain said no exceedances were predicted for residents within the communities surrounding Burrard Inlet, or for the area users frequenting the provincial parks. The company said

exceedances only were predicted at an isolated location along the water's edge of Burrard Inlet within the perimeter of another industrial facility, where public access will be restricted.

Trans Mountain said the risk estimates for short-term inhalation of NO₂ did not change between the assessment cases (i.e., base, application and cumulative cases), indicating that the incremental change associated with the Project-related marine vessel traffic will have very little, if any, effect on the health risks associated with short-term exposure to NO₂.

Trans Mountain said that short-term exceedances were predicted for the respiratory irritants mixture across all the assessment cases for the residents of the Squamish Nation at Capilano 5, and for the District of North Vancouver. Exceedances were not predicted at any of the other Indigenous communities (i.e., Tsleil-Waututh First Nation at Burrard Inlet 3 and Squamish Nation at Seymour Creek 2, Kitsilano 6 and Mission 1). Trans Mountain said the incremental changes as a result of COPC emissions from the marine vessel traffic associated with the Project and the reasonably foreseeable increase in other marine vessel traffic are essentially negligible, and that the Project will have very little, if any, impact on health risks associated with short-term exposure to the respiratory irritants at these locations.

The company concluded that, overall, adverse health effects from acute exposures would not be expected.

Chronic effects

Trans Mountain said that, for chronic effects via the primary inhalation pathway, in all cases the maximum predicted air concentrations of the COPC (acting either singly or in combination) associated with the Project were lower than the corresponding exposure limits. Trans Mountain concluded long-term health risks associated with the COPC exposures are considered negligible or low, and adverse health effects from the long-term inhalation of the COPC associated with the Project-related marine vessel traffic are not expected.

Trans Mountain said the potential health risks associated with Project-related marine vessel traffic via the relevant secondary exposure pathways were also examined. The company said that potential chronic multiple pathway health risks were estimated based on the assumption that residents would be continuously exposed for an assumed lifespan of 80 years. Trans Mountain said that in all cases the maximum predicted exposures through the secondary pathways of the COPC (acting either singly or in combination) were lower than the corresponding exposure limits, and that long-term health risks are therefore considered negligible or low, and adverse health effects from the inhalation of dust, food ingestion, and dermal contact are not expected.

Trans Mountain said the high degree of conservatism incorporated into both the exposure estimates and the exposure limits must be considered in the interpretation of the exceedances, and that based on the weight of evidence, it is unlikely that people would experience health effects as a result of the potential increase in Project-related marine vessel traffic.

Cumulative effects

Trans Mountain said the RSA was used for the purposes of assessing the cumulative health effects associated with the chemical emissions from increased Project-related marine vessel traffic. It said the contribution from Project-related marine vessel traffic to the cumulative exposure to COPCs was negligible. Trans Mountain said in the majority of instances, the potential health risks remained unchanged between the cases, indicating that Project-related marine vessel traffic will have very little, if any, effect on the base case health risks or cumulative exposure contributions.

A number of participants raised concerns regarding Trans Mountain's assessment of the potential effects on human health resulting from Project-related marine traffic.

Burnaby Residents Opposed to Kinder Morgan Expansion (BROKE) said that Trans Mountain did not adequately assess the human health risks, including acute and chronic health effects of exposure to benzene and 1,3-butadiene. BROKE said additional information to understand the human health impacts in the area surrounding the terminal and the exit for ships through the First and Second Narrows is needed to better understand the impacts, and should include a focus on those most vulnerable to exposure to benzene and 1,3-butadiene, such as young children and those with genetic susceptibility to carcinogens.

NS NOPE expressed concern over the potential human health effects associated with short-term and long-term exposure to benzene, including as part of a mixture with 1,3-butadiene. Living Oceans Society raised concern that the maximum predicted ground-level air concentrations of benzene in Burrard Inlet area would exceed the national one-hour Ambient Air Quality Objective (AAQO) for benzene.

In response to concerns about the potential effects of butadiene, for acute exposure to 1,3-butadiene, Trans Mountain said the predicted 24-hour air concentrations for the three assessment cases (i.e., Base Case, Application Case and Cumulative Case) were compared with the acute (24-hour) exposure limit or Reference Concentration developed by the U.S. EPA for the protection of the human population (including sensitive individuals) against the potential reproductive and developmental effects associated with short-term inhalation of 1,3-butadiene. Trans Mountain said that chronic health risks were assessed

by comparing the maximum predicted annual air concentrations for the three assessment cases (i.e., Base Case, Application Case and Cumulative Case) to the U.S. EPA's chronic Reference Concentration for the potential reproductive and developmental effects associated with long-term inhalation of 1,3-butadiene (U.S. EPA 2002a). The potential cancer risks, specifically the risk of developing leukemia, also were assessed.

Trans Mountain said that in all instances, cancer risks for 1,3-butadiene were predicted to be less than 1 in 100,000, indicating that the incremental cancer risks from the Project-related increase in marine vessel traffic are deemed to be "essentially negligible." It said the contribution from the Project-related marine vessel traffic to the cumulative 1,3-butadiene exposures was negligible, and that in all instances, the potential health risks remained unchanged between the Base Case and Application Case, signifying that the Project-related marine vessel traffic will have very little, if any, effect on the Base Case health risks associated with 1,3-butadiene exposure.

With respect to benzene, Trans Mountain said it used the acute health-based exposure limit developed by the Texas Commission on Environmental Quality (TCEQ) for benzene rather than Alberta's one hour AAQO for benzene as the latter did not satisfy the requirement for adequate supporting documentation. Nonetheless, Trans Mountain said it committed to meeting the lowest applicable AAQO established in B.C. or Alberta at each terminal, including Alberta's one-hour AAQO for benzene.

Trans Mountain said the findings of its HHRAs indicate that adverse health effects from short-term and long-term exposure to benzene are not anticipated as a result of the Project-related marine vessel traffic. In all cases, the potential health risks associated with short-term and long term inhalation of benzene were below the benchmark (or target risk estimate) of 1.0, indicating that the predicted peak hourly and annual average air concentrations of benzene were below the corresponding exposure limits. Trans Mountain also said incremental lifetime cancer risks associated with Project-related marine vessel traffic were predicted to be less than 1 in 100,000 (i.e., less than one extra cancer case in a population of 100,000 people). This indicates that the incremental cancer risks from the Project-related marine vessel traffic are deemed to be "essentially negligible."

Trans Mountain said benzene was assessed in the acute immunotoxicants mixtures, and in assessment of chronic effects, benzene was included in both the immunotoxicants and hematotoxicants mixtures. It said the potential health risks for each of the mixtures was predicted to be below the target risk estimate of 1.0, indicating that adverse health effects from short-term and long-term exposure to the immunotoxicants and hematotoxicants mixtures, of which benzene is a constituent, would not be anticipated. Trans Mountain concluded that overall, the absence of adverse health effects associated with the Project and Project-related marine vessel traffic applied whether benzene was assessed on an individual basis or as part of a mixture.

Living Oceans said Trans Mountain's assessment does not provide the information needed to adequately assess the human health risks, and significantly underestimates the impact of operations on air quality. Living Oceans said that where emissions exceed exposure limits, such as for the respiratory irritants mixture, these emissions should be mitigated to improve air quality and reduce human health risks.

The Upper Nicola Band and Tsawout First Nation said that Project components, including the incremental tanker and tug traffic associated with the Project, would release sulphur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter (PM₁₀; PM_{2.5}) that affect human health, and that exposure to these pollutants can cause respiratory and heart health effects and increase mortality rates in humans. Living Oceans raised concerns regarding emissions from tugs and tankers, and that exceedance of air quality limits for NO_x and SO₂ will occur along the tanker route, and produce plumes that potentially affect long sections of coastline.

Health Canada said the information provided by Trans Mountain suggests that overall, there is low likelihood for acute and chronic health effects due to Project air emissions, including effects due to Project-related marine vessel emissions. Most of the health risks appear to be a result of the ambient air quality, since there are minor changes in health risk estimates for the base, application, and cumulative cases. However Health Canada said deficiencies identified by a number of participants regarding the air dispersion modelling affected its level of confidence, and that individuals with existing respiratory or cardiovascular conditions may experience reactions to even small changes in Project-related emissions. Health Canada said it supports Trans Mountain's commitment to continuous improvement in the implementation of efficient emission control measures and air quality monitoring to manage the health risks due to changes in air quality.

In response to these concerns, Trans Mountain noted that the results of additional air dispersion modelling for marine transportation present the predicted peak 24-hour and maximum annual concentrations for PM_{2.5} and PM₁₀ under the Base Case, Application Case and Cumulative Case, and that the revised results are lower than those assessed in the HHRA of marine transportation. The company said the results of the additional air dispersion modelling for PM do not affect the conclusions of the HHRAs in that they continued to show a low potential for adverse health effects as a result of the Project and Project-related marine vessel traffic.

Trans Mountain said the results of its HHRA of marine transportation revealed exceedances of the one hour Metro Vancouver AAQO for NO₂ under each of the assessment cases (i.e., Base Case, Application Case and Cumulative Case). However, it said maximum predicted annual average air concentration for NO₂ within the LSA for marine transportation (i.e., 5-km buffer extending from the outermost edge of each shipping lane within Burrard Inlet) was below Metro Vancouver's annual AAQO, suggesting that adverse health effects associated with long-term exposure to NO₂ are not expected. Trans Mountain also noted that the results of additional air dispersion modelling show a peak predicted one-hour concentration for NO₂ of 186 µg/m³ for the Base Case, Application Case and Cumulative Case, and this predicted peak is below the one-hour Metro Vancouver AAQO. Trans Mountain said for these reasons, the risk of people experiencing adverse health effects within the LSA for marine transportation from the short-term inhalation of NO₂ is low.

Trans Mountain said the findings of the HHRAs indicate that adverse health effects from SO₂ exposure associated with Project-related marine vessel traffic are not anticipated. In all assessment cases (i.e., Base Case, Application Case and Cumulative Case), the predicted health risks associated with short-term exposure to SO₂ were below the benchmark (or target risk estimate) of 1.0, indicating that peak predicted 10-minute and one-hour air concentrations for SO₂ were less than the corresponding exposure limits. The company also noted that the air dispersion modelling that formed the basis of the HHRAs did not take into account the more stringent fuel sulphur regulations that were introduced in January 2015. Under these regulations, the maximum sulphur content in fuel oils within ECAs is 0.1 per cent. Inclusion of the lower sulphur fuel content into air dispersion modelling would serve to reduce the SO₂ emissions from marine vessels and subsequently the predicted air concentrations of SO₂ in the Burrard Inlet area.

Effects from noise and light

Several participants raised concerns regarding noise, vibration, odour and light emissions from the increase in Project-related vessels. Some intervenors said that the increased use of anchorages in Burrard Inlet and English Bay would detract from the experiences of other marine users and would negatively affect residents in nearby communities through increased noise and light. Others said that the increase in other activities, such as bunkering and increased use of escort vessels, would increase noise and air pollution for users.

MH-052-2018 hearing

During the MH-052-2018 hearing, Trans Mountain submitted a 2017 report prepared for the VFPA titled "Environmental Air Assessment." Annual emission estimates for all of the contaminants of interest including GHGs and NO_x were provided in Tables 37 to 40 for the VFPA Study Area, which extends to the western port jurisdictional boundary at the mouth of the Burrard Inlet. This report indicated that, based on dispersion modelling results with a number of conservative assumptions, which were intended to over-estimate effects, the Project would comply with all applicable ambient air quality objectives in place at that time, including those for nitrogen dioxide (NO₂).

Health Canada said that it is not aware of any information that would alter the views expressed in the department's 2015 letter of comment concerning mitigation and monitoring for the potential health effects of Project-related marine shipping.

TWN filed its Assessment Report in the OH-001-2014 hearing and is of the view that it remains accurate and applicable to the MH-052-2018 hearing. For example, TWN identified the following consequences of marine shipping effects on individual and community health: dietary change and health effects from lack of resources, including traditional staple foods; hindrance of and failure to provide conditions for cultural work.

The BC Métis Federation raised concerns that Project-related marine shipping will impact air quality and human health. In order to address these concerns, the BC Métis Federation made recommendations around clean marine shipping, firm limits on tanker speeds in local waters, and funding for Indigenous health organizations.

Metro Vancouver said that changing standards for nitrogen dioxide (NO₂) as set out in the new Canadian Ambient Air Quality Standards (CAAQS) established subsequent to the OH-001-2014 hearing, and updated new air quality monitoring data, both highlight the potential for significant impacts to onshore air quality.

In response to the concerns from Metro Vancouver, Trans Mountain said that these CAAQS are intended to be objectives for ambient air quality measurements recorded at air quality monitoring stations in large urban areas or municipalities, as opposed to assessing dispersion modelling results (which are inherently conservative) at points close to the emission sources. Trans Mountain has committed to monitor the ambient air quality at a new monitoring station within the fence-line of the WMT, and to comply with applicable ambient air quality objectives as noted in the Air Emissions Management Plan, in accordance with the requirements of NEB Condition 52.

More specific information regarding the mitigation measures being put in place to reduce air emissions from Project-related marine shipping is found in Section 14.7.1 of this report.

Effects from noise and light

Trans Mountain said that it considered anchoring within the assessment of potential effects on the acoustic environment in the OH-001-2014 hearing. It noted that noise related to dropping of anchor chains may contribute to the potential residual effect of annoyance to human receptors by singular sound events and concluded that this potential residual effect was to be periodic in frequency, low-to-medium in magnitude, and not significant.

Trans Mountain said that it intends to manage arriving vessels to minimize the use of anchorages by holding tankers at the Westridge Marine Terminal dock whenever a berth is available, even if cargo transfer is not planned immediately. Trans Mountain also said that if assigned berth is not immediately available, there is inclement weather, or for any other reason the berth or vessel is not ready, the vessel may anchor at one of the four designated anchorages that have been established within the jurisdiction of the VFPA.

The VFPA said that it does not anticipate the number of anchorages will have to be increased to service Project-related tanker traffic. Further, the VFPA said it did not identify a requirement to conduct a Project-related anchorage environmental or risk assessment given that additional Project-related anchorage requirements are not envisioned and the practice of having deep-sea vessels, including tankers, anchor in the Port of Vancouver is well-established.

The VFPA Port Information Guide from May 2018 includes guidelines concerning noise and light for all vessels anchoring within the Port of Vancouver. For example, all vessels, while at anchor, should minimize noise levels and light usage in consideration of local residents. VFPA also created a Noise Monitoring Program to help better understand the source and intensity of port-related noise in order to better respond to community concerns.

Health Canada said that it does not appear that the sound from three ships docked and idling at the same time was evaluated, which is the worst-case scenario for noise generation from docked vessels. Health Canada also said there is no apparent formal complaint resolution plan identified. In the event of public complaints related to Project-related noise as it affects residents adjacent to anchorages, Health Canada recommended that a formal, transparent and readily accessible complaint-response process be in place as a means of identifying and mitigating Project-related noise complaints.

The District of West Vancouver said the Project will bring negative impacts and costs to the District through its regular operations, including the effect of emissions on air quality and noise and light pollution.

NS NOPE repeated their concerns expressed in the OH-001-2014 hearing that the increased noise and light pollution caused by the tankers anchored in Burrard Inlet opposite Westridge Marine Terminal will cause significant adverse impacts to local residents. NS NOPE suggested additional conditions for Trans Mountain related to effects of marine shipping on the residents on the shores of Burrard Inlet, specifically: consideration of effects of shipping on human health, noise effects study, lighting impacts study, and complaints-response process.

Views of the Reconsideration Panel

The Board is of the view that for the purposes of assessing the potential effects on human health resulting from Project-related marine shipping, Trans Mountain followed a generally acceptable risk assessment paradigm, and that its assessment adequately identified and evaluated the potential effects on human health from Project-related marine shipping. The Board notes that Trans Mountain relied primarily on the use of exposure limits developed or recommended by authorities such as Health Canada and the United States Environmental Protection Agency (US EPA). The Board finds this approach acceptable, as these guidelines are broadly protective of human health.

The Board acknowledges that several Indigenous groups, municipalities and federal departments expressed concerns that the potential emissions associated with Project-related marine vessel traffic could affect human health. The Board acknowledges that there would be minor predicted exceedances of the short-term exposure limits for respiratory irritants at the Squamish Nation Capilano 5 reserve and for the District of North Vancouver. The Board notes, however, that these predicted exceedances occurred through all of the assessment cases examined by Trans Mountain. Therefore, the Board is of the view that the contributions of Project-related marine traffic to these exceedances would be inconsequential and not likely to cause significant adverse effects on human health.

A number of intervenors raised concerns regarding the potential health risks associated with exposure to chemicals of potential concern (COPCs) including benzene and 1,3-butadiene. The Board considered these concerns, the evidence of intervenors and the applicant. The Board finds that, based on the generally accepted methodologies used by Trans Mountain, the potential health risks associated with long-term inhalation of chemicals, such as benzene, were below the corresponding exposure limits, and that this applied whether benzene was assessed on its own or as part of a mixture of chemicals. The Board therefore finds that for long-term exposure risks associated with Project-related marine shipping, the maximum predicted concentrations of carcinogenic and non-carcinogenic chemicals, including benzene and 1,3-butadiene, are likely to be lower than the corresponding exposure limits developed by Health Canada and other authorities and, therefore, are not likely to cause significant adverse effects on human health.

The Board acknowledges the relevant conclusions drawn in this chapter on air emissions that, although Project-related marine shipping is expected to result in increased emissions in the Regional Study Area (RSA), such emissions are expected to remain below applicable ambient air quality objectives. As discussed in the section in this chapter on marine air emissions, the Board finds that Trans Mountain's predicted concentrations for both PM_{2.5} and nitrogen dioxide emissions at the Tsleil-Waututh Nation's Burrard Inlet No. 3 reserve, as a result of Project-related marine shipping, are well below the applicable objectives. The Board notes Trans Mountain's commitment to discuss the possibility of undertaking an ambient survey on Tsleil-Waututh Nation's reserve lands. The Board is not persuaded that a program to monitor air contaminants at or adjacent to Tsleil-Waututh Nation's reserve is warranted at this time.

The Board acknowledges that there is an existing regulatory regime governing air emissions from tankers underway or in transit. Trans Mountain would require Project-related tankers and barges to follow international and federal regulations and apply best practices during operations. Under Transport Canada's *Vessel Pollution and Dangerous Chemicals Regulations* pursuant to the *Canada Shipping Act, 2001* these tankers would be required to carry onboard a volatile organic compound management plan that meets the requirements of the International Convention for the Prevention of Pollution from Ships.

As stated in Chapter 10, the Board would impose Condition 52 requiring Trans Mountain to develop an air emissions management plan for the Westridge Marine Terminal. Monitoring conducted pursuant to this plan would verify predicted emissions levels, and would require Trans Mountain to implement appropriate mitigation if there are exceedances of criteria established within the approved plan.

With regard to the concerns raised by participants about noise and light from tankers docked at the VFPA managed anchorages, the Board notes that all vessels at anchor within VFPA's jurisdiction are expected to adhere to VFPA's guidelines regarding noise and light pollution. The Board further notes that Trans Mountain intends to utilize the three berths available at the Westridge Marine Terminal dock in order to reduce pressure on anchorages.

In response to Health Canada's recommendation during the MH-052-2018 hearing to estimate noise impacts based on three ships docked and idling at the same time, the Board is of the view that this is unnecessary because it is adequately covered by Board's established lifecycle compliance verification and enforcement approach. Trans Mountain has control over ships when they are at berth at the WMT. The Board would impose Condition 141 requiring Trans Mountain to conduct and file post-construction noise surveys, including at the WMT.

In response to Health Canada's recommendation and NS NOPE's submissions during the MH-052-2018 hearing for a formal complaint resolution process to address concerns about noise and light from tankers docked at the VFPA managed anchorages, the Board is of the view this mitigation measure is not within Trans Mountain's control. The VFPA remains the steward of the Port of Vancouver. The VFPA has guidelines concerning noise and light for all vessels anchoring within the Port of Vancouver; however, it is not clear from the evidence on the record whether the VFPA has a formal complaint resolution process. Therefore, the Board would include Recommendation 16 encouraging GIC, in conjunction with VFPA, to develop a formal complaint resolution program that gathers community feedback, brings together diverse community stakeholders to facilitate discussions about port-related impacts, and resolves complaints about vessels anchored at the VFPA-managed anchorages.

In conclusion, considering that Trans Mountain will be required to adhere to all federal and international emission requirements to reduce emissions from the Project-related marine shipping, the Board finds that the residual effects from Project-related marine shipping is not likely to cause significant adverse effects on human health, including the health of Indigenous people.

Significance evaluation: adverse effects on human health

	Criteria	Rating	Description
Project effects	Temporal extent	Long-term	Potential human health effects caused by air emissions, noise and light would occur for the duration of operations.
	Reversibility	Reversible	Potential human health effects caused by emissions, noise and light will reverse shortly once the tankers exit the RSA.
	Geographic extent	LSA	The HHRA LSA includes the inbound and outbound marine shipping lanes, the area between the shipping lanes, where it exists, and a 5 km buffer extending from the outermost edge of each shipping lane.
	Magnitude	Low to moderate	Air emissions, noise and light from marine shipping are generally expected to be below regulatory thresholds or guidelines. The instances of minor predicted exceedances of the short-term exposure limits for respiratory irritants at the Squamish Nation Capilano 5 reserve and for the District of North Vancouver occurred though all of the assessment cases examined by Trans Mountain. Therefore, the Board is of the view that the contributions of Project-related marine traffic to these exceedances would be inconsequential.
Cumulative Effects	The Board finds that the contribution from Project-related marine shipping to total cumulative effects on human health is not likely to be significant given that there is an existing regulatory regime that governs the air emissions from the tankers, and the noise and light from vessels at anchor. Taking into consideration that Trans Mountain and Project-related vessels will be required to adhere to all federal and international emission requirements to reduce emissions from Project-related marine shipping, the Board finds that the residual effects from Project-related marine shipping is not likely to cause significant adverse effects. The Board notes that Trans Mountain has set the age limits for tankers that would be acceptable to call at the WMT which in Board's view will improve the efficiency of the vessels resulting in reduction of air emissions. The Board is of the view that as new more efficient vessels account for a greater share of the fleet over time, these standards help in reduction of air emissions from Project-related marine shipping.		
Recommendation	Not likely to cause significant adverse environmental effects.		

14.9 Environmental effects of malfunctions or accidents (spills)

This section discusses the potential environmental effects of spills from Project-related increase in marine vessels. Chapter 10, Section 10.2.17 discusses the effects of spills from the Project, such as from the pipeline or terminals, on various valued environmental components.

14.9.1 Ecological risk assessment methods

In the OH-001-2014 hearing Trans Mountain submitted a Preliminary and Detailed Quantitative Ecological Risk Assessments to evaluate the potential effects of accidental releases at various locations along the marine transportation route. Trans Mountain evaluated a total of six hypothetical scenarios at three different locations with two credible worst-case crude oil spills: 16 500 m³ and a smaller volume of 8 250 m³. Each scenario was evaluated under a range of environmental conditions including winter, spring, summer and fall. Table 30 provides a summary of hypothetical marine transportation oil spill scenarios.

Table 30: Summary of hypothetical marine transportation oil spill scenarios

Scenario	Incident Summary	Release Volume (m ³)
1	Strait of Georgia - Main ferry crossing. Collision with crossing traffic from Fraser River and ferries is a low probability event, but considered because of higher number of crossings per day.	16 500
2		8 250
3	Arachne Reef - Powered grounding is a low probability event due to pilots and tethered tug, but this location is rated with greatest level of navigation complexity for the entire passage. Location also has high environmental value.	16 500
4		8 250
5	Race Rocks - Collision with crossing traffic from Puget Sound and Rosario Strait or grounding at Race Rock is a low probability event, but considered because not all vessels in this location would have pilot onboard.	16 500
6		8 250

Trans Mountain considered the following spatial boundaries for the assessment:

- Oil spill footprint - the area directly affected by oil as a result of a release at various locations along the shipping route; and
- Regional Study Area (RSA) - The RSA is generally centered on the marine shipping route, which extends from the WMT through Burrard Inlet, south through the southern part of the Strait of Georgia, the Gulf Islands and Haro Strait, westward past Victoria and through the Strait of Juan de Fuca out to the 12-nautical-mile limit of Canada's territorial sea. The western boundary of the RSA extends further out to sea than the western boundary of the Salish Sea and the northern boundary of the RSA is limited to the southern portion of the Strait of Georgia. Puget Sound is excluded from the RSA.

Trans Mountain selected ecological receptors to represent species believed or known to be sensitive to spills, and which act as indicators of overall environmental health. Trans Mountain carried out the recovery assessment based on the recovery of ecological receptors following the Exxon Valdez Oil Spill, as many of these ecological receptors also occur along the Project-related shipping route.

Trans Mountain superimposed probability of oiling contours on ecological resource sensitivity maps to quantify the length of shoreline or the area of a particular habitat type that is potentially affected. Trans Mountain said that its ecological risk assessment focused on areas having medium, high or very high probability of oil exposure. Trans Mountain quantified the habitat exposures to different probabilities of oiling and compared that to the total amount of that habitat within the RSA.

Intervenors filed numerous third party expert reports related to marine oil spills.

In the OH-001-2014 hearing, Tsleil-Waututh Nation, City of Vancouver and Living Oceans Society and Raincoast submitted a report prepared by Dr. Jeffrey Short. Dr. Short said that there were shortcomings in Trans Mountain's Ecological Risk Assessment (ERA) with respect to oil spills, including that it:

- i. failed to integrate exposure to oil based on multiple locations, instead choosing a few locations where there might be a higher risk of collision, and omitting some of the most sensitive habitats from its analysis;
- ii. failed to assess hazard based on species sensitivity to oiling independently of oiling probability, took an inappropriately generic approach to assessing sensitivity of species to oiling, and conflated the two concepts of probability and consequence of exposure to oil, which should have been evaluated independently;
- iii. failed to assess the possibility of organisms being exposed to submerged oil; and
- iv. failed to consider all of the ways that oil can harm organisms.

Evaluating exposure to oil based on multiple locations, instead choosing a few locations

Dr. Short's report noted that Trans Mountain's ERA assessed oil exposure risks on the basis of four assumed spill origin locations, one for each ecologically distinct sub-region along the tanker route. It further noted that rather than relying on a single point of origin, the oil exposure assessment should have been based on trajectory modeling results from several points along the tanker route. The report said that integrating exposure risks across several possible spill origin sites provides a more accurate assessment of exposure risk for habitats, especially habitats of high concern such as the intertidal

flats at Sturgeon Bank and the South Arm Marshes. The single spill origin selected by Trans Mountain resulted in a low probability of oiling for these sensitive habitats.

Trans Mountain said that it completed Preliminary Quantitative Ecological Risk Assessments, and Detailed Quantitative ERA to evaluate the potential adverse effects of hypothetical spills from Project-related marine shipping. The ERAs accounted for both the probability and consequences of an accidental cargo spill for six different scenarios. It said that the ERAs were informed by stochastic and deterministic oil spill fate modelling for credible worst-case and smaller spills under a range of environmental conditions representing winter, spring, summer and fall. The ecological consequences of the hypothetical spills were evaluated for ecological receptors representing marine species and habitats found along the shipping route.

Trans Mountain said that it undertook extensive stochastic modelling for three locations, representing spill behaviour, trajectories and fate under realistic combinations of weather and tides in all four seasons. Trans Mountain said that the three hypothetical spill locations bracket the critical habitat for Southern resident killer whale, in addition to capturing major breeding and feeding habitats for marine birds, among other important ecological receptors. It said that the Strait of Georgia hypothetical spill location is in fact most proximal to both the Fraser River Delta and Boundary Bay intertidal habitats that are of great important to shore birds and migratory birds. Trans Mountain said that it rejects Dr. Short's assertion that had the spill location been moved farther north (to a location that would in fact be farther away from these habitats), the oiling risk to these habitats would have been "considerably greater."

Assessing hazard independently of exposure

Dr. Short's report noted that because results from a single location were incorrectly taken as typical of Georgia Strait, habitats and the species that had low estimated likelihood of oiling were then presumed to have low sensitivity to oiling. The report said that the method used by Trans Mountain to evaluate the sensitivity of species to oiling is flawed. Dr. Short said that in the Trans Mountain ERA, species sensitivity to oiling is semi-quantitatively "assessed" by assigning "biological sensitivity ranking factors" (BSF) to species or habitats categorized on the basis of taxonomic or habitat similarity. The four categories considered include seabirds, marine mammals, fish and other inhabitants of the water column and shorelines. Within each category, the same semi-quantitative measures of sensitivity (low, BSF=1; medium, BSF=2; high, BSF=3, and very high, BSF=4) are applied. This approach is invalid because it creates a misleading appearance of false equivalencies for sensitivities to oiling across species and habitats.

Trans Mountain said that the methodology that was used in the ERA of Marine Transportation Spills was based upon the methodology used in the Aleutian Islands Risk Assessment, which is generally regarded as an exemplary study and methodology, and which was recommended by ECCC as an approach that should have been followed by the Enbridge Northern Gateway Project. It said that its ERA demonstrates clearly an independence of evaluation and differentiation between the sensitivity of receptors, and the probability of receptor habitat experiencing oiling.

Assessing the possibility of organisms being exposed to submerged oil

Dr. Short's report noted that Trans Mountain's ERA dismisses the possibility of exposure to submerged oil on the basis of the flawed experimental studies done to evaluate the susceptibility of diluted bitumen to submerge in fresh water from evaporation alone. The report noted the five experimental studies that were conducted to evaluate the environmental conditions and times required for diluted bitumen to submerge in receiving waters, provided limited guidance for predicting the time required for these products to submerge in water. It notes that the thick oil layers (1 mm–20 mm) used in these experiments would rarely occur during the initial discharge phase of a real oil spill unless the spill occurred in a confined area that prevented the oil layer from spreading to its fullest natural extent. The thickness of diluted bitumen slicks that are allowed to spread in unconfined waters is around 0.4 mm, which is 3 to 50 times thinner than the oil slick layers used in the experiments. The report noted that under conditions of warm summer temperatures and moderate wind speeds, the density of diluted bitumen could increase above that of fresh water within as little as 24 hours, which could cause the diluted bitumen to submerge. Further, the report noted that Trans Mountain's ERA excluded potentially major oil exposure pathways, which comprise a host of species, many of which are important for commercial and subsistence harvests.

Trans Mountain said that the scenario advanced by Dr. Short of diluted bitumen achieving a density greater than that of ambient water within 24 hours is not supported by scientific studies, as the shift over to the "secondary" phase of weathering precludes this outcome. Trans Mountain said that more recent literature points to the important role of viscosity in the environmental behaviour of diluted bitumen. It said that as a relatively viscous oil, diluted bitumen is actually less likely to disperse into the water column than conventional crude oils, and concluded that diluted bitumen is likely to pose less risk to aquatic life, or risk that is no different from conventional crude oils.

With respect to the exposure pathways, Trans Mountain said that such exposure pathways were evaluated implicitly in the ERA of Marine Transportation Spills and explicitly in the Detailed Quantitative ERA for Loading Accidents and Marine Spills.

Considering all of the ways that oil can harm organisms.

Dr. Short's report noted that Trans Mountain failed to consider any consequences that may result from photo-enhanced toxicity. This toxicity mechanism has recently been shown to be important for species such as Pacific herring (*Clupea pallasii*) that deposit eggs on intertidal reaches of shorelines and which is an important component of the marine ecosystem in the Salish Sea.

Trans Mountain said that although the potential for photo-enhancement of PAH toxicity exists and has been demonstrated in laboratory studies, it is not considered to be of sufficient importance in the natural environment to merit special consideration. Trans Mountain said that the Detailed Quantitative ERA for Loading Accidents and Marine Spills acknowledged that non-polar narcosis does not address the issue of chemicals that may have a specific mode of action, while also potentially possessing a narcotic effect of lower potency. Trans Mountain said that it believes that phototoxicity is not the primary mechanism of toxicity likely to be responsible for environmental effects in the event of a crude oil spill, and that the ecological relevance of PAH phototoxicity remains questionable, and that it should not be used for environmental management decisions unless its ecological relevance is firmly established.

Concerns raised in the MH-052-2018 hearing

In the MH-052-2018 hearing, several intervenor raised concerns with respect to the adequacy of Trans Mountain's ERA of Project-related marine shipping, including using an indicator species-based approach for assessing the effects of spills.

Living Oceans/Raincoast filed a motion requesting the Board require Trans Mountain to conduct a new risk assessment of Project-related marine shipping that includes all SARA-listed species that may be affected by Project-related marine shipping. Raincoast and Living Oceans submitted that the Board should require the proponent to identify effects and measures with respect to the s. 79(2) requirements for each SARA-listed marine species. They further submitted that the Board should require the proponent to complete a proper risk assessment that addresses effects of Project-related marine shipping, including effects of an oil spill from Project-related marine shipping.

Living Oceans Society, Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation and City of Vancouver submitted "Further report on fate and effect of oil spills from TM project in Burrard Inlet and the Fraser River Estuary, 2018."

Dr. Short's 2018 report raised the same concerns regarding the adequacy of Trans Mountain's ecological risk assessment for the Project as those raised in the OH-001-2014 hearing. The 2018 report also said that the Board's conclusion in relation to Dr. Short's 2015 report regarding assumed spill sizes where the Duke-Point-Tsawwassen ferry route intersects with the marine shipping route was factually incorrect and wrong. Dr. Short said that the spill sizes assumed in his May 2015 report were the same as those that Trans Mountain used for its "credible mean and worst-case" scenarios at the location they modeled.

Dr. Short's 2018 report said that within the Strait of Georgia, Trans Mountain selected a single location to "represent" likely effects from a large oil spill anywhere else within the Strait. This location is at the intersection of the marine shipping route through the Strait and the Swartz Bay-Tsawwassen ferry route. It said that however, Trans Mountain's results, and corresponding conclusions about the magnitude of potential oil spill effects, would have been very different if it had conducted the same analysis for a large oil spill where the other major ferry route intersects the marine shipping route in the Strait of Georgia, a mere 16 kilometres to the northwest of the location Trans Mountain actually used. It said that although Trans Mountain initially considered the intersection of the Duke Point-Tsawwassen ferry route with the marine shipping route as another location to model and assess the ecological effects from a major oil spill, Trans Mountain ultimately did not use that location because it concluded that the likelihood of an oil spill there was too low to warrant consideration.

Dr. Short's report said that despite the similarity of the likelihood of a large oil spill occurring at the two major ferry routes within the Strait of Georgia, the ecological consequences of oil spills occurring at those locations would be very different. It said that based on oil spill trajectory modeling performed by Tsleil-Waututh, a major oil spill originating at the intersection of the Duke Point-Tsawwassen ferry route with the marine shipping route would heavily oil shorelines along the length of Roberts Bank, and could oil shorelines within English Bay and perhaps even Burrard Inlet. If a large oil spill contaminated those locations during the spring or fall bird migrations, it could have catastrophic consequences for migratory waterfowl, and these consequences would be much worse than those anticipated by Trans Mountain. It said that had Trans Mountain relied on modeling from the location of the Duke Point-Tsawwassen ferry crossing intersection with marine shipping route, it would have concluded that shorebirds were more vulnerable than seabirds.

Dr. Short's report said that even spills considerably smaller than the credible mean scenario of 8,250 m³ can have substantial adverse effects on sea- and shorebirds as well as marine mammals and other organisms inhabiting the sea surface, and shorelines, and on organisms inhabiting the water column if the oil submerges. The report said that small to medium sized oil spills on the order of 100 to 1,000 m³ can cause substantial mortalities to seabirds, and estimated effects

for small to medium spills in Canada and in Alaska have the potential to contaminate tens of kilometres of shorelines on time scales of decades.

Snuneymuxw First Nation said that Dr. Short provides evidence that an oil spill in the Fraser estuary could kill 100,000 to 500,000 sea- and shorebirds. This would impact Snuneymuxw's ability to access a food source upon which it has traditionally relied, and could also have a devastating effect on finfish populations which are important to Snuneymuxw people. Dr. Short also notes that marine mammals, including killer whales, are particularly vulnerable to oiling as a result of contact with floating dilbit.

Trans Mountain said that the information contained in Dr. Short's 2018 report is generally the same as that presented in the OH-001-2014 hearing, that the report erroneously interpreted the intent and conclusions of Trans Mountain's evidence regarding the fate and behaviour of diluted bitumen, and the opinions presented lack substantiation through provision of specific numbers or reference to relevant expert studies. Trans Mountain said that as such Dr. Short's 2018 report does not change, or cast doubt on, the findings or conclusions in the NEB Report.

BC Nature submitted a report from Anne Harfenist that raised issues related to inadequate consideration of species at risk in the Preliminary Quantitative Ecological Risk Assessment and Detailed Quantitative Ecological Risk Assessment, and underestimate of impacts on species at risk related to inconsistency of approach based on Aleutian Islands Risk Assessment (AIRA) methodology. B.C. Nature and Nature Canada said that Trans Mountain's assessment approach has the potential to inaccurately estimate potential ecological consequences on marine birds and their habitat. The Anne Harfenist report also says there are deficiencies in the assessment of impacts on marine birds from both oil spills and chronic oiling and that new evidence on the distribution and abundance of marine bird species at risk confirms the likelihood that the habitat-focused approach used in the Ecological Risk Assessment studies underestimates the impact of an oil spill on marine bird species at risk.

In the OH-001-2014 hearing, Trans Mountain said it used a habitat-based approach that stems from the assumption that if habitat is protected, then species that use that habitat will also be protected; and conversely, that if habitat is damaged, then species that use that habitat may be harmed. Trans Mountain said that the habitat-based approach provides an estimate of areas that could be affected by spilled crude oil and therefore, all birds using such habitat are addressed in the assessment, including any federally- or provincially-listed species of concern.

In the MH-052-2018 hearing, Trans Mountain stated that BC Nature's evidence does not include any new or updated information that casts doubt on the methodology used to assess effects of crude oil spills in the OH-001-2014 hearing, or that would lead Trans Mountain to alter its conclusions regarding the potential environmental effects of marine crude oil spills on birds.

Trans Mountain said that the Royal Society of Canada (2015) Expert Panel Report on "The Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments," commented that the risk assessments conducted for Trans Mountain Expansion Project are impressive documents in their scope and detail, and are among the best of their kind.

Views of the Reconsideration Panel

With regard to concerns raised by intervenors on the spill evaluation methodology used by Trans Mountain, the Board finds Trans Mountain's methods to assess effects from marine transportation spills to be acceptable. Trans Mountain followed the approach in the Board's Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities, which requires assessment of potential accidents and malfunctions at representative locations along the marine shipping routes.

The Board in its Ruling No. 24 found that an indicator species approach is appropriate for assessing the effects of spills from Project-related marine shipping. The Board was of the view that a risk assessment that considers potential effects on each individual species for every eventuality would be impractical and of little value since the effects of a spill would depend on site- and situation-specific circumstances associated with the spill. The Board noted that no submissions provided new evidence showing how an ERA could be conducted for each individual species considering these variables. The Board was also of the view that the indicator species approach in Trans Mountain's ERAs is adequate for identifying and assessing effects of spills, and for identifying appropriate mitigation measures that could protect individual species and their habitats. The Board said that it finds the indicator species methodology used by Trans Mountain to be credible and consistent with standard practice for conducting an ERA. The Board notes that this is also supported by the Royal Society of Canada Expert Panel Report.

The Board notes BC Nature's concerns based on the report by Harfenist about the habitat-focused approach taken by Trans Mountain to determine effects of an oil spill on marine birds. However, the Board is of the view that a habitat-focused approach is reasonable, since marine birds using that habitat would be directly or indirectly affected by damage to that habitat. The Board is of this view especially given Trans Mountain's assertion in the OH-001-2014

hearing that any mortality of birds caused by a crude oil spill would be a significant adverse environmental effect, and no such mortality is acceptable under any circumstances.

The Board does not accept the conclusion of BC Nature's Anne Harfenist report that the approach used by Trans Mountain based on Aleutian Islands Risk Assessment (AIRA) methodology resulted in inadequate consideration of species at risk. The Board is of the view that the AIRA methodology is consistent with accepted practice and also notes that the Royal Society of Canada (2015) Expert Panel Report on "The Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments" acknowledged that the risk assessments conducted by Trans Mountain was among the best of their kind. The Board finds that the Preliminary Quantitative Ecological Risk Assessment and Detailed Quantitative Ecological Risk Assessment included adequate consideration of species at risk.

Trans Mountain's ERAs considered a number of hypothetical oil spill scenarios. Dr. Short's report submitted by Tsleil-Waututh Nation, City of Vancouver and Living Oceans Society, questioned whether these scenarios were truly representative, whether they were close enough to particular environmentally sensitive areas, and whether they give an adequately comprehensive view of the potential effects of an oil spill.

The Board agrees that the spill sizes considered in Dr. Short's 2015 report were similar to those that Trans Mountain used for its "credible mean and worst-case" scenarios at the location it modeled 16 km away from the location modeled by Dr. Short. However, the Board does not agree that a credible mean or worst-case scenario spill is likely at the location suggested by Dr. Short. Trans Mountain's marine shipping quantitative risk analysis concluded that a large spill is not a likely event at the location considered by Dr. Short. Therefore, Trans Mountain did not conduct spill modelling at this location. The Board's Views on Trans Mountain's marine shipping quantitative risk analysis, including the likelihood of a spill at this location, are provided in Section 14.11.2. The Board's views on the concerns noted by Dr. Short regarding slick thickness used in research and its effects on the potential for spilled diluted bitumen to sink or submerge are provided in Chapter 8.

The Board has not considered Trans Mountain's scenarios as a demonstration of all the potential locations and volumes of a spill. Rather, the Board has used them as examples that provide an idea of the potential effects pathways that could occur, and together with the evidence from other hearing participants, has generalized such pathways to predict the type of effects that could result from a spill. The Board finds Trans Mountain's approach reasonable and in Board's view the locations modeled by Trans Mountain provide representative effects.

The Board notes that some of the evidence submitted by participants did not always distinguish the source of the spill when discussing the potential effects. The Board agrees that it is not always necessary to make such a distinction. For example, oil spilled from the pipeline or facilities could enter the marine and estuarine environment and affect valued components discussed in this chapter.

In regard to issues related to assessing the possibility of oil exposure to submerged oil in Dr. Short's report, the Board accepts Trans Mountain's assessment of selecting ecological receptors to represent species believed or known to be sensitive to spills, and which act as indicators of overall environmental health. The Board notes that Trans Mountain quantified the habitat exposures to different probabilities of oiling and compared that to the total amount of that habitat within the RSA, which the Board finds acceptable. The Board's views on the environmental behaviour of spilled oil, including the potential for submergence, are included in Chapter 8.

In regard to the concerns raised by Dr. Short with respect to the consequences from phototoxicity, the Board finds that although possible, photo-enhanced toxicity of organisms is not likely to be material to the results of the ecological risk assessment as phototoxicity is not likely a primary mechanism of toxicity. The Board accepts Trans Mountain's evidence based on its review of research conducted on the topic that indicates although the potential for photo-enhancement of PAH toxicity exists and has been demonstrated in laboratory studies, it is not considered to be of sufficient importance in the natural environment to merit special consideration. The Board is of the view that Trans Mountain's ecological risk assessment is adequate to provide an indication of potential environmental effects based on the toxicity pathways used.

14.9.2 Baseline data

In the OH-001-2014 hearing, numerous participants raised concerns about the sufficiency of marine resources baseline data. The Board of the Friends of Ecological Reserves and the City of Port Moody raised concerns over the adequacy of baseline data of marine resources (i.e., fish, vegetation, etc.) within Burrard Inlet and along the shipping lanes. They emphasized that such baseline data is crucial in considering what might be lost if there is a spill, determining effects after a spill, and in crafting criteria for monitoring during post-spill restoration efforts. In response, Trans Mountain said that it conducted the marine transportation effects assessment based on up-to-date research, does not believe that additional data collection would affect the conclusions presented in the Application, and that vessel traffic associated with the Project would represent a relatively small proportion of total vessel traffic along the marine shipping lanes.

B.C. Nature and Nature Canada and ECCC raised concerns about sufficiency of marine bird baseline data.

B.C. Nature and Nature Canada said that without the quantitative marine bird community baseline information, the Project-related impacts cannot be assessed, mitigated and monitored in the event of a large oil spill in the Marine Transportation RSA.

During the MH-052-2018 hearing, ECCC reiterated that a solid marine bird baseline would be key to informing spill response and to inform recovery of marine bird species at risk. Mr. R. MacVicar and the Province of B.C. also outlined the need for marine bird baseline data.

ECCC said that the existing data would not provide a sufficient baseline to inform the development of recovery initiatives, to determine the types and levels of compensation measures, and to allow for an evaluation of recovery success in the event of a spill. It proposed a condition that would require Trans Mountain to develop a marine bird baseline monitoring plan that would describe species composition and their spatial and temporal abundance patterns to identify high consequence areas/habitats in the event of an oil spill.

Trans Mountain agreed that collection of additional baseline marine bird data could contribute to coordinated planning initiatives and said it has provided support to several initiatives to collect additional marine bird data in the Marine Transportation RSA. Trans Mountain said that it was exploring additional options to contribute towards the collection of long-term monitoring data for marine birds that may be affected by the Project-related marine shipping and other industrial activities, in cooperation with regulatory authorities, industry, local communities, Indigenous groups, and other stakeholders.

ECCC stated that during an emergency, its National Emergencies Centre under the Environmental Emergencies Program identifies sensitive ecosystems and wildlife, such as migratory birds. ECCC said that the Canadian Wildlife Service conducts monitoring programs to support its mandate for migratory birds, species at risk, and habitat under its jurisdiction, and that available migratory bird and species at risk distribution and abundance data is shared with the National Environmental Emergencies Centre.

ECCC said that work initiated through the World Class Tanker Safety System is being continued through the Oceans Protection Plan (OPP). The following plans for the coming year are of particular relevance:

- At-Sea-Surveys are currently planned for 2019, with the aims of collecting baseline data to inform emergency response and building on long-term distribution, abundance and habitat use information. These surveys will include >1200 km of transects and >50 days of observer effort, covering both nearshore and pelagic habitat throughout the west coast of Vancouver Island and the Salish Sea. The program will coordinate with ongoing ships-of-opportunity surveys, as well as systematic surveys in the Salish Sea. The program also provides support for future surveys by the Tsleil-Waututh Nation in Burrard Inlet.
- Occurrence data or other products generated by marine bird monitoring activities funded under OPP will be stored either in existing databases or in new databases, archived by the principle investigators.

Trans Mountain committed, in the OH-001-2014 hearing, to participate in additional collaborative partnerships to collect data on marine bird abundance, distribution and diversity in the Marine RSA and to consult with ECCC and other industry and stakeholders on the structure and scope of a monitoring program. Though the initiative did not proceed due to stakeholder availability, Trans Mountain said it remains interested to contribute to marine bird monitoring in the Salish Sea that would grow capacity of local research groups to monitor marine birds and provide a means for them to contribute to a regional marine bird baseline program.

During the MH-052-2018 hearing, ECCC said that the south coast of B.C. and the Fraser River has an extensive shoreline data set collected over many years by several agencies. ECCC said that it utilizes shoreline data collected by the Province of B.C. and shared with ECCC for spill preparedness- and response-related activities. ECCC said that it and other organizations administer a variety of monitoring and research programs which have included nearshore and pelagic vessel-based surveys, aerial surveys for large congregations of marine birds, and long-term shore-based surveys. In the past few years, several groups including the Tsleil-Waututh Nation, ECCC, and Fisheries and Oceans Canada have undertaken work to update the shoreline data set. This included aerial overflights and ground surveys at selected location. The Burrard Inlet was one of areas recently surveyed in 2018. The Burrard Inlet shoreline data has been segmented and is currently being reviewed for quality control.

Views of the Reconsideration Panel

With regard to baseline information, Trans Mountain and participants submitted some general and some specific evidence concerning the distribution of marine habitats and species throughout Burrard Inlet and the RSA. Detailed mapping of all such habitats and species was not provided. However, participants have provided extensive evidence

concerning the potential effects of a spill on relevant marine habitats and species, which, together with the evidence on the general location of such habitats and species, has provided the Board with sufficient information to evaluate the potential significance of effects from spills. The Board notes that there are many marine users in Burrard Inlet and along the shipping lanes. Therefore, in the Board's view, it is not reasonable for Trans Mountain to take on the sole burden of baseline data collection and monitoring to determine the overall effects of potential accidents and malfunctions associated with all shipping operations.

With respect to baseline information for marine birds in particular, including marine bird species at risk, the Board notes that Trans Mountain is supportive of forming a collaborative partnership along with other industry stakeholders operating in Burrard Inlet and along the shipping route. This partnership would collect data on marine bird abundance, distribution, and diversity in the RSA, and on baseline physiological condition of marine birds. The Board further notes that Trans Mountain has provided support to several initiatives to collect additional marine bird data in the Marine Transportation RSA.

The Board notes the work being conducted by or planned for by ECCC through initiatives such as the OPP. The Board is of the view that baseline data collection currently conducted by ECCC should continue, with support from industry, as warranted.

14.9.3 Air quality

As part of its spill modelling investigations of a hypothetical marine spill at the WMT and the Northern entrance to Haro Strait (Arachne Reef), Trans Mountain conducted air dispersion modelling of a hydrocarbon cloud. Trans Mountain said that evaporation accounts for 20 per cent of the fate of spilled diluted bitumen, and the bulk of evaporation occurs within the first two days. Trans Mountain modelled for the airborne transport of the portion of each pseudo component which evaporated from the spill for both spill locations, using CALPUFF air dispersion modelling.

Several participants expressed concerns with respect to the air dispersion modelling conducted by Trans Mountain in support of the spill modelling. Metro Vancouver said that Trans Mountain did not consider a credible worst-case scenario (similar magnitude spill of 16 500 m³ at Arachne Reef) in Burrard Inlet. Metro Vancouver said that Trans Mountain has not taken into account the full range of weather conditions and marine conditions that could prevail during a spill event.

Metro Vancouver conducted an air quality assessment (Levelton report) for four potential oil spill locations in Burrard Inlet and English Bay in order to capture a range of possible tidal and meteorological conditions during a spill. Metro Vancouver made several recommendations, one of which is to require Trans Mountain to establish real-time air quality dispersion modelling. This modelling would have to be capable of considering an oil spill using real-time meteorological observations. Metro Vancouver said that Trans Mountain should be required to provide the modelling results to municipalities and other agencies within 30 minutes of the initiation of a spill event.

Trans Mountain said that the Levelton report modelled spill volumes that were much larger than what is viable or credible in the selected locations. Trans Mountain said that the report over estimated higher airborne concentrations of evaporated volatiles by two orders of magnitude.

Living Oceans Society said that Trans Mountain cannot assume that the evaporation of hydrocarbons following a spill will generally occur within the first 12 hours, as excess concentrations can persist for weeks after a spill. It also said that oil spill air quality monitoring will need to include both primary emissions from the oil slick (e.g., hydrocarbons) and secondary products (e.g., secondary organic aerosol, ozone, organic nitrates). It requested of Trans Mountain that independent scientists, working in coordination with Trans Mountain, be allowed access to any spill or event site so that credible and transparent air quality information can be provided to the public in the days and weeks following the event.

Views of the Reconsideration Panel

The Board finds that any air quality modelling would have certain limitations and uncertainties associated with it. There is always a wide range of possible scenarios (i.e., all possible combinations of oil spill trajectories, oil spill emissions and meteorological conditions) that can be included in the assumptions. The Board acknowledges the importance of understanding the risks, as informed by air dispersion modelling, in planning and responding to an emergency situation. This could assist the relevant authorities, such as the health authorities, to act in a responsible way and be able to respond in a timely manner.

The Board concurs with Trans Mountain that the Levelton report submitted by Living Oceans Society modelled spill volumes that were much larger than what is considered as a credible event. The Board finds that there is little evidentiary basis to support spills of this size to be credible events, as described in this chapter. As a result, the Board assigned low weight to the Levelton report.

The Board recognizes the regulatory framework that applies to marine oil spill preparedness and response as summarized in Section 14.3. As previously noted, the evidence before the Board indicates that there are competent authorities responsible for the marine oil spill preparedness and response regime and that the regime is functioning appropriately. Trans Mountain does not own the Project-related marine vessels and therefore, does not have direct control over the vessel owner's pollution response planning. Evidence filed by Trans Mountain, Transport Canada and Canadian Coast Guard confirms that vessel owners must have an agreement in place for spill response with Western Canada Marine Response Corporation, and vessels must also have a Shipboard Oil Pollution Emergency Plan.

14.9.4 Environmental effects of spills

For the OH-001-2014 hearing, Trans Mountain evaluated potential environmental effects of the tanker marine spill scenarios for four main ecological receptor group/habitat combinations:

- shoreline and near shore habitats;
- marine fish community and supporting habitat;
- marine birds and supporting habitat; and
- marine mammals and supporting habitat.

Trans Mountain divided each receptor group into sub-categories to reflect their sensitivity to oil exposure and assigned a biological sensitivity ranking factor from low (a value of 1) to very high (a value of 4). Trans Mountain assessed the potential for negative environmental effects of oil exposure at any given location by the overlap of the probability of oil presence, and the sensitivity of the receptor or habitat present at that location. If the receptor is an endangered species, or if provincial and national parks or other conservation areas are present, Trans Mountain considered those as additional factors.

Intervenors questioned Trans Mountain's assignment of biological sensitivity rankings for marine mammals, shorelines, and marine fish.

Trans Mountain said that there is potential for oiling of marine bird and marine mammals following an accidental spill of crude oil along the marine transportation route, and that the extent of oiling and its subsequent effects would depend on the size of the spill, the efficacy of measures to contain and recover spilled oil, the ability of oil spill responders to capture and treat oiled animals, and the intrinsic sensitivity of animals to exposure.

Shorelines and near shore habitat

In the OH-001-2014 hearing, Trans Mountain said that low-energy or protected shorelines almost always have a fine subsurface substrate (sand or mud), even though the surface veneer may be coarse pebble, cobble or boulder. It said that the presence of a water-saturated fine subsurface layer is an important factor that affects sensitivity to oil exposure because it provides a barrier that limits oil penetration of sub-surface sediment and hence, limits long-term retention of oil. Trans Mountain said that in contrast, coarse (pebble, cobble or boulder) shorelines that are highly exposed may be coarse to considerable depth, increasing permeability and the potential for retention or sequestration of stranded oil.

Trans Mountain said that tidal marshes are often associated with river mouths and estuaries, behind barrier islands, or on tidal flats where low-energy wave action and fine-grained sediment accumulation provides an elevated surface where marsh vegetation can become established. It said that eelgrass beds are also typically found in soft sediments of protected bays, inlets and lagoons.

Trans Mountain said the ecological risk assessment indicates that while shoreline habitats would be affected by spilled oil along the marine transportation route, the affected areas generally represent a small fraction of total amount of shoreline belonging to each shoreline sensitivity class within the RSA. Trans Mountain said that very little of the potentially affected shoreline habitat is of a type that would tend to sequester spilled oil. It said that although salt marsh and eelgrass habitats are considered to be highly sensitive to oil exposure, these habitats have a very low probability of oiling for these representative scenarios. Shoreline classes with low exposure cobble/boulder veneer over sand would be most affected, but shorelines of this type are more readily restored if oiled, and would recover in a relatively short period of time.

Trans Mountain said that it is expected that shoreline cleanup and assessment techniques would be applied to the spilled oil that reached the shore, and that most of this oil would be recovered. It said that biological recovery from spilled oil, where shoreline communities were contacted by and harmed by the oil or by subsequent cleanup efforts, would be expected to lead to recovery of the affected habitat within two to five years. Trans Mountain said that by comparison, whether cleaned or not, intertidal communities had recovered within five years after the Exxon Valdez oil spill.

Numerous intervenors raised concerns over spilled oil impacting shorelines. Living Oceans Society said that shoreline oiling following a major oil spill would inflict serious injuries to biological communities inhabiting them in the short term, and

lingering effects could persist for decades to a century on porous beaches (gravel, sand and mud) and in intertidal marshes if oil becomes associated with hypoxic sediments or accumulations of organic matter. These lingering reservoirs of oil pose long-term threats to intertidal organisms, predators that consume them, and to marsh-dwelling birds and mammals. Metro Vancouver said that the large tidal range in Burrard Inlet, along with a shallow, sloping coastline, would result in large areas of intertidal and shoreline habitat being exposed, contaminating oysters, barnacles, and other intertidal invertebrates and shellfish species that are relatively immobile, indiscriminate filter feeders.

Trans Mountain said that it does not dispute that small amounts of crude oil can become sequestered and remain in deep, porous beach deposits, or brackish marshes following an oil spill, and that such oil could remain following a Net Environmental Benefits Assessment. Trans Mountain further noted that sequestered oil along shorelines can persist in a relatively fresh state and that small amounts of this oil can get released exposing marine organisms present in the vicinity. However, the isolated nature and low levels of such exposures render the likelihood of population-level effects low.

ECCC said that, depending on the volume, location, time of year, and other factors, an oil spill could have serious, long-lasting effects on important habitats such as eelgrass. Numerous participants expressed concerns about the effects of oil spills on particularly productive and sensitive marine vegetation communities, such as the freshwater, brackish and salt marshes and eelgrass beds on Sturgeon and Robert banks and upriver on the islands of the Fraser River South Arm; and the eelgrass and kelp beds throughout the Gulf and San Juan Islands. Elaine Leckie filed a report which said that an oil spill could result in long term chronic contamination of eelgrass beds. Cowichan Tribes said that because kelp canopies float, they are subject to oiling in a spill, and that bull kelp is particularly vulnerable.

Trans Mountain said that the level of exposure to spilled oil for eelgrass beds and for kelps, being found in the lower intertidal and subtidal areas, is generally lower than for other ecotypes. It said that based on previous spills, effects are expected to be relatively minor.

Trans Mountain said that eelgrass beds generally recover on their own within one or two growing seasons after light to moderate oiling, and that plants that grow from rhizomes in the soil or sediment usually regenerate, even if the aboveground portions exhibit die-back. Trans Mountain said that, with the implementation of appropriate oil spill response activities, recovery of oiled shoreline habitat within two to five years following a large spill is a reasonable expectation, and referenced studies from a number of previous spills. Cowichan Tribes questioned the assertion of complete recovery within two to five years, and said that Trans Mountain did not discuss the potential for residual effects resulting from disruption of biological community structure. This process can in turn free up habitat space which can be utilized by opportunistic species that can slow or inhibit the recovery of the original community.

A number of participants noted the potential for terrestrial vegetation close to shorelines to be affected by a marine spill. The Board of the Friends of Ecological Reserves, for example, said there are numerous rare plants and lichens in the spray zone of terrestrial ecological reserves along the marine shipping lanes that would be susceptible when storms are blowing sea spray laden with toxic oil, and that this would very likely lead to local extirpations. Trans Mountain said that 43 SARA-listed plant and lichen species, and their critical habitat, have the potential to occur in the supratidal zone; and that high wind and wave conditions leading to the formation of sea spray could result in oiling and death of vascular plants, mosses or lichens. Trans Mountain said with regard to SARA-listed terrestrial plant and lichen species in the supratidal zone that could be affected by oiled sea spray, that although the recovery potential of such communities following oiling is unknown, in consideration of their SARA status and the documented sensitivity of some lichen species to air pollution, it must be assumed that the prognosis for recovery would be poor.

In the MH-052-2018 hearing, Tsawout First Nation said that it is concerned about impacts from Project-related marine shipping on the Sand-verbena moth's critical habitat within Tsawout territory, including loss of Yellow sand-verbena habitat in the event of an oil spill in Tsawout territory.

Trans Mountain said that Sand-verbena moth and Yellow sand-verbena are terrestrial species that occupy habitats above the high tide limit. There are no identified direct interactions between Sand-verbena moth (and its host plant) and Project-related marine transportation (routine operations or accidents and malfunctions). Therefore, no adverse effects are anticipated, and no specific mitigation measures are proposed or required.

Marine fish and fish habitat

In the OH-001-2014 hearing, Trans Mountain said that acute effects of spilled oil on marine fish and invertebrates are rarely observed, except in situations where oil is confined and dispersed into shallow water. It noted that acute toxicity is most likely to occur in the initial 24 to 48 hours following an oil spill as compounds associated with acute toxicity tend to be volatile during that period and are rapidly lost to the atmosphere. Trans Mountain identified non-polar narcosis and Blue sac disease as the two major mechanisms of toxicity to marine fish.

Trans Mountain said that the potential for toxicity to the marine fish community is greatest near the surface where more soluble hydrocarbons can dissolve from the floating fresh oil or form droplets that can be temporarily dispersed down into

the water column by wave action. It also said that extensive formation and dispersion of oil droplets into the water column is unlikely to occur in sheltered waters and that the potential for acutely toxic concentrations of hydrocarbons to extend down into deep water is very low, due to the limited solubility of hydrocarbons, and the dilution that would accompany mixing into deep water.

Trans Mountain said that its ecological risk assessment indicates that fish habitat would be affected by spilled oil along the marine transportation route for all oil spill scenarios and seasonal conditions. It said that the potential for negative effects to the marine fish community is generally low as a result of the low potential for dissolved hydrocarbon concentrations in water to reach thresholds that would cause mortality of fish or other aquatic life. Trans Mountain said that the potential for dissolved hydrocarbon concentrations to reach toxic levels would be greatest in shallow water areas, under weather conditions that caused spilled oil to be driven into shallow areas with wave action, leading to localized high concentrations of dissolved hydrocarbons in the water. This could result in the death of fish and invertebrates as a result of narcosis, or could cause abnormalities in developing embryos if spawn was present.

Trans Mountain said that due to the generally low potential for the spill scenarios to cause wide spread mortality of fish, recovery of the marine fish community would be expected to be rapid. It said that even under a worst-case outcome where localized fish kills might be observed, it is expected that the lost biological productivity would be compensated for by natural processes within one to two years. Trans Mountain said that effects of this type were seen following Exxon Valdez oil spill, but large-scale effects at the population level were not observed. It noted that the effects of the Exxon Valdez oil spill on marine fish populations, were either not significant to begin with or recovery occurred within one or two years at most.

Trans Mountain said that effects of the Exxon Valdez oil spill on marine fish and fish habitat were generally limited to areas where oil was driven into near-shore areas, and these effects were for the most part short-term (days to weeks, rather than years). Trans Mountain said that evidence has been presented for longer-term effects on some habitats, such as intertidal pink salmon spawning areas, where sequestered oil may have leached into spawning gravels up to several years after the spill, causing mortality and developmental effects. However, this did not result in effects at the population level for pink salmon. Trans Mountain indicated the most controversial recovery assessment for the Marine Fish Community aquatic receptor after the Exxon Valdez oil spill is the Pacific herring, as there is debate among scientists on the overall impact of spilled oil and the effect it had on Pacific herring populations.

Numerous participants expressed concern over the recovery of marine fish resources resulting from a Project-related marine vessel. Raincoast Conservation Foundation indicated that Trans Mountain's claim that natural processes would compensate for the lost biological productivity within one to two years potentially misrepresents and minimizes the consequences of an oil spill in the RSA on Pacific herring and other forage fishes. It said that Pacific herring in the RSA recruit to the commercially valuable adult population at age three. Theoretically, if there was an oil spill that caused significant mortality to adult, juvenile and larval herring in the RSA, it would take a minimum of three years for the first generation of post-spill herring to recruit to the adult population and represents the earliest possible timeframe for recovery following significant mortality of adult, juvenile and larval herring.

Raincoast Conservation Foundation also said that cumulatively, chronic small discharges of oil contribute more oil to marine environments than the larger, catastrophic oils spills. It said that due to the documented responses of Pacific herring and other fishes to chronic exposures of oil, even relatively small discharges of oil pose a substantial risk to Pacific herring, other forage fish and marine ecosystems in the RSA. Raincoast Conservation Foundation said that Trans Mountain's failure to include chronic oil spills as an existing habitat disturbance to marine wildlife in the RSA represents a substantial omission and serves to minimize the existing hazards that negatively impact wildlife and their habitats in the RSA.

In the MH-052-2018 hearing, Trans Mountain, in its response to an Information request by Nooaitch and SSN said that it evaluated potential environmental effects of worst-case and smaller pipeline spills and oil spills resulting from marine transportation and these results can be applied to evaluate potential spill-related effects on salmonid fish including Chinook salmon and Steelhead trout.

Trans Mountain said that the potential effects of pipeline and marine oil spills on salmonid species, including Coho salmon and Steelhead trout, were evaluated and tested during the OH-001-2014 hearing. It said that there has been no change in Trans Mountain's assessment of potential effects to Pacific salmon species resulting from hypothetical pipeline spills, or hypothetical spills along the marine transportation route.

Squamish Nation said that the potential impacts of a diluted bitumen spill on fish and fish habitat is of significant concern to Squamish. It stated that the spill response procedures and protocols were insufficiently defined to safeguard their waters and resources, and that the residual or mitigated impacts of accidents and malfunctions cannot yet be adequately assessed.

Coldwater said that each year, several species of fish, including Coho, Chinook, and Steelhead, make the journey from the Coldwater River to the Salish Sea and beyond. Coldwater filed a report prepared by PGL Environmental Consultants entitled "Effects of Marine Shipping on Anadromous Species" that stated Trans Mountain failed to assess potential effects of a diluted spill on the threatened and endangered Coho and Steelhead that return to the Coldwater River, including the potential that a

dilbit spill could result in extinction. It said that Trans Mountain's broad assessment of impacts on marine fish – without a specific assessment of potential effects on threatened and endangered species important to Coldwater – is unacceptable because it fails to consider the unique impacts on Coldwater. The PGL report noted that Trans Mountain's conclusions regarding the effects to fish from a Project-related dilbit spill are based on recovery of sockeye salmon stocks following the Exxon Valdez Oil Spill (EVOS) in Alaska in 1989, and said that this is not an appropriate analogy.

Nooaitch said that increased marine shipping is expected to result in adverse effects to salmon stocks, particularly the already declining Chinook; considered by some to be endangered. A spill in the marine environment could extirpate Chinook salmon, which would result in Nooaitch being denied its Indigenous right to fish a species it has relied on for centuries. Louis Bull said that an oil spill would affect salmon which would in turn affect Bears.

In response to Nooaitch Information request, Trans Mountain said that it evaluated potential environmental effects of worst-case and smaller pipeline spills and oil spills resulting from marine transportation and these results can be applied to evaluate potential spill-related effects on salmonid fish including Chinook salmon and Steelhead trout. It said that the environmental effects of hypothetical spills at four locations and in all seasons were considered to be representative of the environmental effects that could occur at almost any location along the proposed pipeline corridor. For each river, season and ecological receptor type, the expected spatial extent, magnitude, duration and reversibility of negative environmental effects was evaluated, based on the effects documented in various case studies. The spatial extent of environmental effects was found to vary, depending upon the season and river characteristics, and both the spatial extent and magnitude of environmental effects was often rated as "high," at least locally.

Cheam First Nation, Chawathil First Nation and Kwantlen First Nation, Seabird Island Band and Stó:lō Tribal Council and Ermineskin said that in light of how small the salmon runs are these days, and how precarious other fish populations (such as sturgeon and eulachon) are, a spill could potentially have very serious impacts on the fish in the Fraser. Further, there is potential for a spill in the Salish Sea to travel up the tidal portion of the Fraser, which could have very substantial impacts on the sturgeon and eulachon that depend on that habitat.

Driftpile said that the proponent should re-evaluate the potential impacts of a spill on species at risk known to spend time in association with the sea floor including the tope, Green sturgeon (special concern), Longspine thornyhead (special concern), Rougheye rockfish (special concern), Northern abalone (endangered), and Olympia oyster (special concern). It further said that the Proponent must prepare measures within the spill prevention and emergency preparedness and response plan for avoiding and mitigating potential effects on these species.

BC Métis Federation expressed concerns regarding contamination of the Salish Sea (and beyond) in the event of a spill. It said that participants raised concerns about potential impacts to water quality, to people who fish and make a living from the ocean and their way of life, as well as the devastating effects that spills have to marine habitat and wildlife along affected shores.

Marine mammals

Trans Mountain said that aquatic mammals, such as otters and mink that rely upon fur for insulation in cold ocean water, are extremely sensitive to oiling, as well as having potentially high exposure to oil ingestion. It said that mammals that rely upon blubber for insulation are less sensitive to external oiling, although the potential for mortality cannot be ruled out due to other exposure pathways or mechanisms. Trans Mountain said that oil ingestion remains a potentially important exposure pathway, and fouling of baleen plates can have adverse effects on baleen whales, although this would not be a problem for toothed whales.

Trans Mountain said that its ecological risk assessment indicates that marine mammal habitat would be affected by spilled oil along the marine transportation route for all oil spill scenarios and seasonal conditions. Trans Mountain said that there is clearly potential for oiling of marine mammal habitat following an accidental spill of oil along the marine transportation route. It said that the degree to which this potential is realized would depend upon the size of the oil spill, the efficacy of measures intended to promptly contain and recover spilled oil, the ability of oil spill responders to capture and treat oiled animals, and the intrinsic sensitivity of the animals to exposure.

Trans Mountain said that while there is a relatively high probability of exposure for seals and sea lions in the event of an oil spill, and some level of negative effect would be expected for animals exposed to oil, the effects would not likely be lethal, except in the case of weaker animals such as pups or older and diseased animals. Trans Mountain said that there is also a high probability of exposure for whales and that while some level of negative effect would be expected for animals exposed to oil, the effects would not likely be lethal, except in the case of weaker animals, such as calves or older and diseased 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. Trans Mountain said that for mammals with very high sensitivity to oil exposure, such as otters, there is a medium probability of exposure along the marine transportation route in the event of an accidental oil spill. It said that some level of negative effect would be expected for animals exposed to oil and exposure during the winter season would be more stressful than exposure during the summer, but in either case, the combination of

hypothermia and damage to the gastro-intestinal system caused by oil ingested through grooming the fur would have the potential to cause death.

Trans Mountain said that, in the event of a spill, the recovery of marine mammals would depend upon the nature of the injuries received. For some mammal species, recovery may occur at a population level within two to five years. However, for populations such as Southern resident killer whale, the loss of a single animal would constitute an effect at the population level and recovery could take a decade or longer.

Trans Mountain said that despite the intensive studies that followed the Exxon Valdez oil spill, findings on the actual effects and recovery remain controversial. Trans Mountain said that recovery conclusions of the Exxon Valdez oil spill for killer whales are complicated by a focus on specific whale groups that are subject to additional stressors and have not recovered, in contrast with population-level trends which are increasing.

Trans Mountain said that many sea otters were severely affected by the Exxon Valdez oil spill and that a large number of carcasses were collected throughout the spill area. Trans Mountain also said that the sea otter population has been slow to recover, although river otters were deemed to have recovered within 10 years after the spill.

Numerous participants raised concern over spilled oil impacting marine mammals, specifically the Southern resident killer whale. Living Oceans Society said that a large diluted bitumen spill anywhere along the tanker route through the Gulf Islands and the Strait of Juan de Fuca would almost certainly kill substantial numbers of marine mammals, especially harbour seals and harbour porpoises, because of their relative abundance in the Salish Sea. It said that exposure of individual killer whales, however, could have adverse population level consequences for this already endangered stock, where premature loss of just one individual could significantly contribute to the jeopardy of this stock.

Raincoast Conservation Foundation said that Pacific herring and other forage fishes represent a crucial conduit of energy and nutrients from lower trophic levels to upper level predators, such as salmon, marine birds, and mammals. It said that because certain contaminants bio magnify up the foodweb, any increased contamination of Pacific herring could potentially influence the contamination load of upper- level predators, including Southern resident killer whale and other species. Trans Mountain said that the exposure of marine mammals to PAHs was generally found to be low, indicating that chronic exposure to PAHs following a crude oil spill under the conditions assessed is not likely to be harmful to species such as the Southern resident killer whale, Humpback whale, harbor porpoise, harbor seal or Steller sea lion. In particular, the chronic exposure of Southern resident killer whale, which are protected at the individual level under the SARA, was low due to the low and temporary level of bioaccumulation of PAHs by its prey (i.e., salmon and other fish). These low levels of exposure are not expected to result in adverse effects, such as death or injury.

In the MH-052-2018 hearing, Mr. Stewart referred to the "SRKW- A science based review of Recovery Actions," which noted that work on preparing for oil or chemical spills to minimize impacts to resident killer whales identified in the 2011 Southern resident killer whale recovery strategy had still not been started. The review also noted that there is no marine mammal response plan in the event of an oil spill in Canada or specific recovery measures to address the threat of ship strikes, because it wasn't identified as a threat during recovery planning.

Raincoast filed a report by MacDuffee that examined the availability of Chinook salmon as an aspect of critical habitat, the existing degradation of that aspect of Southern resident critical habitat, and the effect that an oil spill in the Fraser River estuary could have for the Southern residents and their critical habitat.

Stz'uminus and Snuneymuxw said that it is deeply concerned about the impacts of a spill on the Southern resident killer whale population. It said that it understands from the Dr. Short Report that a dilbit spill would be catastrophic for these whales, with long-term and potentially irreversible effects on population.

Wilderness Committee said that the recovery strategy for North Pacific Humpback whale states that "proposed pipeline projects, associated tanker traffic, and possible offshore oil and gas exploration and development in coastal B.C. all increase the likelihood of toxic spills in Humpback whale habitat in the future, and underscore the importance of protecting critical habitat and supporting mitigation measures and plan." It said that there is not sufficient data from past oil spill events to conclude how Humpback whales specifically are impacted by these spills. However, research after the Exxon Valdez oil spill showed that it accelerated the killer whale population trajectory towards extinction. It said that two groups of killer whales were severely impacted by the spill and suffered losses of 33 and 41 per cent in the year following the spill. Both groups have not recovered to pre-spill numbers even 16 years post spill and one of the groups is listed as deplete under the *Marine Mammal Protection Act*.

Squamish said in the event of a spill, high mortalities of marine mammals could also result for species such as killer whales, porpoises, dolphins and seals that, like seabirds, routinely inhabit the sea surface, making them especially vulnerable to contact with floating diluted bitumen. In the case of the Southern resident population of killer whales, any additional mortalities resulting from oil exposure could materially contribute to the extinction risk for this stock, which would permanently alter ecosystem functioning in the Salish Sea.

Shxw'ōwhámél First Nation asked for the MMPP to include a specific emergency response plan for marine mammals.

DFO said that a marine mammal oil spill response plan is in development. It focuses on preventing exposure of marine mammals, including resident killer whales, to spills. This includes strategies for monitoring and tracking SRKW; prevention of exposure to oil spills by prioritizing cleanup and booming efforts for key areas; and prevention of exposure using acoustic deterrents to keep resident killer whales away from spill affected areas. There are a number of actions completed or underway to support the strategies described above, including: a real time SRKW tracking network in SRKW critical habitat is in development to assist with locating and determining the direction of travel of SRKWs using hydrophones and cetacean sighting. It said that the current Fisheries and Oceans Canada (DFO) approach is to develop a single marine mammal spill response plan that covers all marine mammal species, including SARA-listed species. It focuses on preventing exposure of marine mammals, including resident killer whales, to spills. This includes strategies for monitoring and tracking SRKW; prevention of exposure to oil spills by prioritizing cleanup and booming efforts for key areas; and prevention of exposure using acoustic deterrents to keep resident killer whales away from spill affected areas.

DFO said that in the case of significant spills, it provides advice and input about environmental sensitivities in the spill area and the prioritization of protection measures through the Incident Command System (ICS). It said that the Environmental Unit under the ICS is where technical experts from all response partners combine to provide advice on environmental protection objectives and priorities, strategies and tactic implementation. Species of conservation concern (e.g., SARA-listed species) are considered an "elevated priority" when the Environmental Unit determines the protection objective and its subsequent protection strategies and tactical implementation.

DFO said that a holistic approach for the protection and treatment of marine mammals, invertebrates, fish and turtles for an oil/chemical spill will draw on all relevant information including physical, chemical, biological, and geographic information.

WCMRC said that it has commissioned the development of specific plans as tools for the use of the entire response community. These plans pre-identify critical information that can be used during a response and present a holistic approach for the protection and treatment of marine mammals, terrestrial animals and birds in the event of an oil spill. The Marine Mammal Oil Spill Response Protocol, developed in collaboration with Sea View Marine Sciences, is an example of one such plan. It said that the Marine Mammal Oil Spill Response Protocol has been exercised by WCMRC and applicable stakeholders.

WCMRC filed a Draft Marine Mammal Oil Spill Response Protocol (MMOSRP) which has been developed to integrate into the WCMRC wildlife response protocols for an oil spill response on the B.C. coast. The intent of this MMOSRP is to build preparedness capacity on the B.C. coast by defining a standard for marine mammal response that uses Incident Command System to drive process. It said that the development of this MMOSRP led to the identification of a number of gaps that provide guidance for the next steps in oil spill preparedness planning. These include the following:

- Consolidation and integration of existing resources for the development of an oiled wildlife response network in B.C. including regulatory agencies, rehabilitation centres, marine professionals, oil spill response organizations (i.e., WCMRC), and oiled wildlife specialists into a British Columbia Marine Wildlife Response Team.
- Assemble oil spill response kits for marine mammals.
- Identify oil spill response training required for marine mammals and other marine wildlife.
- Development of species-specific response plans that include assessment, capture protocols, and rehabilitation guidance.

WCMRC said that The Vessel of Opportunity program is a critical component of WCMRC's response readiness regime. It said that using nearby vessels is an excellent way for a response organization to leverage its resources and expertise during an oil spill.

Marine birds

Section 14.7.4 describes the SARA-listed marine birds that may be affected by operational effects of Project-related marine shipping, as well as the status of species recovery strategies. Since issuance of the OH-001-2014 Report, Western grebe and Horned grebe have been listed as Special Concern under Schedule 1 of the SARA. Trans Mountain said that there are no species-specific Recovery Strategies, Action Plans or Management Plans for either species; however, both are included in the Multi-Species Action Plan for Gulf Islands National Park Reserve of Canada.

ECCC said that Barn swallow and Bank swallow were listed under Schedule 1 of the SARA as Threatened since the OH-001-2014 hearing. ECCC said that an oil spill could impact Barn swallow, Bank swallow, and Common nighthawk given that an oiling event could result in adverse effects to coastal habitats that these species, or their prey, frequent. However, due to the distributions of these species and/or the habitats they use in coastal B.C., ECCC said that the potential for sizable interaction is thought to be much lower than for species identified as having higher vulnerabilities.

ECCC stated that, since the OH-001-2014 hearing, Management Plans have been finalized for each of Ancient murrelet, Black-footed albatross, Peregrine falcon, Red knot, and Great blue heron. ECCC also stated that Recovery Strategies have been finalized for each of Common nighthawk and Red knot since 2015.

Trans Mountain noted that no critical habitat has been identified in either a Recovery Strategy or Action Plan for SARA-listed marine bird species. ECCC said that Management Plans for Western grebe, and Horned grebe (western population) and Recovery Strategies for Barn swallow and Bank swallow are currently being prepared. In addition, draft Marine Critical Habitat for Marbled murrelet is being developed for the Salish Sea.

ECCC stated that it continues to be concerned with the potential consequences of a spill resulting from an accident during loading or transportation of oil. In particular, depending on the specific timing, location and other conditions related to an oil spill, it remains ECCC's view that a large scale spill resulting from the Project has the potential to result in significant impacts to marine birds.

ECCC notes that several recovery strategies and action plans place emphasis on acute and chronic oil spills as a major threat to marine birds. Marbled murrelets are described as being among the species most vulnerable to oil spills at sea. Western and Horned grebes have been among the most frequently oiled birds in past spills in Canada and the United States, and both acute and chronic oils are listed as threats to these species. Ancient murrelets are described as highly vulnerable to chronic and acute oil spills, and the recovery plan identifies increased tanker traffic and risk of oil spills as a threat to the species.

Various participants, in both the OH-001-2014 hearing and the MH-052-2018 hearing, raised concerns about oil spill effects on marine birds and their habitat.

Trans Mountain said that shorebirds have a generally low sensitivity to oiling; however, some shorebirds would be sufficiently oiled to result in mortality of adult or juvenile birds, or that eggs would become oiled resulting in embryo mortality. It further noted that oil exposure could extend to affect a large number of known breeding or colony sites for seabirds, as well as a large number of Important Bird Areas in the Strait of Georgia, Gulf Islands, and Strait of Juan de Fuca region. Trans Mountain said that there is a high probability of exposure for seabirds in the unlikely event of a crude oil spill, and some level of negative effect would be expected for birds exposed to crude oil up to and including death as a result of hypothermia, loss of buoyancy, and / or oil ingestion.

B.C. Nature and Nature Canada raised concerns about effects of chronic oil spills on marine birds. Trans Mountain said that as part of its Tanker Acceptance Standard, it would require Project vessels to not discharge any bilge water while within the territorial waters of Canada. Trans Mountain said that escort tugs would discharge bilge water, if required, in compliance with the *Canada Shipping Act, 2001, Vessel Pollution and Dangerous Chemicals Regulations*, which states that discharged bilge water must contain no more than 15 mg/L oil and discharges must be made when the vessel is underway. Trans Mountain said that the requirement to treat bilge water is contained in the International Maritime Organization's International Convention for the Prevention of Pollution from Ships (MARPOL) and in Canada is enforced through the *Canada Shipping Act, 2001, Vessel Pollution and Dangerous Chemicals Regulations*.

During the OH-001-2014 hearing, the City of Vancouver, Tsleil-Waututh Nation, and Living Oceans submitted a report by JWS Consulting LLC on the fate and effect of oil spills from the Trans Mountain Expansion Project on Burrard Inlet and the Fraser River Estuary. The report noted that a major spill could result in a large scale mortality of sea- and shorebirds.

Trans Mountain said that any mortality of birds caused by a crude oil spill would be a significant adverse environmental effect, and no such mortality is acceptable under any circumstances.

During the MH-052-2018 hearing, intervenors including Tsleil-Waututh First Nation, Malahat First Nation, Stz'uminus First Nation, Snuneymuxw First Nation, Squamish First Nation, referred to a report by Dr. Short that concluded that small to medium sized oil spills on the order of 100 to 1 000 m³ from the Project can cause substantial mortalities to seabirds.

Biofilm

In the OH-001-2014 hearing, the Lyackson First Nation stated that if diluted bitumen made it to shore at Roberts Bank, it could potentially adversely affect migratory birds and/or the biofilm and biomat on which they rely. ECCC noted the importance of biofilm to sandpipers and said that in the event of a spill where oil reached the Fraser River estuary, changes to important food supplies, such as biofilm, could have population effects on Western sandpiper and other shorebirds. It recommended a certificate condition that would require Trans Mountain undertake studies on the effects of oil on biofilm with the focus on crude oil, that would fill identified data gaps and would inform emergency response.

Trans Mountain said that oil fate modelling showed that probability of oiling on sturgeon and Roberts Bank is very low, and stochastic oil spill modelling results indicate that oiling potential along mudflats in the Fraser River Delta is limited. Trans Mountain said that any such effects would be reversible and therefore, it was not proposing to undertake studies to investigate potential effects of oil on biofilm.

In the MH-052-2018 hearing, ECCC provided studies that it said provides a greater understanding of the importance of biofilm in the marine shipping area for migratory shorebirds. Trans Mountain said that the studies that have become available recently as a result of the review of the Roberts Bank Terminal 2 Project, provide no new information that would add to the existing assessment of the effects of crude oil spills on biofilm.

Trans Mountain notes that most spills of heavy oils arise from conventional shipping, not from crude oil tanker accidents. Therefore, the perceived risk of oil spills to Roberts and Sturgeon Banks is associated with the broader marine shipping industry, and not the Project specifically.

Wildlife emergency response plan

During the MH-052-2018 hearing, ECCC reiterated its recommendation made in the OH-001-2014 hearing that Trans Mountain develop a Wildlife Emergency Response Plan (WERP). ECCC said that WERPs are documents that outline the initial and ongoing wildlife-related strategies that are needed to support any wildlife response objectives that may occur at the onset of a pollution or non-pollution incident.

ECCC said that Trans Mountain would be best placed to collect migratory bird and species at risk data, conduct risk assessment strategies, identify response strategies, and determine the type and extent of monitoring in relation to various events to inform the Plan, with support and assistance from qualified professionals. ECCC recommended that Trans Mountain consult with ECCC, other relevant regulatory authorities and Indigenous groups in the development of data collection approaches, risk assessment and response strategies, and monitoring approaches that would inform the plan. ECCC would provide guidance, information and relevant data for Trans Mountain to incorporate into the plan, and regular oversight of the effectiveness of its implementation.

ECCC noted that it conducts ongoing baseline surveys of priority marine bird species to identify their abundance and distribution, including SARA-listed species. In the event of an oil spill, this information, as well as on-site reconnaissance and local and Indigenous knowledge, is used to assess the threat to birds. ECCC may also convene the Environmental Emergencies Science Table, an advisory mechanism that coordinates scientific expertise to identify environmental protection priorities for a pollution incident. At this time, ECCC has not developed any species-specific response plans for SARA-listed marine birds that may be affected by Project-related marine shipping, and is not aware of any such plans that have been created by third parties. However, for an oil spill that threatens wildlife, a Wildlife Management Plan is developed. This plan assesses the potential impact to all wildlife in the geographic area. SARA-listed species that may be impacted are specifically identified and prioritized in the Wildlife Management Plan. As well as a Wildlife Impact Assessment, the Wildlife Management Plan also includes wildlife reconnaissance surveys, ongoing monitoring, hazing and deterrence and wildlife collection and rehabilitation.

ECCC said it has been resourced (initially under World Class Tanker Safety Phase II, and currently under Oceans Protection Plan Regional Response Planning sub-initiative) to collect marine bird environmental sensitivities data in marine waters of southern B.C., including but not limited to the Salish Sea.

Trans Mountain, in response, said that ECCC would be best placed to collect migratory bird and species at risk data, conduct assessment strategies, identify response strategies, and determine the type and extent of monitoring in relation to informing WERPs for marine transportation. Through participation in regional planning and preparedness efforts, Trans Mountain understands that other federal government agencies, provincial government agencies, Indigenous and local communities, vessel operators, Western Canada Marine Response Corporation, and other stakeholders would also have a role in one or more aspects related to informing a WERP. Trans Mountain said that it would consider opportunities to implement or support or participate in the collection of information that could be used in a WERP.

Marine bird recovery post-spill

In the OH-001-2014 hearing, Trans Mountain said that recovery of marine birds following the Exxon Valdez Oil Spill (EVOS) was generally rapid and uncomplicated. Trans Mountain said that it is reasonable to expect marine bird recovery at a population level within two to five years following a large oil spill. Trans Mountain further said that populations of alcid birds, which are considered to be most sensitive to spilled oil, could take longer to recover, on the order of 10 years or longer.

B.C. Nature and Nature Canada raised concerns about the post-spill recovery times estimated by Trans Mountain and suggested that Trans Mountain consider other spill events in addition to the EVOS. ECCC said that Trans Mountain's characterization of the EVOS recovery and application of recovery times to potential spill impacts from the Project do not reflect the full breadth of conclusions in the literature regarding recovery times for marine birds. It also said that some studies suggest longer impacts to certain species than what Trans Mountain suggested. Trans Mountain said that its recovery assessments are considered to be realistic.

During the MH-052-2018 hearing, ECCC stated that there is a broad spectrum of results from EVOS studies on marine birds; some provide evidence of longer-term impacts (including suggestions that impacts to some species are still ongoing) and some suggest that impacts only persisted in the short to mid-term.

Views of the Reconsideration Panel

The Board heard several concerns regarding the potential environmental effects of spill on shorelines and near shore habitat, marine fish and fish habitat, marine mammals and marine birds.

The Board also heard from several intervenors that there is potential for a spill in the Salish Sea to travel up the tidal portion of the Fraser, which could have very substantial impacts on various fish species.

The Board is of the view that the environmental effects of a spill from a tanker would be highly dependent on the particular circumstances, such as the amount and the type of product(s) spilled, location of the spill, response time, the effectiveness of containment and clean-up, the valued components that are impacted, and the weather and time of year of the spill.

For example, a small spill that is quickly contained could have adverse effects of low magnitude, whereas a credible worst-case spill could have adverse effects of larger geographic extent and longer duration, and such effects would probably be significant. Dr. Short said that small to medium sized oil spills on the order of 100 to 1 000 m³ from the Project can cause substantial mortalities to seabirds, and estimated effects for small to medium spills in Canada and in Alaska. In the Board's view, there is a spectrum of potential spill outcomes ranging from small quickly contained spills that do not result in significant effects to credible worst-case spills that would result in significant effects. In between these two extremes are other spills that could also result in significant effects depending upon the circumstances.

The Board is of the view that spills could impact key marine habitats, such as salt marshes, eelgrass beds and kelp forests, which could, in turn, affect the numerous species that rely upon them. Spills could also affect terrestrial species along the coastline, including SARA-listed terrestrial plant species.

The Board is of the view that although impacts from a credible worst-case spill would probably be adverse and significant, natural recovery of the impacted areas and species would likely return most biological conditions to a state generally similar to pre-spill conditions. Such recovery may be as quick as a year or two for some valued components, or may take as long as a decade or more for others. Valuable environmental values and uses could be lost or diminished in the interim. For some valued components, including certain SARA-listed species, recovery to pre-spill conditions may not occur.

As discussed in Section 14.11.2, the Board is of the view that although a large spill from a tanker associated with the Project would result in significant adverse environmental effects, such an event is not likely.

In regard to the PGL report entitled "Effects of Marine Shipping on Anadromous Species" submitted by Coldwater, the Board finds that Trans Mountain's ERAs adequately considered various environmental effects of hypothetical spills that are representative of the range of seasonal effects that could result from an oil spill. In the Board's view, a specific assessment Coldwater Steelhead and Coho is not necessary as Trans Mountain's ERA provides an idea of the potential effects that could occur as a result of a spill. The Board is of the view that effects of a spill could be significant, and as noted above, it is dependent on various factors.

In regard to the MacDuffee report, the Board acknowledges the risks that catastrophic events such as oil spills could present to Southern resident killer whales and their prey. The Board is of the view that, as noted above, the effects of a spill are very dependent upon the circumstances. The Board notes the concerns raised by intervenors in regard to the recovery of fish populations affected by a spill. The recovery of fish populations contacted by oil could take a number of years depending on the severity of the impact on the population. For SARA-listed or COSEWIC species (including certain salmonid species), the recovery may take even longer or the populations may never recover. In addition, predators of impacted fish species could also be affected indirectly due to diminishment of their prey.

Several intervenors raised concerns about the impacts of a spill on marine mammals, including the impacts on the Southern resident killer whale population. In the Board's view, mortality of individuals of the SARA-listed species could result in population level impacts and could jeopardize recovery. For example, the Recovery Strategy of the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada states that while the probability of either Northern or Southern resident killer whales being exposed to an oil spill is low, the impact of such an event is potentially catastrophic.

With respect to the concerns raised by Tsawout First Nation regarding impacts of spills from Project-related marine shipping on the Sand-verbena Moth's critical habitat within Tsawout territory, including loss of Yellow Sand-verbena habitat, Trans Mountain noted that there are no identified direct interactions between Sand-verbena Moth (and its

host plant) and Project-related marine transportation (routine operations or accidents and malfunctions). Trans Mountain said that it did not anticipate any adverse effects, and therefore no specific mitigation measures are proposed or required. The Board accepts the logic of Trans Mountain's response to this concern.

Despite suggestions from some intervenors that marine bird critical habitat could be affected by Project-related marine shipping, none of the Recovery Strategies for marine bird species at risk potentially affected by Project-related marine traffic have identified marine bird critical habitat.

Parties have said that large spill would have an adverse effects on marine birds. ECCC filed studies highlighting the importance of biofilm for marine life, including birds. The Board accepts this evidence, and finds that a credible worst-case oil spill, although unlikely, would have a significant effect.

The Board does not accept ECCC's recommendation that Trans Mountain would be best placed to collect the data, develop the required strategies, and determine the type and extent of monitoring required in order to develop a Wildlife Emergency Response Plan. The Board is of the view that ECCC's work in the development of a Wildlife Management Plan which assesses the potential impact to all wildlife, including SARA-listed species, and that also includes wildlife reconnaissance surveys, ongoing monitoring, hazing and deterrence and wildlife collection and rehabilitation demonstrates that ECCC, and not Trans Mountain, is best placed to develop a Wildlife Emergency Response Plan.

The Board acknowledges that a marine mammal oil spill response plan is in development which focuses on preventing exposure of marine mammals, including resident killer whales, to spills. The Board also acknowledges that there is a Draft Marine Mammal Oil Spill Response Protocol which has been developed to integrate into the WCMRC wildlife response protocols for an oil spill response on the B.C. coast. The Board notes that the development of this plan led to identification of a number of gaps that provided guidance for the next steps in oil spill preparedness planning. To further the consideration of response planning for SARA-listed species, including marine mammals, the Board notes that it has included this issue within Recommendation 7.

The Board acknowledges that, since the OH-001-2014 Hearing, there have been improvements in the area of spill prevention, and emergency preparedness and response, as discussed in Section 14.11 of this chapter.

14.10 Socio-economic effects of malfunctions or accidents (spills)

This section discusses the potential socio-economic effects of spills from Project-related increase in marine vessels. Chapter 11 discusses the effects of spills from the Project, such as from the pipeline or terminals, on various valued socio-economic components. A discussion on the spill evaluation methodology can be found in Section 14.9.1

14.10.1 Marine commercial, recreational, and tourism use

In the OH-001-2014 hearing, Trans Mountain said that, while potential socio-economic effects of worst-case and smaller spills will vary depending on the exact location and nature of the incident, particular patterns of resource use in the vicinity and key economic activities in areas that may be reached by a spill, a worst-case spill from a marine vessel could have potentially large impacts on marine commercial, recreational and tourism use.

Trans Mountain said that a marine spill, particularly a large spill that affects one or more important commercial fishing areas, would likely result in loss of commercial fishing income due to regulated or voluntary closures and possibly reduced demand due to concerns about fish quality. It said a Project-related tanker spill could affect the tourism and recreation industry by directly disrupting the activities of tourists and recreationalists, and by causing economic effects to recreation or tourism-based businesses as a result of activities being restricted or prohibited near the spill site and in cleanup areas. Marine spills could potentially damage marinas, boats, and business or commercial establishments and infrastructure, resulting in costs for individuals and municipalities and lost income for affected businesses. Trans Mountain said that in such cases, the vessel responsible for the spill would be responsible for compensating those who suffered damage.

Both Indigenous and non-Indigenous participants noted the significant economic value commercial fishing provides to B.C.'s coastal communities and stressed the very serious risks to the livelihood of those who depend upon it should a spill occur. Indigenous groups, including the First Nations of Maa-nulth Treaty Society, Lyackson First Nation, Cowichan Tribes, Musqueam Indian Band, Tsawout First Nation, T'Sou-ke First Nation, and the Swinomish, Tulalip, Suquamish, and Lummi Indian Nations, expressed concern regarding the impact a spill would have on their economic development interests and commercial harvesting rights.

Several participants raised concerns about the impact a spill would have on recreational and tourism use, either by causing disruption to tourist and recreation activities, or economic loss to local businesses and tourism. Both the City of Vancouver and the City of Victoria noted the contribution tourism and commercial activities serve for the local population and

economy, and expressed concern that an oil spill would result in both short-term and long-term impacts to local businesses and tourism.

Numerous letters of comment described the pristine beauty of the coastal waters of B.C. and the value the natural resources bring to the writers, their families and all visitors to the region through recreational activities and artist endeavors. Many said that if a spill were to occur, there would be a loss in activities such as recreational fishing, whale-watching, ocean kayaking, and recreational boating and sailing, as these are all dependent on clean waters.

The City of Vancouver said it undertook an assessment of the value of the City of Vancouver brand to determine what impact, if any, a small, medium or large oil spill in the Metro Vancouver area would have on the brand value from an economic standpoint. The City of Vancouver concluded that an oil spill would result in the impairment of the Vancouver brand and a reduction in brand value ranging between USD \$1 billion for a small spill and USD \$3 billion for large spill.

The Wilderness Tourism Association of B.C. said that any spill in B.C. would have an impact on B.C.'s Super, Natural British Columbia® brand, and affect both provincial and Canadian tourism industries.

In the MH-052-2018 hearing, participants continued to express concerns about the impact a spill would have on marine commercial, recreational and tourism use, including economic impacts to the commercial fishing and tourism industry, as well as impacts to recreational activities.

Views of the Reconsideration Panel

After considering the relevant evidence filed in both the OH-001-2014 hearing and MH-052-2018 hearing, the Board confirms the following views expressed in the OH-001-2014 Report.

The Board is of the view that the effects of a spill from a tanker would be highly dependent on the particular circumstances, such as the amount and the type of product(s) spilled, location of the spill, response time to contain and recover the spill, the effectiveness of containment and clean-up, the valued components that are impacted, and the weather and time of year of the spill. For example, a small spill that is quickly contained could have adverse effects but of low magnitude, whereas credible worst-case spills would have adverse effects of larger geographic extent and longer duration, and such effects would probably be significant.

The Board acknowledges that many parties expressed concerns about potential short-term and long-term spill effects on resources that they use or depend on. The Board finds that a large oil spill would cause disruptions in people's lives, especially those people who depend on the marine environment for commercial and recreational activities and other uses. As discussed in Section 14.9.4, the Board finds that although impacts from a credible worst-case spill would probably be adverse and significant, natural recovery of the impacted areas and species would likely return most biological conditions to a state generally similar to pre-spill conditions. Certain values and uses could be lost or diminished in the interim. The Board views recovery of the socio-economic environment as the time when immediate impacts and interruption to people's lives are no longer evident, and the natural resources upon which people depend are available for use and consumption. The Board notes Trans Mountain's commitment to use available spill response technologies to mitigate spill impacts to ecosystems and assist in species recovery. The Board is of the view that implementation of an appropriate spill response, and measures such as compensation and harvest restrictions or closures would lessen the effects experienced until resource-dependent species recover.

As discussed in Section 14.11.2, the Board is of the view that although a large spill from a tanker associated with the Project would result in significant adverse environmental and socio-economic effects, such an event is not likely.

For all socio-economic elements, the Board has incorporated the potential consequences of a spill into its discussion on Spill Risks in Chapter 1, and considered them in its overall weighing of the benefits and burdens of the Project in Chapter 2.

14.10.2 Heritage resources

In the OH-001-2014 hearing, Trans Mountain said that heritage resources could be affected by a spill in a number of ways. Oil and cleanup activities can directly damage artifacts and sites or disturb their context, which may result in permanent loss of information critical to scientific interpretation.

Several intervenors expressed concerns regarding the impacts an oil spill would have on heritage resources along the marine coastline. Pauquachin Nation said it conducted an Archaeological Overview Assessment of the marine shipping component of the Project and found that there are potentially hundreds of sites at theoretical risk. Pauquachin Nation recommended that a general archaeological specific spill response plan be developed and include protocols and procedures to ensure protection of archaeological sites where possible, and mitigation of impacts where these are unavoidable.

Scia'new First Nation said the coast is dotted with registered archaeological sites, burial sites and sacred sites that may be affected by oil contamination from small or large mishaps, and impacts associated with cleanup measures following a spill.

In the MH-052-2018 hearing, intervenors continued to express concerns about the impact a spill would have on heritage resources including how the effects of an oil spill would cause loss, damage or contamination of important archaeological resources.

Views of the Reconsideration Panel

After considering the relevant evidence filed in both the OH-001-2014 hearing and MH-052-2018 hearing, the Board confirms the following views expressed in the OH-001-2014 Report.

The Board acknowledges the high degree of concern Indigenous groups have regarding potential spills or contamination of the ocean, and how it would impact archaeological sites located on the shoreline. The Board is of the view that the effects of a spill from a tanker would be highly dependent on the particular circumstances, such as the amount and the type of product(s) spilled, location of the spill, response time to contain and recover the spill, the effectiveness of containment and clean-up, and the weather and time of year of the spill. A credible worst-case spill would have adverse effects.

The Board is of the view that the effects of a credible worst-case spill on heritage resources could be adverse and significant. However, as discussed in Section 14.11.2, the Board is of the view that although a large spill from a tanker associated with the Project would result in significant adverse environmental and socio-economic effects, such an event is not likely.

The Board encourages Indigenous groups to participate in the spill response planning process with regulatory authorities such as the Canadian Coast Guard and Transport Canada, and the certified response organization WCMRC. The Board also encourages Indigenous groups to share information regarding potential archaeological and cultural heritage sites with the B.C. Ministry of Forests, Lands & Natural Resource Operations.

14.10.3 Community well-being

In the OH-001-2014 hearing, Trans Mountain said that marine oil spills may adversely affect community well-being by affecting cultural and heritage resources, traditional lands, culture, and practices and psychological well-being.

Several participants raised concerns about the impact a spill would have on their quality and enjoyment of life, and community well-being.

Numerous letters of comment explained personal attachments the authors have with the land and water, and described how life would change in the event of a spill. Many commenters described a sense of devastation and incalculable loss at the thought of a spill.

The Village of Belcarra said that an oil spill of any size into Central Burrard Inlet would irreparably harm the social fabric of the Belcarra community which includes fishing, tourism and recreation.

Mr. Guy McDannold said that an oil spill would cause socio-economic devastation, the destruction of the fishery, tourism and the established way of life so important to the communities in the area. The result would be a catastrophic loss of the foundation upon which the communities and the lives of those on the south west coast of Vancouver Island are built. Mr. McDannold said that an oil tanker spill would kill the small coastal communities, and that people would no longer have a reason or ability to live there.

Ms. Sara Steil said that, along with the unknown physical effects attributable to an oil spill, there would also be mental health effects. Job and income loss, and the loss of the attributes of unspoiled natural beauty of the area could deeply affect the members of a community, whose identities have been formed around living in close proximity to these attributes. As an island community; the sea and shorelines are part of the fabric of its existence.

In the MH-052-2018 hearing, participants continued to express concerns about the impact a spill would have on community well-being, including how a spill would negatively affect their quality and enjoyment of life, and community well-being.

Views of the Reconsideration Panel

After considering the relevant evidence filed in both the OH-001-2014 hearing and MH-052-2018 hearing, the Board confirms the following views expressed in the OH-001-2014 Report.

The Board considered all of the evidence regarding the value that people and communities place on a healthy natural environment. The Board is not able to quantify how a spill could affect people's values and perceptions, given that it would be highly dependent on the particular circumstances. The Board finds that a credible worst-case spill would be

likely to have short-term negative effects on people's values, perceptions and sense of well-being. The Board is of the view that implementation of appropriate mitigation and compensation following a spill would lessen these effects over time. The Board is also of the view that appropriate engagement of communities in determining spill response priorities, identifying community impacts, and developing associated community mitigation plans can also lessen effects on communities. As discussed in Section 14.11.2, the Board is of the view that although a large spill from a tanker associated with the Project would result in significant adverse environmental and socio-economic effects, such an event is not likely.

14.10.4 Local infrastructure and services

Trans Mountain said that in the event of a spill, particularly a credible worst-case incident, demands are likely to be placed on local, municipal, regional and independent emergency responders, hospitals, clinics, social service and relief organizations, and local, municipal, regional and federal government officials and staff.

During both the OH-001-2018 hearing and MH-052-2018 hearing, participants, including several municipalities, expressed concern that a spill response would cause a significant draw on resources, including the need for increased operational staff.

Views of the Reconsideration Panel

The Board acknowledges the high degree of concern municipalities have regarding potential spills, and how it would impact local infrastructure and services. The Board finds that a credible worst-case spill would be likely to have short-term negative effects on infrastructure and services; however, as discussed in Section 14.11.2, the Board is of the view that although a large spill from a tanker associated with the Project would result in significant adverse environmental and socio-economic effects, such an event is not likely. The Board is of the view that implementation of appropriate spill response measures following a spill would lessen these effects. A more detailed discussion of the commitments and initiatives by Trans Mountain, WCMRC and the Federal Authorities regarding spill response is found in Section 14.11.3.

14.10.5 Traditional marine resource use

In the OH-001-2014 hearing, Trans Mountain said that Indigenous peoples have historically used or presently use the shipping route to maintain a traditional lifestyle and continue to use marine resources throughout the Salish Sea region for a variety of purposes, including fish, shell-fish, mammal and bird harvesting, aquatic plant gathering, and spiritual/cultural pursuits, as well as through the use of waters within the region to access subsistence resources, neighbouring communities and coastal settlements.

Trans Mountain said that although the risk of a Project-related oil spill was shown to be low, evidence from the Exxon Valdez Oil Spill indicates that subsistence harvesting by Indigenous communities and individuals would be affected. Trans Mountain said that adverse effects resulted from reduced availability of fish and wildlife, concern about possible health effects of eating fish and wildlife, and disruption of traditional lifestyle due to participation in, or disturbance by, cleanup activities. The company said fears about food safety diminished over time and harvest levels increased since the spill, but the increase has been variable, and composition of harvested species has changed. Trans Mountain noted that other factors have influenced this change and discerning what is spill-related is difficult.

Indigenous groups in the marine corridor expressed concerns about the impacts of spills. Several Indigenous groups, including Tsawout First Nation, the First Nations of Maa-nulth Treaty Society, and Musqueam First Nation, said that rights were not being accommodated and that if a spill occurred, it would impact their ability to exercise harvesting rights as a result of access restrictions due to regulated or voluntary spill-related closures, or damage to vessels or gear. They also expressed concern that an oil spill may damage culturally or spiritually sensitive areas, or cause interruption of traditional ceremonies during the cleanup period.

A number of Indigenous groups, including Musqueam First Nation and Scia'new First Nation, described the importance and value of aquatic resources for their subsistence activities and culture. Many Indigenous groups, including Snuneymuxw First Nation and the First Nations of Maa-nulth Treaty Society, expressed concerns that an oil spill may reduce the quantity and quality of marine resources and wildlife. They said this impact could extend beyond when closures are lifted. They noted that just because the probability of a spill is small, that is not sufficient reason to determine the effects of a spill are not significant. They also noted concern that there is no adequate compensation for loss of marine resources in the event of large spill.

Several Indigenous groups, including Tseil-Waututh First Nation and Stz'uminus First Nation, noted that an oil spill would affect integral aspects of their culture including their subsistence, economy, social activities, ceremonial activities, cultural transmission, and water based travel. Tseil-Waututh Nation said that there is not one single negative effect to Tseil-Waututh culture from the potential spills associated with the Project, but rather a number of effects and cascading effects

that reach all aspects of Tseil-Waututh culture. The most certain negative effect would be further dislocation from their territory and the resources of that territory. Many Indigenous groups said that if there is an oil spill, the adverse effects could be catastrophic and devastating, causing severe and irreparable harm, and remain for many years as a result of loss of cultural knowledge.

Through its extensive engagement activities, Trans Mountain said that it understands that an oil spill into the marine environment, arising from an incident involving a tanker is a major concern for Indigenous communities. Trans Mountain said it recognizes that an unmitigated oil spill from a tanker could have immediate to long-term effects on the biophysical and human environment of the Salish Sea. Trans Mountain committed to enhanced navigation and safety measures and to the continued identification of improvements to the existing oil spill response preparedness and response capacity, in consultation with Indigenous groups. Trans Mountain also committed to invite all Indigenous groups to attend regional workshops where mitigation measures and monitoring programs will be discussed.

In the MH-052-2018 hearing, Trans Mountain said that it considered the potential effects of a large or credible worst-case oil spill on elements of the environment that support Indigenous rights and interests and Indigenous culture and subsistence in its original Application.

Trans Mountain said that it understands the importance of marine resources to Indigenous communities and understands the concerns in the unlikely event of a spill occurring during tanker transit through their traditional territories. Trans Mountain said that it considered the potential effects of spills on elements of the environment that support Indigenous rights and interests including TMRU and proposed mitigation in its original Application. Trans Mountain said that it also considered and assessed spill effects on environmental health and community wellbeing, including toxic exposure, traditional lands, culture, and subsistence practices and psychological well-being.

Throughout 2015 to the present, Trans Mountain said that it had facilitated introductions and meetings of marine Indigenous communities with the Western Canada Marine Response Corporation (WCMRC). The purpose of these meetings was to inform Indigenous communities of WCMRC's state of preparedness and current plans in place should a marine spill occur and to mitigate the impacts thereof. This includes protection of wildlife, economic and environmental sensitivities.

Indigenous intervenors continued to express concerns about the impacts of spills within the marine corridor. They raised concerns about the impacts that spills would have on their Indigenous and Treaty rights, including interruptions to fishing and harvesting activities due to impacts to the environment and marine resources or spill-related closures. Indigenous intervenors also expressed concerns about the long-lasting impacts to their cultural practices and activities as a result of a spill, noting that the continuity of their culture and identity is dependent upon access to healthy marine resources. Marie Zackuse, Chairwoman of Tulalip Tribes said the following during OTE:

The consequences ... of a spill would be unspeakable. It would affect marine life and shellfish for decades to come. Frankly, it would have the potential to put an end to our Coast Salish lifeways. Without access to healthy fish, clams, and wildlife, our culture and spiritual practice could not continue.

Tseil-Waututh Nation (TWN) provided new confidential information related to their spiritual and cultural connections within these areas, and noted that water pollution caused by oil spills would prevent access to their practices. TWN also noted that the discontinuation of these practices would permanently negatively impact TWN's culture and spiritual practices.

Indigenous communities along the coast and upstream of the marine shipping areas, such as Squamish, Neskonlith, Coldwater, Adams Lake, Little Shuswap Lake Indian Band, and SSN raised concerns with the impacts of marine spills on their ability to engage in traditional practices in relation to salmon. They noted that any spills impacting the health or abundance of salmon or Steelhead upstream would interrupt their fishing, trade, stewardship, story-telling and ceremonial practices associated with these fish. Councillor Chris Lewis from the Squamish Nation said the following during OTE:

"...if the salmon did not return, the stories would not be told because there's no salmon. So that connection to the salmon and the Squamish People is very significant."

Multiple Indigenous communities such as Malahat, Pacheedaht, Lyackson, Musqueam and others noted that there needs to be a greater role for First Nations in spill response. They noted that this would help identify and protect traditional resources, culturally sensitive sites and locations of special importance to First indigenous communities in the event of an oil spill in the Salish Sea. Indigenous intervenors noted that this type of involvement would also fit within the stewardship responsibilities that Indigenous communities have for their traditional territories. The Indigenous Caucus of the IAMC noted that the inclusion of Indigenous peoples in spill response is one of the priorities for the marine subcommittee of the IAMC, and the Caucus had a variety of recommendations regarding the involvement of First Nations in spill response.

Trans Mountain acknowledged the concerns raised by Indigenous communities related to the potential for a marine spill and the adequacy of spill response procedures and mechanisms and the ultimate effect of any oil spill on Indigenous culture and way of life. Trans Mountain submitted that the original assessment conclusions have not changed as a result of the additional evidence provided by Indigenous communities in the MH-052-2018 hearing.

Trans Mountain also acknowledged the concerns raised by non-coastal Indigenous communities regarding the impacts of a marine spill adversely affecting the salmon resources returning from the ocean to inland areas. Trans Mountain said it understands the integral cultural and economic importance of the Thomson and Fraser River fisheries to inland Indigenous communities in B.C. Trans Mountain noted that the assessment of Project-related effects on the exercise of Indigenous and Treaty rights, including in the unlikely event of a spill, was extensively summarized in Chapters 5, 11 and 14 of the Board's OH-001-2014 Report.

Trans Mountain noted that Geographic Response Strategies (GRS) are being developed by WCMRC as part of implementing the Enhanced Response Regime (ERR). It further noted that WCMRC continues to develop partnerships with Indigenous and/or coastal communities as part of their overall community engagement process and in order to develop new and improve existing GRS, including the collection of Traditional Marine Resource Use/Traditional Ecological Knowledge information from Indigenous communities to incorporate into its GRS. Trans Mountain stated that upon request of WCMRC it is ready to assist or facilitate conversations between WCMRC and Indigenous communities.

Views of the Reconsideration Panel

The Board acknowledges the high degree of concern Indigenous groups have regarding potential spills or contamination of the rivers and ocean, and how it would affect their traditional use and cultural identity. The Board acknowledges the effort undertaken by Indigenous communities who provided oral traditional evidence to the Board and shared additional information regarding their traditional marine use areas within the Salish Sea, as well as their concerns regarding the impacts a spill would have on their traditional marine use, cultural practices and activities. The Board has considered all the evidence placed on the record, including that related to marine shipping safety and navigation. The Board also has taken into consideration the commitments by Trans Mountain, WCMRC and the Federal Authorities to engage and involve Indigenous communities in spill response. More information regarding initiatives by Trans Mountain, WCMRC and the Federal Authorities regarding Indigenous involvement in spill response is found in Section 14.11.3.

The Board is of the view that the effects of a credible worst-case spill on the current use of lands, waters and resources for traditional purposes by Indigenous people would likely be adverse and significant.

As discussed in Section 14.9.4, the Board finds that although impacts from a credible worst-case spill would probably be adverse and significant, natural recovery of the impacted areas and species would likely return most biological conditions to a state generally similar to pre-spill conditions. Certain values and uses could be lost or diminished in the interim. The Board notes Trans Mountain's commitment to use available spill response technologies to mitigate spill impacts to ecosystems and assist in species recovery. The Board is of the view that implementation of an appropriate spill response, and measures such as compensation and harvest restrictions or closures would lessen the effects experienced until resource-dependent species recover. The Board finds the probability of a worst-case event is very low.

The Board has incorporated the potential consequences of a spill into its discussion on Spill Risks in Chapter 1, and considered them in its overall weighing of the benefits and burdens of the Project in Chapter 2.

14.10.6 Human health

In the OH-001-2014 hearing, Trans Mountain said for the credible worst-case marine spill scenario (16 500 m³ of spilled oil), comparison of the predicted maximum one-hour average concentrations of the chemicals of potential concern (COPC) to corresponding acute inhalation exposure limits revealed exceedances of the exposure limits were predicted for the following COPC: aliphatic C1-C4, aliphatic C5-C8, and aromatic C9-C16 groups, benzene, toluene, and xylenes. The exceedances indicate the possibility that people exposed to each of these COPC during the early stages of the spill incident could potentially experience adverse health effects.

Trans Mountain said the exceedances were spatially predicted to occur predominantly over water, but in some instances, extended over land, including island communities along the marine shipping route. The areal extent and coverage was greatest for the aromatic C9-C16 group and benzene, with exceedances extending up to approximately 20 km from the spill source. Coverage across this area was nearly complete with a number of island communities located within the affected area. In the case of the aliphatic C5-C8 group, toluene, and xylenes, the areal extent of the exceedances was similar to that of the aromatic C9-C16 group and benzene. However, coverage was much sparser and confined predominantly to areas over

water, with fewer island communities likely to be affected. In the case of the aliphatic C1-C4 group, the predicted areal extent of exceedances did not extend beyond three kilometres from the spill source.

Trans Mountain said the temporal extent of the exceedances followed a biphasic pattern, with the second phase extending out to approximately 20 to 30 hours after the start of the spill event, regardless of the spill size. It is conceivable that these exceedances could occur before the arrival of first responders and the implementation of emergency and spill response measures.

Trans Mountain said a comparison of the predicted maximum one-hour average airborne concentrations of the COPC against the corresponding one-hour Acute Exposure Guideline Levels (AEGL) and Emergency Response Planning Guidelines (ERPG) reveals that the predicted concentrations were consistently lower than these guidelines, including the Tier-1 values, indicating that people in the area would not be expected to experience health effects other than mild, transient sensory and/or non-sensory effects.

Trans Mountain said that, based on the weight-of-evidence, there is no obvious indication that human health would be seriously adversely affected by acute inhalation exposure to the chemical vapours released during the early stages of a spill under any of the simulated and unmitigated oil spill scenarios examined. The health effects that could be experienced by people in the area would likely be confined to mild, transient sensory and/or non-sensory effects, attributable largely to the irritant and central nervous system depressant properties of the chemicals. Odours also might be noticed, which could contribute to added discomfort and irritability.

Trans Mountain said these mild, transient health effects could be experienced under all of the simulated and unmitigated oil spill scenarios examined. However, the intensity of the effects would be greatest for the larger-sized spills because of the higher concentrations of the chemical vapours that could be encountered and the longer durations of exposure. The absence of any serious adverse health effects from exposure to the chemical vapours released from the surface of the oil slick during the early stages of the spill scenarios applies to people in general, including the general public as well as first responders arriving on scene. First responders could remain on scene for some time while working to isolate, contain and recover the spilled oil, and could face the prospect of direct physical contact with the oil and/or more prolonged exposure to the vapours.

A number of intervenors and commenters, including Indigenous groups, and municipal and federal governments, raised a range of concerns regarding potential effects on human health that may result from a spill or accident in the marine environment.

Metro Vancouver and Tsleil-Waututh Nation said the results from their own air quality modelling assessment were based on hypothetical large spills of 16 000 m³ at English Bay, First and Second Narrows, and a spill of 8 000 m³ in Burrard Inlet. The scenarios predicted exceedances for a number of COPC for areas where people may be present (but not permanently living), including Stanley Park, Lions Gate Bridge and Second Narrows Bridge. Tsleil-Waututh Nation said that, based on the simulated scenarios considered, the greatest human health risk from benzene and i-butane is likely to occur during the first hour following an oil spill.

The City of Burnaby said even if a large oil spill in Burrard Inlet is extremely unlikely, the public health consequences could be very significant, given the large and densely populated communities surrounding Burrard Inlet. It said health authorities do not have the capacity for monitoring chemicals released following a large oil spill, and that local public health authorities should be included in incident notification protocols. The City of Burnaby said Trans Mountain has not described how it intends to communicate with health authorities and other agencies, and how it intends to assess and monitor exposure in the event of a spill and to share information necessary to make timely public health decisions.

The City of Burnaby and the Fraser Valley Regional District said Trans Mountain's HHRA results potentially underestimate the predicted health risks. The Cities said the exclusion of possible large spills of gasoline or jet fuel, and potential post-spill health risks associated with all plausible pathways of exposure were not considered.

Health Canada said the effects of oils spills into the marine environment are a major concern of area residents, including Indigenous people, due to effects on marine country foods, the environment and recreation activities. Health Canada said country foods are major components of the Indigenous traditional lifestyle, and it is important to consider potential impacts of a spill on the contamination of, access to, and availability of marine country foods consumed by Indigenous communities.

Health Canada said eliminating or minimizing exposure is of utmost importance to protect the health of a population located in the vicinity of a spill. Health Canada suggested a number of considerations for the development of mitigation measures and spill management plans, including measures to quickly and effectively limit human exposure, the possible time lags for contaminants to appear in country foods, and communications plans and health advisories developed with communities and health authorities. Health

Canada said the magnitude of air quality impacts of spills into the marine environment may be greater than was presented in Trans Mountain's HHRA.

NS NOPE said there is evidence of appreciable but reversible short-term impacts for residents living in spill impact zones. There is an extended range of impacts with potentially longer duration for workers (resident and non-resident volunteers and paid professionals) engaged in clean-up. Although long-term studies are lacking, there is some evidence of respiratory, endocrine, immunological and genotoxic effects persisting for years in highly exposed cleanup workers. NS NOPE said these short- and long-term physical impacts can be mitigated to some extent through the use of appropriate personal protective equipment, and effective health and safety training.

NS NOPE also said mental health impacts were more sensitive indicators of harm than physical impacts, and were most often related to income loss or financial uncertainty. Mental health and community impacts can be mitigated, in some cases, by easing financial uncertainty through timely and satisfactory compensation and through mechanisms that encourage or utilize social support.

Living Oceans said Trans Mountain's two evaluated spill scenarios represent a very small subset of possible failures, environmental conditions and other factors that might affect human health, and therefore do not represent the magnitude of human health risks resulting from a maximum credible worst-case spill. Living Oceans said even considering the limitations of the two scenarios, the modeled releases pose inhalation risks to nearby populations, as well as the potential for significant dermal and ingestion exposures.

Tsleil-Waututh Nation raised a number of concerns about the potential impacts of an oil spill on Tsleil-Waututh Nation's practices and customs. Tsleil-Waututh Nation said, depending on the location, extent and timing of a spill, it could have major impacts on Tsleil-Waututh Nation's practice and custom of relying on salmon for subsistence, would limit Tsleil-Waututh Nation's potential to harvest seabirds and shorebirds, and would severely limit their ability to re-start clam harvesting. Tsleil-Waututh Nation said if their traditional foods sources are negatively affected by a spill, this affects their ability to harvest them, and hence Tsleil-Waututh's primary context for cultural transmission is also negatively impacted.

Matsqui First Nation provided an assessment of the potential impacts of a number of hypothetical spill scenarios (including a marine spill in the Strait of Georgia). Matsqui said the predicted impacts on physical health in each scenario are characterized as severe, including impact outcomes such as higher rates of illness (from lower nutrition due to limited consumption of fish after spill), high stress, and reduced pre-natal health and youth development. Matsqui First Nation said immediate and long-term health related issues from a spill affecting Matsqui reserve lands, the Fraser River or Burrard Inlet were rated as 'extremely significant'.

Pacheedaht said a number of elements were missing from Trans Mountain's assessment of the Project, including potential health effects based on specific consumption patterns, potential health effects associated with abandonment of traditional diet, and a determination of significance of these potential effects.

Pauquachin Nation and Tsawout First Nation raised a number of general concerns about potential impacts on the health of community members, including loss of access to marine resources, and concerns about the potential health effects related to the replacement of traditional foods with store-bought foods.

Trans Mountain said planning and preparedness around emergency and spill response are critical to ensure timely and adequate response to any spill event, to limit opportunities for chemical exposures, such that public health is not threatened or compromised.

Trans Mountain said, to mitigate human health impacts in the event of a spill, environmental monitoring and surveillance programs would be initiated to help guide decision-making. Once a spill has occurred, DFO would be notified, and it, working with other government authorities (e.g., ECCC and the Canadian Food Inspection Agency) and in consultation with other appropriate network resources, would assess the spill. Based on spill location, size and the potential opportunities for people to be exposed to the spilled oil through different exposure pathways, they would determine if additional spill response measures may be needed to protect public health. Trans Mountain said this determination would extend to measures required to ensure the safety of the public food supply, and if warranted, could include controls such as the closure of commercial and recreational fisheries and the issuance of fish, shellfish and/or other seafood consumption advisories.

Trans Mountain said as part of overall emergency and spill response, notification of the public of the spill would include notice to avoid contact with the spilled oil, with examples provided of precautions to take to prevent both direct and incidental exposure. If people might be exposed to the oil through direct skin contact, consultation with the appropriate network resources and public health authorities would be undertaken on measures to be implemented beyond recovery and clean-up. Trans Mountain said closure of public waterways, beaches or shorelines could be ordered by the appropriate authorities if public health or safety were threatened.

During the MH-052-2018 hearing, Trans Mountain said that effects of an oil spill from Project-related marine shipping was another issue that was thoroughly canvassed in the OH-001-2014 hearing. Overall, none of the information filed by intervenors in the MH-052-2018 hearing is new or updated information that is materially different from the information the Board considered in the OH-001-2014 hearing. As a result, Trans Mountain said that the Board's findings in OH-001-2014 hearing remain valid and no changes to the Conditions are warranted.

The Canadian Coast Guard said that it undertakes emergency response planning for marine spills within its mandate, which includes potential spills from Project-related marine shipping. The approach and principles described in the Canadian Coast Guard's response plans are consistent with those described in Health Canada's "Guidance for the Environmental Public Health Management of Crude Oil Incidents – A Guide Intended for Public Health and Emergency Management Practitioners." Both Health Canada and the Canadian Coast Guard prioritize the health and safety of first responders and the public during the spill response.

The Canadian Coast Guard submitted version 2.0 of the Greater Vancouver Integrated Response Plan (GVIRP) for Marine Pollution Incidents. At a local level, the GVIRP integrates public health management during both preparedness and response. There are many organizations that were instrumental and agree in principal to support the implementation and ongoing maintenance of the Plan, including First Nation Health Authority and Vancouver Coastal Health Authority. The GVIRP includes information about the role of health authorities during response to marine pollution incidents that occur, or may occur, in the Greater Vancouver Area.

A number of intervenors and commenters, including Indigenous groups, and municipal governments, raised a range of concerns during the MH-052-2018 hearing regarding potential effects on human health that may result from a spill or accident in the marine environment. For example, a number of municipalities said the Project poses an unacceptable risk of oil spills and the related environmental, health and economic impacts of those spills. Metro Vancouver and the District of North Vancouver said the NEB should recommend that GIC include air quality monitoring during spills in response plans such as the GVIRP and WCMRC Spill Response Plan.

A number of Indigenous communities (i.e., Chawathil First Nation, Cheam First Nation, Kwantlen First Nation, Seabird Island Band, Stó:lō Tribal Council) raised concerns during the MH-052-2018 hearing about potential impacts on the health of community members, including loss of access to marine resources, and concerns about the potential health effects related to the replacement of traditional foods with store-bought foods. For instance, Mr. Mark Sampson a fisherman from the Tsartlip First Nation said the following during OTE:

The marine environment and everything it has to offer is very important to our diet. We need these things in our bodies to continue on growing in a healthy way.

And Councillor Ms. Tumia Knott from the Kwantlen First Nation recounted during OTE the following words from an Elder:

We are the river. The river is us. We are connected to that river. We are responsible for the health and well-being of that river and, in turn, it is responsible for our health and well-being.

The Stó:lō Collective said that air quality is a key environmental concern in relation to Project-related marine shipping, including contributions from a marine spill to regional air quality issues and the contamination of the fish being wind dried. The Squamish Nation said that oil spills from Project-related marine shipping in the Nation's territory will cause significant adverse effects on the health and socio-economic conditions of Squamish Nation members. TWN identified the following effects of an oil spill on individual and community health: diabetes and cancer rates are high in the community and the proposal will only make them worse; the proposal threatens many elements of community health – natural resources, security, community cohesion and well-being, and self-determination.

Evidence submitted by BROKE and NS NOPE, such as the Takaro Update Report and the Updated Ott Evidence, expressed concerns surrounding the potential health effects that could be experienced by communities and clean-up workers as a result of a marine oil spill. NS NOPE said the Board should find that Project shipping will cause significant adverse effects to the health of North Shore communities, and the Board should determine that these effects cannot be justified in the circumstances.

The FER said that Trans Mountain's marine public outreach program should include risks to public health in the event of a marine spill.

In response to suggestions about the health effects of dispersants, the CCG said that no dispersants are currently approved for use in response to ship-source oil spills in Canada. Given that the use of dispersants is not a pre-approved response technique in the marine RSA, Trans Mountain said an evaluation of the combined effects of crude oil and dispersants in the Ecological Risk Assessment of Marine Transportation Spills Technical Report is not warranted.

Views of the Reconsideration Panel

The Board is of the view that, in the event of a spill in the marine environment during shipping, including a large spill, there would be adverse effects on human health. These effects would vary over time and space depending on the location and extent of the spill, and there would likely be exceedances of certain short-term exposure limits for some chemicals of potential concern, including both carcinogenic and non-carcinogenic chemicals, but these would be expected to diminish in the hours following a spill. Some people would likely experience health effects, including a

range of transient effects. These health effects could be experienced in all spills, but the intensity of the effects would be greatest for the larger-sized spills because of the higher concentrations of the chemical vapours that could be encountered and the longer durations of exposure. As noted by Trans Mountain, first responders could face the prospect of direct physical contact with spilled oil, and may have more prolonged exposure to the vapours. Trans Mountain has described its emergency response measures that would be initiated in the event of a spill, including those intended to protect human health. The Board acknowledges that, since the OH-001-2014 hearing, there have been improvements in the area of spill prevention, and emergency preparedness and response.

The Board notes some of the concerns from the OH-001-2014 hearing about the inclusion of local and Indigenous health authorities in marine pollution incidents. The Board is encouraged to see, in the evidence submitted in the MH-052-2018 hearing, that the First Nation Health Authority and Vancouver Coastal Health Authority were instrumental and agree in principal to support the GVIIRP. The Board also notes concerns raised by municipalities in the MH-052-2018 hearing about the inclusion of more detailed information in the GVIIRP around air quality monitoring. The Board is not including a recommendation to the GIC on this topic because the GVIIRP is the product of a cooperative effort and the Board is not well positioned to prescribe detailed requirements.

In response to the suggestion for Trans Mountain to expand its Marine Public Outreach Program to include risks to public health in the event of a marine spill, the Board is of the view that the federal government has the authority to address such matters. Therefore, the Board would include Recommendation 12 encouraging GIC, in conjunction with the Pacific Pilotage Authority and Transport Canada, to continue engagement and awareness activities targeting Indigenous coastal communities, recreational boaters, fishing vessel operators, and operators of small vessels with respect to safety of navigation and prevention of collisions with larger vessels. The focus of these engagement and awareness activities should be determined by the regulatory authorities who have the appropriate jurisdiction and expertise.

The Board assessed all the evidence placed on the record, including that related to marine shipping safety and navigation (for example, the mitigation measures to anticipate and prevent marine spills and protect human health). The Board is of the view that although a credible worst-case spill from a tanker associated with the Project would result in significant adverse environmental and socio-economic effects, the probability of such an event is very low. For example, the Board notes that Trans Mountain's risk assessments, which the Board accepts, show a very low likelihood of major oil spills within Burrard Inlet and English Bay. As discussed further in this chapter, the Board finds that based on evidence filed by Trans Mountain and intervenors, a large spill in Burrard Inlet would result in significant adverse environmental and socio-economic effects. Evidence filed by parties such as the City of Vancouver, City of Burnaby, NS NOPE and BROKE, and the Tsleil-Waututh Nation indicate the potential extent of such effects. However, based on the evidence before it, the Board finds that a large spill in Burrard Inlet is not a likely event. The Board is therefore of the view that the potential effects on human health that are predicted to result from such spill scenarios are also not likely to occur.

14.11 Spill prevention, risk analysis, emergency preparedness, and response

14.11.1 Spill prevention

14.11.1.1 Marine shipping safety

Marine vessel traffic and Project-related tankers

In the OH-001-2014 hearing, Trans Mountain said that the sailing route from the WMT to the high seas outside the mouth of the Strait of Juan de Fuca is a relatively uncomplicated route. The most challenging part of the route is from the WMT to the Second and First Narrows in the Traffic Control Zones (known in the OH-001-2014 hearing as Movement Restricted Areas) within Vancouver Harbour.

Trans Mountain said that weather conditions and oceanographic factors along the tanker route are considered to be mild and should not cause delays or alterations to the vessel route, except for reduced visibility due to fog. The TERMPOL Review Committee said that with respect to the oil tanker transits, there are no restrictions in place along the proposed route aside from those within Vancouver Fraser Port Authority's Traffic Control Zones, where vessels are not permitted to continue transit if weather prevents them from staying on course. The Pacific Pilotage Authority has not had to abort a transit due to poor weather since its inception, and ensures its pilots exercise the practices of good seamanship in adverse weather conditions. The Committee found weather related restrictions beyond existing requirements were not currently necessary and that additional weather monitoring is not required in the southern Strait of Georgia as the area is already adequately monitored.

Trans Mountain said that the global safety record in the marine industry has improved continuously over the past 40 years due to regulatory changes and improved safety procedures. In particular, the worldwide incident frequency involving oil tankers was among the lowest for all marine vessels from 2002 to 2011. Despite the increase in volume of oil transported, the number of oil spills has decreased between 1970 and 2012. Trans Mountain said that between 2002 and 2011, there was one incident on the west coast involving an oil tanker; no damage was done to the tanker's hull and no oil was released. It specifically said that double hull tanker design has significantly reduced the number of oil spills from tankers and that only a fraction of tanker incidents result in the release of oil. Other contributing factors included the segregation of oil cargo tanks, improved reliability of machinery, improved navigational aids, and improved risk management.

Trans Mountain said that there has not been a complete loss of cargo from a double hull tanker over the last 30 years. Between 1998 and 2011, there have been five collision incidents involving double hull and double sided crude and product tankers that led to spills; the average cargo oil outflow was approximately 2,000 metric tonnes. Trans Mountain said that this record highlights the benefits of double hulls in limiting outflow from a tanker in case of hull damage. Trans Mountain said that tankers have operated out of the WMT for 60 years with no oil pollution incident from tanker operations.

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Current data from the International Tanker Owners Pollution Federation filed by Trans Mountain indicated that there is a continued downward trend in large oil spills (>700 tonnes) and medium sized spills (7 – 700 tonnes) from tankers on a world-wide basis despite a world-wide increase in seaborne oil trade.

TERMPOL review process

In the OH-001-2014 hearing, Trans Mountain said that it participated in a TERMPOL review process focused on the increase in marine transportation related to the Project. The review process was chaired and led by Transport Canada. Other federal departments and stakeholders that participated included Fisheries and Oceans Canada, the Canadian Coast Guard, ECCC, the Canadian Hydrographic Service, Pacific Pilotage Authority Canada, British Columbia Coast Pilots and Vancouver Fraser Port Authority.

Trans Mountain said that, in general, the TERMPOL process focuses on the marine transportation components of a project, and examines the safety of tankers entering Canadian waters, navigating through channels, approaching berthing at a marine terminal and loading or unloading oil or gas. With respect to the increase in existing marine traffic related to the Project, the TERMPOL process focused on the effects of the incremental increase in marine traffic related to the Project.

Trans Mountain said that, to fulfill the requirements of TERMPOL, it submitted a number of studies to Transport Canada for review, and that the relevant results of these studies had been incorporated into its environmental and socio-economic assessment. In particular, Trans Mountain said that the results of a quantitative risk assessment informed the assessment of accidents and malfunctions, the description of spill prevention, emergency preparedness and response, and the identification of improved practices.

Transport Canada filed with the Board a copy of the TERMPOL Report which included a number of findings and recommendations from the TERMPOL Review Committee. Trans Mountain said that it supported and agreed to adopt, and provided information on how it would address, each of the recommendations and findings.

The TERMPOL report is discussed more in Section 14.11.2.

Tanker construction and design

Trans Mountain said that before coming to Canada, tankers are required to meet high standards of design and construction:

- Tankers are built according to regulations established by the International Maritime Organization and adopted by their flag state.
- Ship construction and repairs are inspected and documented by a classification society to ensure construction meets these regulations and specifications.
- All oil tankers calling at the WMT would be of double-hull construction and have segregated cargo holds. This type of construction reduces the possibility of cargo spills and minimizes potential spill volume in the event of damage to the hull.

Tanker operations

Trans Mountain said that tankers coming into and departing from the WMT are subject to requirements that contribute to navigational safety and thus spill prevention in Canadian waters.

Trans Mountain said that, throughout operations, tankers are:

- inspected by their flag state, by classification societies and by insurers;
- vetted by charterers and terminals; and
- inspected in other ports of call by inspectors of the respective local national authorities, including those (e.g., Canada) that are signatories to the various international conventions on port state control (ship inspection programs).

Trans Mountain said that its Vessel Acceptance Standard (called Tanker Acceptance Standard in the OH-001-2014 hearing) describes the requirements for accepting a vessel for berth at the Westridge Marine Terminal and it applies to all ocean going tankers carrying crude oil. It said that a common purpose of both the Vessel Acceptance Standard and the Westridge Marine Terminal Regulation and Operations Guide is to maintain, promote and encourage high standards in Project-related marine shipping. It noted the following in relation to its Vessel Acceptance Standard.

- Pipeline shippers own the product shipped on the Trans Mountain pipeline and that the shippers are responsible for chartering tankers to transport the product that arrives at the WMT.
- Pipeline shippers have their own tanker screening and selection process to ensure that tankers calling on the WMT meet international regulations and Trans Mountain's Vessel Acceptance Standard.
- Pipeline shippers are required to submit a Vessel Proposal Form to Trans Mountain prior to the pipeline shipper's first batch of product leaving from Edmonton to the WMT.
- Based on the information submitted and the vessel's inspection history, which is maintained on an international database, Trans Mountain has the right to reject any vessel proposed by the pipeline shipper that does not meet the standards and criteria set by the harbour master for Port of Vancouver, and by Trans Mountain.
- Project-related commitments or NEB condition items would be included in both the Vessel Acceptance Standard and the Westridge Marine Terminal Regulation and Operations Guide as appropriate. For example, the Vessel Acceptance Standard would include the requirement for loaded tankers to have a suitable arrangement for the proposed enhanced tug escort between the WMT and Buoy J prior to departure. The Westridge Marine Terminal Regulation and Operations Guide would provide guidance on the tug, tug procedures, and communication practices.

Upon coming to Canada, tankers are scrutinized to ensure they are compliant with Canadian and Trans Mountain's requirements including:

- Vessels proposed by a pipeline shipper to receive oil at the WMT are pre-screened by the Trans Mountain loading master using industry databases and the company's own records before being accepted or rejected for scheduling purposes.
- The pipeline shipper arranges for a local shipping agent to assist the vessel with local logistical and regulatory requirements.
- A tanker must have an arrangement with a Transport Canada certified response organization for spill response services and a Shipboard Oil Pollution Emergency Plan before entering Canadian waters.
- A tanker must contact the Canadian Coast Guard for permission to enter Canadian waters before entry.

Upon arrival in Canadian waters, tankers must follow strict communications and guidance protocols:

- A tanker must contact the Canadian Coast Guard for permission to enter Canadian waters before entry.
- A tanker travelling in the Strait of Juan de Fuca must use the International Maritime Organization approved traffic separation scheme, which is managed jointly by Canadian and United States authorities. Traffic Separation Schemes are used worldwide and have been proven to reduce the possibility of collision between vessels by regulating the flow of crossing traffic.
- Ship traffic through the shipping lanes in the Salish Sea Region is jointly monitored by the Canadian and United States Coast Guards.
- The tanker remains in communication with the Canadian Coast Guard Marine Communications and Traffic Services and the tanker's position is monitored throughout the transit. A combination of radar, automatic

information system and direct radio communication is used to coordinate safe conduct of the vessel with other masters and pilots.

- Empty tankers headed for the WMT pick up a pilot at the Victoria pilot station near Brotchie Ledge.
- Under the pilot's guidance, and monitored by the Marine Communications and Traffic Services, the ship navigates through the established shipping lanes to Port Metro Vancouver.
- The established shipping lanes maintain separation between inbound and outbound traffic. Many different types of vessels use the shipping lanes to access the ports and terminals of the Puget Sound, various ferry terminals, Robert's Bank terminal, the mouths of the Fraser River, and the Burrard Inlet/Vancouver Harbour.

Once a tanker enters the jurisdiction of Vancouver Fraser Port Authority, a series of additional established operating rules and protocols apply. Should the Project be approved, Trans Mountain said that existing rules and protocols would likely apply subject to improvements resulting from the TERMPOL process and from other federal and provincial reviews currently underway:

- Vancouver Fraser Port Authority rules for conduct of shipping within its jurisdictional area are documented in its Harbour Operations Manual.
- The ship's agent would have requested Port of Vancouver operations to assign an anchorage for the tanker based on availability and operational requirements. A tanker may anchor at one of the designated locations in English Bay or off the WMT, depending on the timing of tides, the WMT loading schedule, and the tanker's own requirements for provisioning and maintenance. In some cases, the tanker may proceed directly to berth.
- Pilots leave the tanker when it is at anchor, but are aboard anytime it moves, even if from anchor to the dock and back.
- The tanker is inspected by Transport Canada upon its first arrival in Canada and once per year after that. This might occur at anchor or alongside the WMT.

Trans Mountain said that, when a tanker berths at the WMT:

- The tanker is assisted by docking and mooring tugs tethered to the tanker at the WMT dock.
- The WMT loading facility is operated in accordance with regulations established by the National Energy Board, Transport Canada, and others as required.
- In accordance with its Tanker Acceptance Standard, prior to commencing any cargo operation, the tanker is physically inspected by Trans Mountain's loading master to confirm both the information presented in the pre-screening and the condition of the vessel. Any deficiencies noted have to be rectified before cargo loading can commence.
- A spill containment boom is deployed to enclose the tanker and terminal. A second boom is on-hand as a back-up in case of an emergency and WCMRC moors a skimming vessel at Trans Mountain's utility dock near the loading dock.
- Loading arms and vapour recovery lines are connected to the tanker. The WMT vapour destruction system is started and loading commences. Loading typically takes 24 to 36 hours depending on the size of the vessel.
- The Loading Master stays aboard the tanker throughout the loading process, and has the authority to stop the loading process at any time should concerns arise. The Loading Master also acts as the key shipside contact for communication with the terminal.
- Terminal operating procedures include an emergency response plan. Staff is trained and regular exercises are held to practice procedures.
- WCMRC has spill response equipment staged on the water in Vancouver Harbour and a main base of operations close to the WMT in Burnaby. WCMRC also maintains equipment caches on Vancouver Island for response in the Salish Sea.
- Trans Mountain has its own spill response equipment.

When tanker loading is complete and the vessel departs:

- Trans Mountain's Loading Master stays on board until pilots come to move the vessel away from the dock.

- After the tugs are made fast, the tanker is cast off and typically goes to anchorage to wait for tide for the Second Narrows transit, as required by Vancouver Fraser Port Authority's Harbour Operations Manual.
- Two Pacific Pilotage Authority-certified pilots come aboard to safely navigate the tanker out of Canadian waters. Laden tankers must have two pilots on board, one to ensure safe conduct of the vessel and one to monitor the bridge crew and ship systems.
- Vancouver Fraser Port Authority's Harbour Operations Manual defines the Second Narrows Traffic Control Zone and associated rules of transit, including daylight transit, size restrictions, required tug escorts and speed restrictions. Only one vessel at a time is allowed in the Second Narrows Traffic Control zone and First Narrows. Marine Communications and Traffic Services monitors the tankers' progress and other vessels' traffic in the Vancouver Harbour.
- Before the transit begins, Marine Communications and Traffic Services declare a clear narrows and the Canadian National Railway is contacted to raise its rail bridge, which spans the Second Narrows.
- Vancouver Fraser Port Authority rules require that two large tugs be tethered to the stern and at least one tug to the bow for the Second Narrows Traffic Control Zone transit. The two large tugs tethered to the stern are required for the transit through the remainder of Vancouver Harbour.
- After clearing the First Narrows, the escort tugs fall away and the tanker transits without escort until it approaches the East Point on Saturna Island.
- The Pacific Pilotage Authority has established tug escort requirements for the Salish Sea region, in particular in Haro Strait through Boundary Pass. A single large tug must be tethered to the tanker before East Point and remain tethered until Victoria. The tug remains in untethered escort until the tanker passes Race Rocks.
- The two Pacific Pilotage Authority-certified pilots disembark at the Victoria pilot station near Brotchie Ledge.
- The tug leaves the tanker at Race Rocks as the tanker enters the Strait of Juan de Fuca.
- No pilotage or escort is required through the Strait of Juan de Fuca but the tanker and all other traffic are monitored by Marine Communications and Traffic Services.
- United States industries fund a rescue tug at Neah Bay, Washington, to assist any vessels in distress in the Strait of Juan de Fuca.
- Upon clearing the Strait of Juan de Fuca, the tanker continues to its destination.

Trans Mountain said that Trans Mountain shippers exporting crude oil via Westridge are aware of the need to only nominate tankers of high operating standards. Shippers know a tanker that fails to be accepted or is rejected outright could lead to delays and business loss. Trans Mountain said that it has not had to reject a tanker once it had been deemed acceptable at the conclusion of the pre-screening for scheduling purposes.

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Pilotage

Trans Mountain, Transport Canada, Pacific Pilotage Authority, The Canadian Marine Pilots Association, and BC Coast Pilots Ltd. discussed pilotage in relation to Project vessels and other marine vessels.

Trans Mountain said that since the issuance of the OH-001-2014 Report, it has continued to engage and work with the BC Coast Pilots Ltd., Pacific Pilotage Authority, Transport Canada, Canadian Coast Guard and the Vancouver Fraser Port Authority to complete its commitments under the TERMPOL Review Committee's Findings and Recommendations. For example, it said that real time navigation simulations have been completed with Aframax vessels simulating arrival, departure and emergency maneuvers involving a simulated expanded marine terminal at the BCIT Marine Campus facilities in North Vancouver. Parties involved were satisfied with the navigation of the vessels in relation with the layout of the expanded marine terminal. It said that BC Coast Pilots Ltd. continues to practice simulated exercises in cooperation with Trans Mountain to ensure safe and efficient movement of Project tankers, and other vessels, through Burrard Inlet.

Pacific Pilotage Authority said that since its input to the OH-001-2014 hearing, it has implemented a number of improvements to further enhance the safety of the marine pilotage operation on the west coast of Canada, which could be considered relevant to the project being considered. It said that the most significant improvements included:

- For enhanced training, testing and mentoring programs, a partnership with the BC Coast Pilots Ltd. regarding ownership and operation of a full mission bridge simulator housed on the premises of the Pacific Pilotage Authority;
- Implementation of a more formalized training program; and
- Development of a sophisticated forecasting model to forecast manpower needs based on the number of projects that are expected to go to fruition.

The Pacific Pilotage Authority noted that one of the courses a pilot is required to take is a tethered tug training course. This is conducted in partnership with the local tug companies who supply tug masters to participate in joint training with the pilots, thereby further refining the use of tethered tugs for tankers. The course tests the attendee's reactions and actions to catastrophic failures along the route of the tanker.

The Pacific Pilotage Authority said that it believes that when all the agreed upon mitigations are in place, the Project vessels can be moved safely within the waters of the west coast of Canada. It noted that pilots on the west coast of Canada have moved crude oil carriers without incident for over 50 years. The Pacific Pilotage Authority said that even with the inclusion on Project-related tankers its overall assignment totals would still be lower than they have been in the past.

The Canadian Marine Pilots Association noted that pilots are not employed by shipowners or shippers. They are dispatched to commercial vessels via regional federal agencies and are formally entrusted with responsibility for conducting vessels, and for making all decisions necessary for their safe navigation. Approximately 50,000 pilotage assignments take place every year in Canada translating to over 2,000,000 assignments since the *Pilotage Act* was enacted in 1972. It said that success rate of these assignments has consistently stood at over 99.9 per cent, despite the increasing size of vessels using the waterways. The Canadian Marine Pilots Association said that the *Pilotage Act* ensures that only the most senior, properly trained pilots would be dispatched to Project-related vessels. It said that the pilots have a unique level of knowledge of local waters and they continue to receive extensive training throughout their career on the latest navigational techniques and the most modern technologies and aids to navigation available. They are able at all times to exercise their best professional judgement, without undue pressure from commercial interests, and with safety as the first consideration. The Canadian Marine Pilots Association said that this system compares favourably with anywhere in the world.

The Canadian Marine Pilots Association said that Canadian pilots are at the forefront of new navigation technology, and are deeply involved in many related international, national and regional forums, and provided examples of innovative developments recently integrated in Canadian pilotage practices.

The Canadian Marine Pilots Association said that it is of the view that the conclusions and conditions contained in the Board's OH-001-2014 Report, as they relate to the safe navigation of Project-related vessels, are sound.

BC Coast Pilots Ltd. said that pilots played an important role during the TERMPOL review of the Project and a related formal risk assessment regarding transits through Vancouver's Second Narrows, providing an independent point of view in the review of the shipping-related operational parameters of the Project, and identifying many required risk-mitigation measures.

BC Coast Pilots Ltd. said that BC Coast Pilots live and work along the B.C. coast and have a lifetime of experience in how tides, geography and weather patterns affect the way ships move in and out of B.C.'s ports and harbours. BC Coast Pilots Ltd. said that pilots across Canada operate under the *Pilotage Act*, which is focused on making sure pilots can operate independently from industry and can provide unbiased service, and fact-based expert opinions, that focuses only on safety and protection of the marine environment.

BC Coast Pilots Ltd. said that in light of pilotage requirements and other risk-mitigation measures that have been identified to provide for the safe navigation of Project-related ships, it is of the view that the conclusions and conditions contained in the OH-001-2014 Report, as they relate to the safe navigation of Project-related vessels, are valid.

The Board's Marine Technical Advisor said that in his view, the competency of the BC Coast Pilots Ltd. is perhaps the most crucial factor in vessel transit safety and incident mitigation.

Marine Communications and Traffic Services, and safe navigation

The Canadian Coast Guard provided an update on improvements and initiatives related to Marine Communications and Traffic Services (MCTS) and the safe navigation of vessels. The role of the MCTS program is to provide communications services to mariners in Canadian waters on a 24/7 basis. This includes responding to vessels in distress, providing safety services to mariners, communicating with vessels, regulating traffic in vessel traffic zones and identifying and tracking vessels operating in Canadian waters through data sensors such as radar and Automatic Identification System. Canadian Coast Guard said:

- Modernization and consolidation of MCTS centres across the country has been completed, including those in Victoria and Prince Rupert. Through the Oceans Protection Plan, existing operational network equipment located at these MCTS centres will also be modernized. Other improvements to MCTS include installation of redundant communications technology, installation of six new radar sites on the West Coast, additional staffing, improvements in hydrography and charting in key areas, and enhanced marine weather services.
- A preliminary assessment of the existing aids to navigation system along the route identified in the Trans Mountain's TERMPOL submission was completed. The assessment evaluated the level of risk in the waterway to determine the appropriate combination of aids to navigation required for risk mitigation, and took into account the larger draft and under keel clearance of Project size vessels. The assessment also identified the authority responsible for implementing and maintaining any new aids to navigation in accordance with existing national directives and policies.
- It is continuing to explore and test e-Navigation concepts and technologies in order to provide current and contextualized marine navigational information to improve marine safety when operating in Canadian waters.
- From 2024 to 2026, the Canadian Coast Guard will replace its RADAR systems as part of its lifecycle management of these assets. The new RADARs will have enhanced capabilities reflective of the latest technology and will foster increased situational awareness accuracy in waters within the scope of the Project.

Emergency towing and places of refuge

Transport Canada and Canadian Coast Guard discussed the increased emergency towing capacity initiative under the Oceans Protection Plan. The objective is to increase emergency towing capacity to assist disabled vessels and enhance both incident prevention and response capacity. Implementation is underway and includes installation of emergency tow kits in caches along the B.C. coast, the leasing of two emergency offshore towing vessels for operations on the West Coast of Canada for three years beginning fall 2018, conduct of a national emergency towing needs assessments; and, developing a long-term national strategy for emergency towing. Transport Canada and Canadian Coast Guard said that the Government of Canada will review the operations of the two leased emergency offshore towing vessels throughout the duration of their three-year lease, including the frequency of their deployment for emergency towing operations. This information will support the development of a long-term approach to emergency towing on the West Coast. Funding models for a long-term national strategy for emergency towing including private, public, and a combination thereof.

Heiltsuk Nation said that the emergency offshore towing vessels referred to by Transport Canada and Canadian Coast Guard would not be in place by the end of 2018 due to a faulty procurement process for the vessels. It submitted that the proposed towing vessels cannot reasonably be taken as contributing to mitigation measures for a credible worst-case spill.

Transport Canada said that pre-identification of potential places of refuge is key in a time-sensitive situation. Pre-planning allows for the deliberate compilation and consideration of information prior to an incident such as information on logistics, environmental sensitivities, human use, navigation, potential use conflicts and local knowledge. It said that it is reviewing and updating the 2007 Places of Refuge Contingency Plan and associated regional plans, with engagement from key partners. The intent is for the work to be completed by 2022.

Vancouver Fraser Port Authority requirements

The Vancouver Fraser Port Authority said that it has developed and formalized Traffic Control Zones, formerly known as Movement Restricted Areas, for the purpose of promoting safe and efficient navigation and environmental protection in the waters of the port. It said that the First Narrows Traffic Control Zone and Second Narrows Traffic Control Zone establish practices and procedures to be followed by ships, including Project-related vessels. The Traffic Control Zone practices and procedures establish a one-way vessel traffic system, navigation clearances, communications protocols, navigation restrictions (i.e., tidal current windows, clear narrows, speed, visibility and wind restrictions), vessel traffic procedures, pilotage requirements and vessel assist (escort) tug requirements.

The Vancouver Fraser Port Authority also noted that it had proposed to Transport Canada Marine Safety and Security in 2018 that the Vancouver & Approaches Traffic Separation Scheme be amended, with a target date for implementation of 2019. It said that the Vancouver and Approaches TSS is a two-way ship routing system providing piloted ships (including Project-related marine shipping), and other large vessels safe access from the Strait of Georgia Traffic Separation Scheme, through English Bay to the Burrard Inlet, accessed via the First Narrows Traffic Control Zone. Changes to the Traffic Separation Scheme are being proposed because of the trend toward increased size and dimensions of ships calling the Port of Vancouver and to improve the alignment of inbound vessels.

Turn Point Special Operating Area

The Friends of Brooks Point expressed concerns about violation of navigational rules within the Turn Point Special Operating Area, an area that Project-related tankers travel through. It said that the current navigational rules in the Turn Point SOA are outdated and inadequate for the current level of shipping and that the rules are not currently enforced.

The Canadian Coast Guard said that it has not observed or reported any marine occurrences or incidents in the Turn Point Special Operating Area in the past 5 years. The Special Operating Area is under 24/7 surveillance by the officers of the Victoria MCTS Centre and information is constantly being exchanged between the MCTS officers and the pilots or bridge officers of obliged domestic vessels navigating within this zone. It said that due to the voluntary nature of the Turn Point Special Operating Area, not all instances of apparent noncompliance are problematic. Although very rare, there are cases where pilots coordinate meeting arrangements that are outside of the standard and then inform the MCTS centre of these arrangements in advance of the encounter. The MCTS centre monitors for compliance with the new expected interaction to ensure the arrangements are safe and properly applied. Transport Canada said that there are no proposed changes to the navigational rules within the Turn Point SOA.

14.11.2 Marine shipping risk analysis

In the OH-001-2014 hearing, numerous participants, including Ms. Daphne Louis and Ms. Sheila Harrington, said that the significant increase in tanker traffic associated with the Project would increase the risk of a large spill and said that the risk of a catastrophic oil spill is too great to allow the Project to proceed. Participants referred to the potential for a spill from a tanker at berth or within Burrard Inlet to be 8 000 m³ or more or for a spill along the marine shipping routes to be the complete loss of the tanker's cargo. Participants said that such scenarios should be considered credible worst-case scenarios.

Lopez No Coalition said that although project tankers will be double hulled and accompanied by tugs, the probability of such a major oil spill in San Juan Islands waters cannot be completely eliminated.

Trans Mountain said that its marine shipping risk analysis considered regional traffic growth, navigational hazards, vessel construction, and risk controls under the existing marine shipping safety regime. The analysis identified potential locations for tanker accidents, the probability of an incident and potential spill volumes associated with those incidents. It said that its marine shipping risk analysis was based on the use of Aframax tankers and the spill volume associated with a credible worst-case spill scenario was 16 500 m³, with a mean case spill volume of 8 250 m³. Neither of these spill volumes represented the loss of the entire cargo of an Aframax tanker, and Trans Mountain said that such an event was so unlikely it was not a credible event. Trans Mountain said that exclusive use of smaller Panamax vessels for the risk assessment would not materially change the overall oil spill risk.

Following its marine shipping risk analysis, Trans Mountain conducted additional detailed analysis indicating that any large volume tanker spill within Burrard Inlet would not be a credible event. This conclusion was based on lack of energy to puncture the hull and marine safety mitigation measures within Burrard Inlet and area such as pilotage and traffic restrictions.

Trans Mountain's marine shipping risk analysis identified eight locations along the tanker route where there is a higher degree of navigation complexity and probability of an incident due to a navigation issue involving collision or grounding of a tanker due to vessel traffic or narrow passage width (Figure 29). Five of these eight locations were then modeled for hypothetical spill scenarios as described in Chapter 8, Section 8.1.3.2. Trans Mountain said that it chose its modelling locations based on an assessment of both probability and consequence associated with an oil spill. Spill modelling was not conducted at locations B and C because of the low probability of an accident occurring at these locations. Site F was not modeled because the modelling conducted at site G would be representative of both locations.

The Tsleil-Waututh Nation, the City of Vancouver and the City of Burnaby said that spill volumes ranging from 8 000 m³ at the WMT to 16 000 m³ at other locations in Burrard Inlet and area, including from a tanker at anchor in English Bay, were credible worst-case scenarios.

Trans Mountain said that its risk assessment work indicated that there was a very low likelihood of major oil spills within Burrard Inlet and English Bay and that no credible large oil spill scenarios in these segments of the transit were identified. In response to the assertion made by Tsleil-Waututh Nation, City of Vancouver and the City of Burnaby that 16 000 m³ in English Bay was a credible scenario, Trans Mountain said that a potential large spill for a tanker at anchor in English Bay was not credible because:

- there is no incident on record of a vessel being struck by another while at anchor in English Bay;
- the selected spill site is close to 2 km from the route used by those vessels that are large enough and capable of causing sufficient damage to the inner hull of a double hull tanker at anchor as to cause an oil spill;

- vessels entering Burrard Inlet are subject to a number of navigational and safety measures;
- a laden tanker would almost always proceed directly to sea and not anchor in English Bay; and
- it would take more energy on the part of the colliding vessel to breach a vessel at anchor than it would if both vessels were moving.

The Cowichan Tribes critiqued Trans Mountain's marine shipping risk analysis including the model upon which the analysis was based. The Cowichan Tribes said that while the underlying methodology was sound and followed industry accepted practice, the underlying data and details of the implementation lead to several significant weaknesses. It said that key conclusions drawn from Trans Mountain's analysis were incomplete and misleading.

The City of Vancouver said that Trans Mountain's marine shipping risk assessment incorrectly focused on hazard probability instead of risk and this resulted in an improper exclusion of a large range of low probability, high consequence events from the risk assessment. It said that an assessment of the risk of a diluted bitumen spill to Vancouver requires an assessment of both the likelihood of a spill occurring and the impact of a spill on Vancouver.

Metro Vancouver said that Trans Mountain failed to adequately assess the potential effects of a credible worst-case oil spill scenario of 16 500 m³ within Burrard Inlet, and the associated impacts on air quality, human health and environment.

Trans Mountain said that intervenors, such as the Cowichan First Nation, the City of Vancouver and Metro Vancouver, focused on potential consequences associated with spills but did not consider the likelihood of such an incident occurring. Trans Mountain said that by focusing on consequences, these intervenors did not consider: the presence (or lack) of hazards that might cause accidents, the engineering and procedural controls and safety management systems which are applied to reduce their likelihood, or steps that might be taken to mitigate the consequences.

Concerned Registered Professional Engineers said that the spill return periods estimated by Trans Mountain are mathematically equivalent, for example, to a 10 per cent probability that a spill of 8.25 million or more litres will occur in a 50 year operating period, even taking into account all the proposed mitigation strategies (e.g., use of escort tugs). Concerned Registered Professional Engineers said that this risk was unacceptable.

The Tsawout First Nation compared Trans Mountain's marine shipping risk estimates to alternative methodologies. The Tsawout concluded that Trans Mountain's spill risk estimates are at the low end of the range of estimates and work conducted by the Tsawout was at the upper end of the range of estimates. The Tsawout said that a comparison of strengths and weaknesses for each method suggests that there is no single best guess estimate of potential spill risk from the increase in Project-related tankers. It said that Trans Mountain's estimates should not be relied upon as an accurate estimate of tanker spill risk.

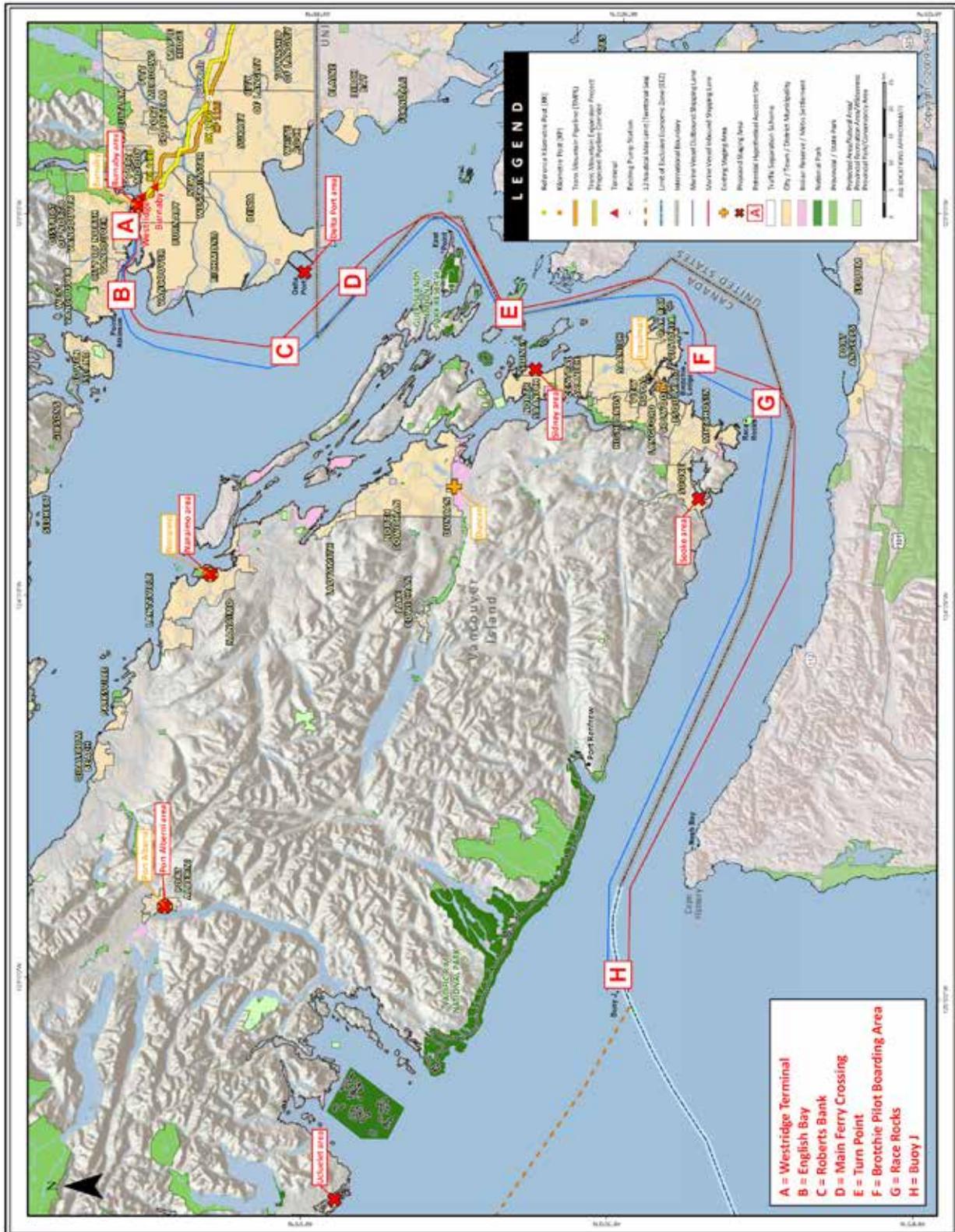
In response to the Tsawout First Nation's work, Trans Mountain said that it did not agree with the Tsawout's conclusions and that it took exception to several aspects of the report. Trans Mountain said that the Tsawout had made no attempt to gather independent data and carry out a structured risk assessment as had been done for Trans Mountain or for Transport Canada as part of the Tanker Safety Expert Panel Review. Trans Mountain said that the results of the risk assessment conducted for the Tanker Safety Expert Panel and its own risk assessment were closely correlated.

The Islands Trust Council, Pacheedaht First Nation and Capital Regional District also referred to the marine shipping risk assessment prepared for Transport Canada and the report of the Tanker Safety Expert Panel. The participants said the information confirms that there is high risk associated with oil spills in the waters off the southern coast of Vancouver Island, due to large volumes of marine traffic close to environmentally sensitive areas. Capital Regional District said that the risk would increase further if tanker traffic increased. The Islands Trust Council noted that the Tanker Safety Expert Panel report said that the southern coast of B.C., including Vancouver Island, was one of two areas in Canada with the highest potential impact from a spill.

Participants filed comments regarding recent marine shipping risk assessment work conducted in Washington State. The United States Environmental Protection Agency recommended that the NEB review the Vessel Traffic Risk Assessment Study developed for the Gateway Pacific Environmental Impact Assessment for additional conditions that the NEB or other Canadian agencies may require for vessel traffic associated with the Project.

Trans Mountain said that the NEB's Filing Requirements Related to the Potential Environmental and Socio-economic Effects of Increased Marine Shipping Activities required it to include an assessment of potential accidents at the Terminal and at representative locations along the marine shipping routes. Selection of locations should be risk-informed, considering both probability and consequence, and that the assessment must include a description of credible worst-case spill scenarios and smaller spill scenarios.

Figure 29: Possible locations for an accident involving a Project-related tanker



Trans Mountain said that the TERMPOL Review Process Guidelines do not define a credible worst-case scenario but that the definition is determined by the risk assessor and then evaluated by the TERMPOL Review Committee. Trans Mountain said that there is no precedent of complete loss of all cargo from a double hull tanker. Its analysis concluded that the credible worst-case spill volume along the tanker route was 16 500 m³. The volume of oil spilled during an accident is directly related to the severity of the incident and the type and extent of damage caused. Therefore, the probability of a very large oil volume being released during a tanker incident must be assessed, in the first place, based upon the probability of the selected location being capable of hosting such a severe incident.

Trans Mountain said that there are no proposed or widely accepted risk acceptance criteria for marine oil spills. If criteria were defined, the proposed operations could be either acceptable or not acceptable. Trans Mountain said that its quantitative marine risk assessment shows a substantial reduction of risks, on a risk per cargo transported basis. This was achieved by adopting an informal risk acceptance criterion for marine oil spills of "minimum increase of risk compared to present day operations." Trans Mountain said that the adoption of such an approach resulted in the proposed extraordinary precautionary measures undertaken during tanker loading and transit and its proposal to significantly enhance oil spill response in the region.

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The Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation, and the City of Vancouver submitted an updated assessment of potential marine shipping oil spill risk associated with the project prepared by Drs. Thomas Gunton and Chris Joseph. The report provided an alternate assessment of oil spill risk using the United States Bureau of Ocean Energy Management's Oil Spill Risk Assessment Model. Based on a review of Trans Mountain's evidence, evidence based on other spill risk methodologies including the United States Bureau of Ocean Energy Management's Oil Spill Risk Assessment Model, and adherence to the precautionary principle as prescribed in relevant Canadian legislation, Dr.'s Gunton and Joseph said; "...it is our professional judgment that the probability of a marine tanker spill for the Project over a 50-year operating period based on the NEB definition of the marine project area ranges between 43 per cent and 75 per cent, with the best estimate based on the precautionary principle being at the upper end of this range." The report concluded that it is likely that marine tanker traffic from the Project will cause significant adverse effects.

The Gunton and Joseph report said that the Board had been unclear in its OH-001-2014 Report conclusions on the likelihood of smaller marine spills causing significant adverse effects. It said that while the NEB reached a conclusion that effects of large marine spills would be significant, the NEB did not reach any conclusion on whether the adverse impact of small marine spills would be significant and whether small spills are likely to occur.

Trans Mountain said that application of the United States Bureau of Ocean Energy Management's Oil Spill Risk Assessment Model to the Project was an overly simplistic method, and a risk assessment based upon that approach would not be geographically specific and would not take into account the specific mitigation measures being proposed for the Project. Trans Mountain noted that United States Bureau of Ocean Energy Management data indicate that there has been only one spill in port and none at sea from 2004 to 2013 in US waters over which time, on average, 3.0311 billion barrels of crude oil was handled annually. Trans Mountain also observed that there have been no spills of Alaska North Slope crude loaded from Valdez, Alaska since 1991. Trans Mountain said that given the similar advanced nature of the marine regimes in the US and Canada, Trans Mountain believes the oil spill record of Alaska North Slope crude is highly representative of the low likelihood of an oil spill from Project-related tankers, which operate under similar marine and navigational regimes to the Alaska North Slope tankers.

Trans Mountain said that the results of its own application of the United States Bureau of Ocean Energy Management's Oil Spill Risk Assessment Model validates the refined results of the risk assessment conducted as part of the OH-001-2014 hearing on the likelihood of oil spill by a Project-related tanker. These results indicated a 16 per cent likelihood of an oil spill over 50 years for Project-related tankers.

Overall, Trans Mountain said that information contained in the Gunton and Joseph report is generally the same as that presented in the OH-001-2014 hearing, is overly simplistic, and fails to consider the specific geography and mitigation measures proposed for the Project. Trans Mountain said that the report should not change the findings or conclusions of the NEB Report.

Dr. Jeffrey Short filed a report on the fate and effect of oil spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary on behalf of the Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation, City of Vancouver, and Living Oceans Society. Dr. Short said that a credible worst-case spill is "almost equally likely" at the point where the Duke-Point-Tsawwassen ferry route intersects with the marine shipping route as the location modeled by Trans Mountain for potential spill effects further to the south at the main ferry crossing between Tsawwassen and Swartz Bay.

As described in Section 14.2.1 of this MH-052-2018 Report, NS NOPE said that Trans Mountain had underestimated the number of tankers per month that have utilized Westridge Terminal in the past. Trans Mountain said that the oil spill frequency assessment that formed part of its marine shipping risk analysis, conducted by Det Norske Veritas, was based upon 408 partially laden Aframax tankers. It said that the exact number of vessels that have called on WMT in each year historically does not affect that risk assessment.

The City of Victoria said that it does not agree with Trans Mountain's assertion that the marine oil spill risk will remain the same if the Project is approved. It said that Trans Mountain's own evidence indicates that the probability of a marine oil spill along the tanker route will increase significantly because of the Project from 1 spill in 309 years to 1 spill in 46 years.

Washington State Department of Ecology and Friends of the Earth US filed the 2015 Vessel Traffic Risk Assessment Study funded by the Washington State Department of Ecology and submitted to the Department in 2017. This study was also referred to by other parties such as the Makah Tribal Council. The purpose of the vessel traffic risk assessment was to evaluate the combined potential changes in risk due to potential development of a number of potential maritime terminal developments and inform relevant US regulatory authorities and other marine stakeholders and British Columbia non-profit groups of these potential changes to risk. The vessel traffic risk assessment stated:

"The combined evaluated risk changes serves as an information source to these tribes and stakeholders to assist them as to what actions could be taken to mitigate potential increases in oil spill risk from large commercial vessels in the VTRA Study Area, should all or some of these terminal projects come to fruition. However, this study was not designed to measure the effectiveness of risk mitigation measures already in place."

Washington State Department of Ecology said that Trans Mountain should consider the information in the Vessel Traffic Risk Assessment Study for additional prevention measures that could be taken to reduce the risk of a spill incident. Washington State Department of Ecology said that all of the risk analysis studies that it reviewed supported the conclusion that large oil spills from tank vessels are expected to be rare events.

Friends of the Earth US also referred to a workshop hosted by the Washington State Department of Ecology in 2016 in which Washington State Department of Ecology described preliminary results of the 2015 vessel traffic risk assessment that included risk mitigation cases to explore actions that could be taken with a goal of reducing potential oil loss from tankers, cargo vessels, and tugs/barges. Washington State Department of Ecology described these results for participants to consider when reviewing risk mitigation measures for marine shipping in the area.

To address the marine shipping risk profile within the shared waters of the Salish Sea, the Makah Tribal Council recommended that development of a Canada/United States Transboundary Vessel Traffic Risk Assessment be pursued.

Concerned Professional Engineers Society said that the marine shipping spill risk analysis, conducted by Det Norske Veritas, and considered in the OH-001-2014 hearing was misleading. It also reiterated its spill risk estimates filed as part of the OH-001-2014 hearing. Concerned Professional Engineers Society said that with all mitigation in place, there is a 10 per cent probability of at least one spill in 50 years greater than 8 250 cubic metres and a 19 per cent probability of a spill of any size over a 50 year period.

Trans Mountain said that the spill risk calculations provided by Concerned Professional Engineers Society did not consider refined risk assessment values included as part of the OH-001-2014 hearing. Trans Mountain said that with all mitigation imposed, the likelihood of an oil spill of 8 250 m³ or more in 50 years for the entire regional study area is 8.4 per cent, the likelihood of a large oil spill of 16 500 m³ in 50 years for the entire regional study area is 1.7 per cent and the likelihood of an oil spill of any size in Vancouver Harbour from a Project-related vessel during vessel transit is once in 19,286 years or 0.3 per cent in 50 years.

Concerned Professional Engineers Society said that there has not been a proper analysis of the potential for a collision of fully loaded or empty Aframax-type tankers with the Ironworkers Memorial Bridge or Canadian National Railway Bridge spanning the second narrows in Burrard Inlet. It filed a report prepared in 2018 for the BC Ministry of Transportation and Infrastructure assessing vessel collision risk and mitigation for the Ironworkers Memorial Bridge at Second Narrows in Burrard Inlet. The report stated that there have been no commercial vessel collisions with the Ironworkers Memorial Bridge since it was built in 1960 and that there has been one collision with the adjacent CN Rail bridge in 1979 by a cargo ship as it attempted to transit during heavy fog. This collision led to development of the Second Narrows Traffic Control Zone and associated mitigation measures. There have been no collisions with the CN Rail bridge since the Traffic Control Zone measures were implemented. The report discussed additional potential mitigation to enhance protection of the bridge.

Trans Mountain said that it did not agree with the Concerned Professional Engineers Society's interpretation of the report prepared for the BC Ministry of Transportation and Infrastructure. It also said that potential tanker collisions with the Ironworkers Memorial Bridge were fully adjudicated in the OH-001-2014 hearing and that nothing has changed since the closing of that record that would make a Project-related tanker collision with the bridge, or an oil spill, more likely. It said

that with mitigation in place for transit of the Second Narrows, a collision event of a Project-related tanker with the bridge is unlikely.

Gerald Graham noted the sinking of the MV Sanchi in the East China Sea in January 2018. Mr. Graham noted that this incident involved the sinking and complete loss of cargo of the double hulled tanker. He said that this incident now makes the possibility of the complete loss of cargo from a Project-related, double-hulled tanker eminently credible, on the grounds that a spill of this magnitude has already happened to another double-hulled tanker. Mr. Graham said that a total loss of cargo should be considered a credible worst scenario.

Based on his review of Trans Mountain's marine shipping risk analysis, conducted by Det Norske Veritas, and the TERMPOL review process, the Board's Marine Technical Advisor said that he was of the view that the marine operational risk assessments are complete and adequately reflect the associated risks and associated risk mitigation in marine operations. He also said that he does not agree that the risk of vessel collision with the Second Narrows bridges invalidates the Det Norske Veritas spill risk assessment. He said that the evidence shows that the risk of such a collision is extremely low.

Trans Mountain's additional mitigation measures

In the OH-001-2014 hearing, Trans Mountain said that, with existing mitigation measures, a Project-related spill from a tanker would be an unlikely event. It said that its marine shipping risk analysis concluded that existing risk controls in the project area are comparable to global best practices. To increase shipping safety, Trans Mountain proposed a number of enhancements, including extended tug escort through the Strait of Georgia.

Trans Mountain identified the possibility of drift grounding¹³¹ or collision with another vessel as key areas of navigation where additional mitigation would result in a significant improvement to navigational safety. To reduce oil cargo spill risk resulting from the Project, Trans Mountain proposed an increase in the existing level of tug escort for laden Project-related tankers during their entire passage from the WMT to Buoy J, near the limit of Canada's territorial sea. This would be outside of the Pacific Pilotage Authority and Vancouver Fraser Port Authority's geographical jurisdiction.

Trans Mountain said that, if the requirements for enhanced tug escort are not mandated under federal regulation, it would develop a tug matrix for inclusion as part of its Tanker Acceptance Standard. This standard would prescribe minimum tug capabilities required upon departure of the tanker from the WMT. The tug matrix would define the capabilities and number of tugs required for foreseeable meteorological and ocean conditions and would be based on tanker and cargo size. Trans Mountain said that, should weather conditions be forecast to exceed the criteria established in the tug matrix or the capabilities of available tugs, a tanker would be required to delay its departure until the weather subsides or a sufficient escort was available. This situation was not expected to be common.

The TERMPOL Review Committee supported Trans Mountain's proposed enhanced tug escort requirements and recommended that a tug matrix should be developed in consultation with the Pacific Pilotage Authority, British Columbia Coast Pilots and Transport Canada.

Trans Mountain said that its Tanker Acceptance Standard requires that vessels departing Canada via the Strait of Juan de Fuca take the most direct route out of the Canadian Exclusive Economic Zone (EEZ) (200 NM from coast of Canada). This reduces the exposure to circumstances where a disabled tanker could run aground on Canada's coastline, as the tanker's risk for drift grounding steadily declines as its distance from shore increases. Trans Mountain said that within 61 km (33 nautical miles) of leaving Buoy J (i.e., within about three hours) the tanker is beyond the limits of the Voluntary Tanker Exclusion Zone which is considered by Transport Canada as the point where there is sufficient time and distance to secure external marine resources to prevent grounding in an emergency. Prior to this, the escort tug would be available to return to assist the tanker.

San Juan County Council recommended that prior to Project approval, a prepositioned emergency towing vessel capable of responding to any vessel that has lost power be located in the area of Boundary Pass and Haro Straits.

The Pacific Pilotage Authority submitted information regarding its tug escort requirements and recent changes and amendments to those requirements. The Pacific Pilotage Authority concluded that it had done "exemplary work in determining the requirements for tethered escort tug on the West Coast" and they "will continue to use these principles for all new liquid bulk proposals."

Trans Mountain said that with the implementation of its proposed mitigation of additional dedicated tug escort and other risk reduction measures, the return period for a spill of any size from Project-related tanker traffic would be 1 in 284 years

¹³¹ A tanker losing power and drifting on to a rocky shore.

and return periods for the mean case spill volume and credible worst-case spill scenario would be 1 in 568 years and 1 in 2841 years, respectively. Trans Mountain said that this would maintain the potential oil spill risk associated with the increased tanker traffic resulting from the Project at close to the level associated with the current level of tanker traffic.

Trans Mountain's expert consultant, Det Norske Veritas, said that, with implementation of Trans Mountain's proposed extra risk controls, the level of care and safety in the study area would be raised well above globally accepted shipping standards.

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Trans Mountain said that it is part of a Project Shippers Marine Sub-committee, working on a process to ensure that an adequate level of tug services is available on the west coast to accompany laden tankers in the future during their transits through the Strait of Juan de Fuca. It noted that the process was currently on hold given the Federal Court of Appeal Decision regarding the Project.

Transport Canada and the Pacific Pilotage Authority provided their views on the Board potentially recommending to the Government of Canada that the proposed voluntary enhanced tug escort for Project-related tankers be made mandatory under relevant federal legislation. Transport Canada said that new regulatory requirements under the *Canada Shipping Act, 2001* would be needed to make enhanced tug escort mandatory with respect to oil tankers. Before proceeding with the regulatory process, Transport Canada would need to assess the proposed measure to determine whether mandatory enhanced tug escorts for all oil tankers, whether in the waters within the limits of a port or elsewhere, would result in an overall benefit to marine safety and the environment and what effects it would have on navigation. Transport Canada's assessment would also consider the national implications of implementing such a measure. It said that it would also widely consult with affected stakeholders, including the United States, industry and First Nations, before and during any regulatory process.

The Pacific Pilotage Authority said that if a particular measure is endorsed by federal regulators, be it voluntary or otherwise, it would be prudent for applicable authorities to monitor its application and use.

Transport Canada said that it continues to support Trans Mountain's commitment for enhanced tug escort for Project-related tankers being made mandatory through the certificate terms and conditions through the Board's permitting process.

Conclusions of the TERMPOL Review Committee

As submitted in the OH-001-2014 hearing, the TERMPOL Review Committee supported key risk reduction measures proposed by Trans Mountain and concluded that it did not consider the overall increase in marine traffic levels to be an issue. The Committee said that while there will always be some risk in any project, after reviewing Trans Mountain's studies and taking into account its commitments, it had not identified any regulatory concerns, associated with Project-related tankers, for the tankers, tanker operations, the proposed routes, navigability, other waterway users and the marine terminal operations. The Committee said that implementation of its findings and recommendations, in conjunction with Trans Mountain's commitments, would provide for a higher level of safety for tanker operations commensurate with the increase in traffic.

Trans Mountain said that it supported and agreed to adopt each of the Committee's findings and recommendations.

Trans Mountain said that it would appropriately implement, monitor and enforce adherence to marine shipping best practices, commitments such as enhanced tug escort, and other requirements through its Tanker Acceptance Program, as a member of the Board of Directors of WCMRC, regular shipper meetings and close liaison with marine authorities.

Views of the Reconsideration Panel

The Board accepts the evidence filed by Trans Mountain regarding marine shipping navigation and safety, including the reports filed as part of the TERMPOL Review Process. The Board finds that Trans Mountain's application met the requirements outlined in the Board's 10 September 2013 "Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities" and the Board's 12 October 2018 Filing Requirements for the MH-052-2018 hearing regarding spill prevention.

Marine shipping regulatory framework

In Section 14.3, the Board summarized the existing regulatory regime related to marine shipping navigation, safety, spill prevention, environmental protection, emergency response and preparedness. These areas are not under its regulatory jurisdiction.

The evidence before the Board indicates that there are competent authorities responsible for this regime and that these jurisdictions cooperate with each other and other organizations in facilitating the safety of marine shipping. The

evidence indicates that the regime is functioning appropriately. The evidence indicates that the regime is reviewed periodically and that there are completed, ongoing, and planned improvements to the marine shipping regulatory framework since the Board's OH-001-2014 Report. These regulatory improvement initiatives have been summarized in Section 14.3 and elsewhere in Chapter 14. Any changes to the existing regime would be the responsibility of those competent authorities.

The Board acknowledges the work of the TERMPOL Review Committee and, as it said in its 10 September 2013 marine shipping filing requirements, the Board did not duplicate the work undertaken by the TERMPOL Review Committee.

The Board is of the view that completed and planned regulatory improvement initiatives will contribute to the overall safe conduct of marine shipping, including for Project-related vessels, within the Salish Sea. The Board considers that with the significant number of initiatives since the OH-001-2014 Report, there is a better understanding of the marine shipping issues. While a number of the regulatory improvements are not completed, substantial and detailed progress has been made since the OH-001-2014 Report and is expected to continue.

Safety measures

The Board accepts Trans Mountain's evidence that the global safety record in the marine industry, particularly for oil tankers, has improved continuously over the past 40 years due to regulatory changes, improved safety procedures, and improved tanker design such as double hulls.

The Board accepts the evidence filed about tanker construction, design and operations. The Board acknowledges the legal requirements governing vessels entering Canadian waters and also, the requirements set out in Trans Mountain's Vessel Acceptance Standard. To monitor future developments of Trans Mountain's Vessel Acceptance Standard, the Board would impose Condition 134 requiring Trans Mountain to file the Standard and future updates with the Board.

The Board notes that the TERMPOL Review Committee made a number of findings and recommendations in its report, and that Trans Mountain said that it supported and agreed to adopt each finding and recommendation. The Board recognizes the work conducted by Trans Mountain since the issuance of its OH-001-2014 Report with the BC Coast Pilots Ltd., Pacific Pilotage Authority, Transport Canada, Canadian Coast Guard and the Vancouver Fraser Port Authority to complete its commitments under the TERMPOL Review Committee's Findings and Recommendations.

The Board recognizes the safety record and expertise of the Pacific Pilotage Authority and the involvement of the Pacific Pilotage Authority and BC Coast Pilots Ltd. in marine safety planning for Project-related vessels. The Board gives considerable weight to the views offered by these participants that Project-related marine shipping can be carried out safely, including the safe handling of increased shipping volume related to the Project. The Board also accepts the view of its Marine Technical Advisor as to the importance of the role of competent pilots in vessel transit safety and incident mitigation. While intervenors raised numerous concerns about what they perceived to be the risks from increased tanker volume, none provided compelling evidence that brought into question the skills and competency of the pilots that would be on Project-related vessels. The Board puts significant weight on the evidence of the pilots that they are the local marine experts that utilize their skill and training to safely navigate vessels in and out of port.

Some participants raised the need for additional tugs to escort Project-related vessels and Trans Mountain made a voluntary commitment to implement enhanced tug escort measures that exceed regulatory requirements. Evidence filed by Trans Mountain, Transport Canada and the Pacific Pilotage Authority indicates that tug escort is an important mitigation measure. In its report, the TERMPOL Review Committee supported the implementation of Trans Mountain's key risk reduction measures, including but not limited to, enhanced tug escort. The Board agrees.

The Board notes that Transport Canada said in the MH-052-2018 hearing that it continues to support Trans Mountain's commitment for enhanced tug escort for Project-related tankers being made mandatory through the certificate terms and conditions through the Board's permitting process. As it said in its OH-001-2014 Report, the Board expects Trans Mountain to follow through on its voluntary commitment for enhanced tug escort for Project-related tankers. For any Certificate issued, the Board would impose Condition 133 requiring Trans Mountain to demonstrate that it has included in its Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide a requirement for tankers nominated to load at the Westridge Marine Terminal to have a suitable arrangement for the proposed enhanced tug escort between the Westridge Marine Terminal and Buoy J prior to departure. The Board notes that its Marine Technical Advisor supported the Board's inclusion of Condition 133.

If the Project is approved and Trans Mountain decides to proceed, it would be required to comply with all conditions that are included in the Certificates and associated regulatory instruments. However, as the Board does not regulate marine shipping, its regulatory authority is limited to the construction and operation of the pipeline and Westridge Marine Terminal and its authority to enforce the implementation of the enhanced tug escort is limited. Therefore, to bolster regulatory oversight over enhanced tug escort, the Board recommends that the GIC develop a regulatory

framework for making such tug escort mandatory for Project-related tankers (Recommendation 8). GIC should also consider mandatory enhanced tug escort for other vessels as appropriate.

Should Trans Mountain's voluntary commitment regarding enhanced tug escort be made mandatory through an alternate marine shipping regulatory framework, if appropriate, Trans Mountain could apply to the Board to have its certificate varied accordingly.

The Board is of the view that the evidence filed by those bodies that regulate marine shipping and by Trans Mountain indicate that there is an acceptable level of safety in place regarding marine shipping associated with the Project.

Marine shipping risk analysis

The Board accepts the evidence filed by Trans Mountain regarding potential spill risks associated with Project-related marine shipping. The Board notes that, in its report, the TERMPOL Review Committee did not identify any concerns regarding Trans Mountain's marine shipping risk analysis. Instead, the Committee said that it had not identified any regulatory concerns related to the marine shipping component of the project and that it did not consider the overall increase in marine traffic levels to be an issue.

The Board acknowledges the evidence filed by participants who raised concerns about Trans Mountain's marine shipping risk analysis. Several participants criticized Trans Mountain's risk assessment methodology and said that the risk of a catastrophic oil spill is too great to allow the Project to proceed. Others said that, even with double hulled tankers and tugs escorts, the probability of such a major oil spill cannot be completely eliminated.

During the OH-001-2014 hearing, participants such as the Tsawout First Nation and Concerned Registered Professional Engineers commented on interpreting the results of Trans Mountain's marine shipping risk analysis. The Tsawout First Nation said that Trans Mountain's estimates should not be relied upon as an accurate estimate of tanker spill risk. Concerned Registered Professional Engineers said that the spill return periods estimated by Trans Mountain are mathematically equivalent, for example, to a 10 per cent probability that a spill of 8.25 million or more litres will occur in a 50 year operating period, even taking into account all the proposed mitigation strategies (e.g., use of escort tugs).

During the MH-052-2018 hearing, the Board also heard concerns from intervenors such as the Tseil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation, the City of Vancouver, the City of Burnaby, and Concerned Professional Engineers Society regarding Trans Mountain's marine shipping risk analysis and potential oil spill risks. The Board notes that much of the evidence filed by intervenors in the MH-052-2018 hearing regarding marine shipping risk was the same or similar to that filed during the OH-001-2014 hearing. The Board has examined new evidence filed by intervenors and is of the view that it confirms the conclusions from the OH-001-2014 Report regarding the adequacy of Trans Mountain's marine shipping risk analysis.

The Board recognizes the difference in opinion between Drs. Gunton and Joseph in their report and Trans Mountain as to the appropriate application of the United States Bureau of Ocean Energy Management's Oil Spill Risk Assessment Model. The Board accepts Trans Mountain's position that Gunton and Joseph's application of the United States Bureau of Ocean Energy Management's Oil Spill Risk Assessment Model to the Project was an overly simplistic method that did not consider specific geography and mitigation. Trans Mountain also said that the Gunton and Joseph report should not change the findings or conclusions of the Board's OH-001-2014 Report. The Board has given additional weight to Trans Mountain's position based on:

- The fact that Gunton and Joseph did not consider specific geography and mitigation relevant to Project-related marine shipping as noted by Trans Mountain;
- The safety record of oil tankers transiting US waters as noted by Trans Mountain;
- The fact that experts on the TERMPOL Review Committee did not identify any concerns regarding Trans Mountain's marine shipping risk analysis; and
- The views of its Marine Technical Advisor who said that he was of the view that the marine operational risk assessments are complete and adequately reflect the associated risks and associated risk mitigation in marine operations.

The Board has given little weight to the views expressed by Concerned Professional Engineers Society regarding potential tanker collisions with the Ironworkers Memorial Bridge or Canadian National Railway Bridge spanning the second narrows in Burrard Inlet. The Board is of the view that potential tanker collisions with the Ironworkers Memorial Bridge were considered in the OH-001-2014 hearing and considering the mitigation measures in place, were found to be an unlikely event. Further, the Board notes that the vessel collision and risk assessment mitigation report prepared for the BC Ministry of Transportation and Infrastructure states that there have been no commercial vessel

collisions with the Ironworkers Memorial Bridge since it was built in 1960 and that there has been one collision with the adjacent CN rail bridge in 1979. This collision led to development of the Second Narrows Traffic Control Zone and associated mitigation measures and there have been no collisions with the CN Rail Bridge since the Traffic Control Zone measures were implemented.

Further, the Board notes that the Concerned Professional Engineers Society is expressing potential concerns on behalf of third parties, that is, BC Ministry of Transportation and Infrastructure and CN Rail. Evidence filed by the Concerned Professional Engineers Society states that the Ministry of Transportation and Infrastructure did not intend to file the report as part of the MH-052-2018 hearing. The Board notes that if the BC Ministry of Transportation and Infrastructure or CN Rail had similar concerns as that expressed by the Concerned Professional Engineers Society, the opportunity to express those concerns and file evidence was available to them. Evidence before the Board indicates that both organizations are aware of the Project, that the BC Ministry of Transportation and Infrastructure has consulted with the Vancouver Fraser Port Authority and Pacific Pilotage Authority during the development of the vessel collision risk assessment and mitigation study, and that Trans Mountain has met with CN Rail regarding the Project. The Board expects that BC Ministry of Transportation and Infrastructure and CN Rail would consider any potential effects the Project may have on the bridges as appropriate, and raise any concerns with Trans Mountain and the appropriate regulatory authorities.

Regarding the comments made by Dr. Short that a large spill is a likely event where the Duke-Point-Tsawwassen ferry route intersects with the marine shipping route, the Board does not agree. In the OH-001-2014 hearing, the Board accepted the marine shipping quantitative risk analysis conducted by Trans Mountain which was prepared as part of Trans Mountain's submission to the TERMPOL Review Committee. The Committee did not identify any concerns regarding Trans Mountain's marine shipping risk analysis which was prepared by Trans Mountain's expert consultant Det Norske Veritas with input from the Committee using a methodology considering specific geography and mitigation associated with the Project. The risk analysis concluded that there was a low probability of an accident occurring at this location due to the lower number of ferry crossings per day and the increased sea room for vessels to evade or reduce impact. The Board considers the evidence filed by Trans Mountain on this issue to be thorough and credible. Further, the Board finds that although Dr. Short alleged that a spill is equally likely at this location as the location further south at the main ferry crossing between Tsawwassen and Swartz Bay, he provided no concrete evidence to support this view.

Gerald Graham said that the complete loss of an oil tanker's cargo should be considered a credible worst-case scenario. The Board does not agree. As already discussed, the Board accepted Trans Mountain's marine shipping quantitative risk analysis in the OH-001-2014 hearing. Although an unfortunate incident, the Board is of the view that the sinking of the MV Sanchi does not materially affect its acceptance of Trans Mountain's marine shipping risk analysis which was prepared in the specific context of assessing the safety of Project-related tanker traffic. The Board also notes that in its OH-001-2014 hearing, it found that Trans Mountain's application met the requirements outlined in the Board's 10 September 2013 "Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities" regarding spill prevention. These filing requirements included the need to describe a credible worst-case spill scenario.

The Board understands that marine shipping risk assessment is challenging, as acknowledged in the Gunton and Joseph report filed by the City of Vancouver, Tsleil-Waututh Nation and others. Having considered participants' comments, the Board accepts Trans Mountain's evidence that there are no proposed or widely accepted risk acceptance criteria for marine oil spills. The Board understands that the marine shipping risk assessment performed for the Project-related tankers and the marine shipping risk assessment undertaken for Transport Canada and the report of the Tanker Safety Expert Panel do not recommend stoppage of marine shipping in the area. Rather, such risk assessments are intended to inform mitigation to lessen the potential for an accident to occur, and for spill response planning. That is, the Board does not view the results of these risk assessments as absolute indicators of the actual probability of a spill occurring. However, the Board does find that the marine shipping quantitative risk analysis conducted by Trans Mountain does provide a relative indication as to the actual probability of a spill occurring. This finding has informed the Board's conclusions regarding the likelihood of a spill from a Project-related tanker as discussed in the next section, Marine Shipping Risk.

The Board's understanding of marine shipping risk assessment is further supported by the Vessel Traffic Risk Assessment and statements made by the Washington State Department of Ecology. To the extent that risk assessments conducted in Washington State and associated recommended marine shipping mitigation may be relevant to safe shipping in the Salish Sea, the Board expects that the appropriate competent authorities such as Transport Canada and Canadian Coast Guard would review and consider such information.

The Board notes the Makah Tribal Council's recommendation regarding development of a Canada/United States Transboundary Vessel Traffic Risk Assessment. To the extent that such a risk assessment would contribute to the safety of marine shipping within the Salish Sea, the Board has recommended that the GIC consider the need for a

transboundary vessel traffic risk assessment in conjunction with relevant United States regulatory authorities (Recommendation 9). The Board's Marine Technical Advisor supported this recommendation.

The Board notes that participant's comments on Conditions 91, 133, and 144 and Recommendations 8 and 9 are addressed in Section 14.11.3.

Marine shipping risk

The Board recognizes that the south coast of B.C. has been identified as a high risk area in the marine shipping risk assessment prepared for Transport Canada and the report of the Tanker Safety Expert Panel. The Board understands that this designation is based on both the environmental sensitivity of the area and the probability of a tanker spill occurring. The Board has considered the probability as well as the consequences of a spill in its assessment of the evidence before it. The Board's views on the consequences associated with tanker spills are included in Sections 14.9 and 14.10.

The Board notes that Trans Mountain said that with the implementation of its proposed mitigation of additional dedicated tug escort and other risk reduction measures, the return period for a spill of any size from Project-related tanker traffic would be 1 in 284 years and return periods for the mean case spill volume and credible worst-case spill scenario would be 1 in 568 years and 1 in 2841 years, respectively. Trans Mountain said that this would maintain the potential oil spill risk associated with the increased tanker traffic resulting from the Project at close to the level associated with the current level of tanker traffic.

The Board is of the view that although a large spill from a tanker associated with the Project would result in significant adverse environmental and socio-economic effects, such an event is not likely. For clarity, the Board notes that a large spill would include the credible worst-case and mean spill volumes considered in the marine shipping quantitative risk analysis. The Board has not defined the volume associated with a large spill but it notes that a large spill could also be considerably less than these volumes. The Board's view is based on the totality of evidence before the Board, including, but not limited to:

- the regulatory framework in place and associated regulatory improvement initiatives;
- continuous improvement in the global safety record for oil tankers over the past 40 years due to regulatory changes and improved safety procedures;
- all shipping associated with the Project would occur within established shipping routes;
- the results of Trans Mountain's marine shipping risk analysis;
- existing and enhanced safety measures that would apply to the Project;
- the findings and recommendations of the TERMPOL Review Committee; and
- the results of marine shipping risk assessment work conducted for Transport Canada and the Tanker Safety Expert Panel.

The Board is of the view that although possible, smaller spills from Project-related tankers of a size that would result in significant environmental effects are not likely. This view is informed by its acceptance of the marine shipping risk analysis conducted by Trans Mountain and the spill probabilities estimated therein, including the probability of a spill of any size, and the mitigation measures that would be in place for Project-related marine shipping. However, as discussed in Section 14.9.4, the Board is of the view that the environmental effects of a spill from a tanker would be highly dependent on the particular circumstances, such as the amount and the type of product(s) spilled, location of the spill, response time, the effectiveness of containment and clean-up, the valued components that are impacted, and the weather and time of year of the spill.

Specific to potential spills in Burrard Inlet, the Board heard considerable concern regarding potential spill risk, the resultant potential effects from a large spill, and Trans Mountain's exclusion of assessment of those effects from its environmental effects assessment. As discussed further in this chapter and Chapter 10, the Board finds that based on evidence filed by Trans Mountain and intervenors, a large spill in Burrard Inlet would result in significant adverse environmental and socio-economic effects. Evidence filed by parties such as the City of Vancouver, City of Burnaby and the Tsleil-Waututh First Nation indicate the potential extent of such effects. However, based on the evidence before it, the Board finds that a large spill in Burrard Inlet is not a likely event.

The Board does not accept the assertion made by participants that spill volumes ranging from 8 000 m³ at the Westridge Marine Terminal to 16 000 m³ at other locations in Burrard Inlet are credible worst-case scenarios. The Board notes that Trans Mountain's risk assessments, which the Board accepts, show a very low likelihood of major oil spills within Burrard Inlet and English Bay. No credible large oil spill scenarios in these segments of the transit were

identified and this view is supported by the TERMPOL Review Committee's report. Further, in response to a question from Vancouver Fraser Port Authority, Trans Mountain filed additional evidence indicating that an incident in Burrard Inlet would not be likely to puncture a double-hulled tanker. Trans Mountain also discussed specific marine safety mitigation measures within Burrard Inlet and area such as pilotage, tug escort, and traffic restrictions. The Board accepts Trans Mountain's evidence in response to the assertion made by Tsleil-Waututh Nation, City of Vancouver and the City of Burnaby that a potential large spill for a tanker at anchor in English Bay is not credible. Among other reasons, Trans Mountain said that there is no incident on record of a vessel being struck by another while at anchor in English Bay; in the event of a collision, there would not be sufficient energy to puncture both hulls of a double hull tanker; and a laden tanker would not be likely to anchor in English Bay.

In reaching its conclusions regarding the potential risk of a spill from Project-related marine shipping, the Board has been guided by the precautionary principle. The Board finds that the spill prevention measures proposed by Trans Mountain for Project-related vessels, along with other marine safety measures already in place for all vessels, adequately address potential spill risk associated with the Project. This does not mean that there is a zero incident risk, nor is that possible to achieve. Rather, the potential negative environmental and socio-economic consequences resulting from an incident including spills, although not fully possible to predict, have informed the mitigation for the Project. In the Board's view, this mitigation has driven the risk of a tanker incident down to an acceptable level.

Considering the existence of a comprehensive marine shipping regulatory scheme under the jurisdiction of competent authorities and the mitigation proposed by Trans Mountain to lessen the probability of an incident occurring, the Board remains of the view that there is an acceptable level of safety in place regarding marine shipping associated with the Project. The comments of the Board's Marine Technical Advisor support this view.

14.11.3 Emergency preparedness and response

In the OH-001-2014 hearing, Trans Mountain said that in the event of an accident resulting in an oil spill from a vessel in Canadian waters, the master of the tanker, as the responsible party and in accordance with the law, would notify Canadian Coast Guard as per the procedure in the approved Shipboard Oil Pollution Emergency Plan. If the tanker operator were unable or unwilling to assume the role of incident commander, the role would automatically transfer to the Canadian Coast Guard. The responsible party would then activate the response organization, WCMRC, to provide the equipment and resources to respond to the spill.

The District of North Vancouver said a spill response study prepared for the British Columbia Ministry of the Environment concluded that " while all parties should strive for excellence in designing and implementing a marine spill prevention and response system, it should be acknowledged that spills can happen even with the best possible measures in place and that even the best possible spill response system cannot guarantee that resources at risk will be protected from negative impacts if a spill occurs. "

Similarly, Dr. Lance Barrett-Lennard said that based on past spill events, a large spill could never be entirely or even largely contained, with even the best equipment, training and will in the world. He said that real-world conditions of the west coast of B.C. would cause a fraction of any oil to sink and become impossible to clean up. The fraction of sunken oil would be higher for crude, bunker C or diluted bitumen.

During the MH-052-2018 hearing, many participants such as the Cities of Vancouver and Burnaby, Cowichan Tribes, Pacheedaht First Nation and numerous other First Nations, Washington State Department of Ecology, District of North Vancouver, Friends of Ecological Reserves, Living Oceans Society and the Province of B.C. continued to raise concerns regarding the ability to respond to an oil spill and appropriate spill response planning.

Current marine oil spill preparedness and response measures on the west coast

In the OH-001-2014 hearing, Trans Mountain said that Canada's marine spill response regime is built on the principle of cascading resources, which means that in the event of a spill, the resources from a specific area can be supplemented with those from other regions or from international partners, as needed.

The Canadian Coast Guard said that under Canada's Marine Oil Spill Preparedness and Response Regime, the polluter is ultimately responsible for cleaning up and paying for its own marine spills.

Transport Canada and Trans Mountain said that the Response Organizations and Oil Handling Facilities Regulation under the *Canada Shipping Act, 2001* establishes certified response organizations to provide emergency response capability, leadership and support in the case of an oil spill in a marine environment.

Western Canada Marine Response Corporation is the Transport Canada-certified response organization to respond to oil spills on the West Coast of Canada. Vessels and oil handling facilities, such as the WMT, must have an arrangement with a certified response organization. Transport Canada and Trans Mountain said that vessels must also have a Shipboard Oil

Pollution Emergency Plan and that oil handling facilities such as the WMT, must have an Oil Pollution Emergency Plan and an on-site Oil Pollution Prevention Plan.

Western Canada Marine Response Corporation maintains its certification by undertaking a number of equipment deployment exercises, tabletop exercises, and oil spill response training courses and scenarios within the certification period.

Trans Mountain described Transport Canada's National Aerial Surveillance Program for vessels within Canadian waters. Under this program, Transport Canada performs aerial surveillance over all Canadian waters to detect pollution from ships, deterring potential polluters from dumping oil and other pollution while transiting Canadian waters. Trans Mountain stated that there is an obligation for owners of vessels and operators of oil handling facilities to report marine spills to the Canada Coast Guard. Transport Canada said that, as a part of its World-Class Tanker Safety System measures, it would expand the National Aerial Surveillance Program to deter potential polluters, and identify any pollution incidents early.

Trans Mountain said that WCMRC's area of operation for oil spill recovery and clean-up covers all of Canada's West Coast and all internal navigable waters and is referred to as the Geographic Area of Response. Within the Geographic Area of Response, there are particular areas designated by Transport Canada as needing more rigorous planning standards given the increased risks associated with greater traffic density, convergence of vessels, and volume of oil transported. These areas are termed Designated Ports, Primary Area of Response and Enhanced Response Areas (Figure 30). A more rapid response is mandated for a designated port.

Trans Mountain said that within the Port of Vancouver (a Designated Port), WCMRC is required to maintain a dedicated package of response equipment that is capable of responding to a 150 tonne spill within 6 hours. The WMT is within this area. Trans Mountain said that it would be responsible for undertaking a response at the WMT using Trans Mountain's own, and WCMRC, resources.

Trans Mountain said that the majority of spills greater than 1,000 tonnes occur outside port boundaries where shipping lanes converge. The Primary Area of Response for the Port of Vancouver extends from the Port boundary to a distance of 50 nautical miles in all directions.

Trans Mountain said that an Enhanced Response Area covers areas not within the Designated Port or Primary Area of Response but that still have a higher risk of oil spills due to traffic convergence and volume of shipping.

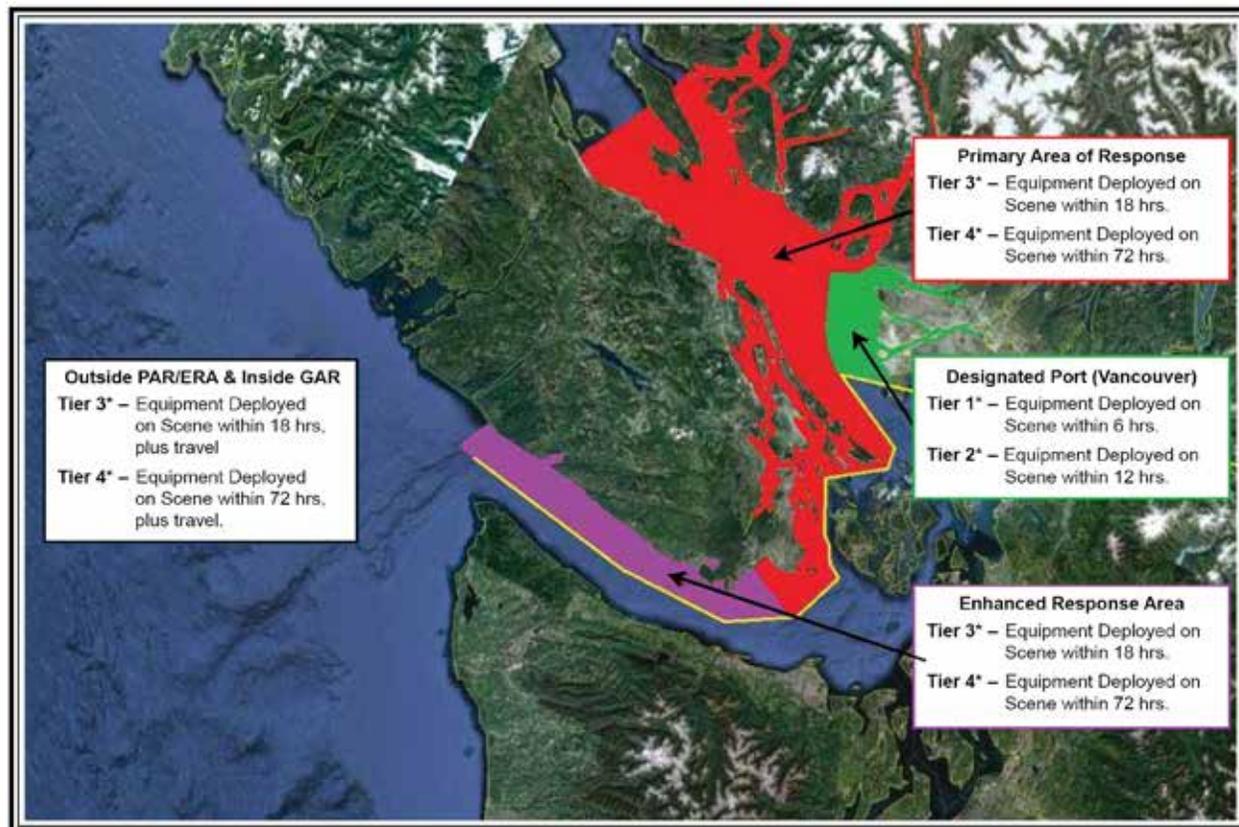
Trans Mountain said that WCMRC would respond, under the guidance of the Incident Command System, to a spill of any size. It said that, although WCMRC is government-certified for a 10,000 tonne response capacity, its current equipment capacity is actually rated at 27,000 tonnes. Additional support for a large spill would be cascaded through contractors and mutual aid partners.

The Canadian Coast Guard said that it has bilateral agreements or administrative arrangements with the United States, France and Denmark and can call upon all signatories to the International Convention on Oil Pollution Preparedness, Response and Cooperation to provide mutual aid in the event that a spill exceeds the capacity for Canada to respond. The level of support and equipment provided by each nation depends on availability of resources.

Trans Mountain described WCMRC's resources to enable it to meet Transport Canada's mandated response planning standards. Trans Mountain said that Transport Canada inspects the entire WCMRC equipment inventory over a continuous 3-year cycle. Trans Mountain described the mutual aid agreements that WCMRC has in place with Canadian and US counterparts. These provide WCMRC with the ability to call on those resources for assistance and equipment in case of a large oil spill. It said that as a result of these agreements, organizations train and exercise together, ensure equipment is compatible, and share communication frequencies and best management practices.

The Village of Belcarra said that WCMRC should develop a geographic response plan for the Central Burrard Inlet. Trans Mountain said that WCMRC, in collaboration with federal government agencies, local governments, First Nations, and other stakeholders, has been developing new coastal Area Plans to prepare responders for the unique aspects of the B.C. coastline. A subset of Area Plans is Geographic Response Plans which are created to reduce the time needed to make decisions during the initial response, and provide information about the site and strategies needed to protect sensitive resources and promote a fast and effective response.

Figure 30: Western Canada Marine Response Corporation areas of response



Trans Mountain said that WCMRC was updating its coastal sensitivity maps with an enhanced coastal mapping system for the B.C. Coast. This system will include coastal sensitivities and associated Geographic Response Strategies and all associated logistical support information. Trans Mountain said that the coastal mapping program was being extended to the entire tanker-shipping route, with a planned completion date of 2017. The program began in 2013 with the initial focus on higher traffic areas such as Vancouver Harbour, southern Georgia Strait, Haro Strait/ Strait of Juan de Fuca, associated Douglas Channel passages, and Prince Rupert. Pre-spill Shoreline Cleanup Assessment Technique requirements, for high-risk areas, would also be addressed concurrently with the geographic response plan planning process.

Washington State Department of Ecology said that Trans Mountain should be required to fund and help develop, test and implement a joint geographic response plan with Washington State Department of Ecology to address the risk from vessels carrying diluted bitumen through shared waters in the Salish Sea.

The District of North Vancouver, the City of North Vancouver and the District of West Vancouver said they fund the North Shore Emergency Management Office. This office supports municipal and regional response capabilities for the North Shore area. These intervenors expressed concerns regarding the level of cooperation in spill response planning and actual spill response between municipalities such as themselves and the Canadian Coast Guard and WCMRC.

The City of Port Moody and the City of Vancouver raised concerns regarding the level of information shared with them by Trans Mountain and WCMRC regarding resources and response expectations in the event of an emergency, and emergency response planning documents.

The Georgia Strait Alliance surveyed emergency planning personnel from coastal local governments in the Georgia Strait region. The respondents expressed concerns regarding information sharing from WCMRC on the local government's role in marine spill response and the lack of engagement on spill response planning initiatives such as geographic response strategies and training and exercises.

The Capital Regional District expressed concerns that local governments along the tanker routes have legal obligations to respond to emergencies within their jurisdiction but may not have sufficient resources to respond to a major oil spill.

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The Canadian Coast Guard said that it is the on-water federal lead agency for marine pollution response. It provides oversight of every marine incident and is responsible for ensuring the cleanup of ship-source and mystery-source spills of oil and other pollutants into Canadian waters. Should the polluter be unable, unwilling, or unknown, the Canadian Coast Guard would assume command of the situation and ensure an appropriate response to the incident.

Canadian Coast Guard said that environmental response planning in the Lower Mainland and South Coast is ongoing as part of regular Coast Guard spill response preparedness activities. The Canadian Coast Guard Marine Spills Contingency Plan – National Chapter establishes the requirement for Geographically Specific Response Planning, and the Coast Guard is working directly with Indigenous communities and other partners on the Lower Mainland and South Coast to develop Geographically Specific Response Plans, like the Greater Vancouver Integrated Response Plan.

Canadian Coast Guard said that it maintains a close working relationship with WCMRC. When an incident occurs, the Coast Guard advises WCMRC of the developing situation to initiate any required preparation for response. This enables the WCMRC to mobilize and deploy staff, vessels and equipment accordingly. The Coast Guard and WCMRC maintain regular communication as the incident evolves.

The Canadian Coast Guard and other federal participants discussed a number of response planning initiatives under the Oceans Protection Plan and other improvements to federal prevention, preparedness and response capabilities since 2015 including:

- Implementation of the Incident Command System and associated training and exercising across federal departments and with external stakeholders. The Canadian Coast Guard could act as the sole Incident Commander or within a Unified Command structure that could include the polluter, First Nations and other levels of government when appropriate and when required.
- Reopening of the Kitsilano Coast Guard Station in 2016 to ensure that an additional layer of marine search and rescue and emergency and environmental response capacity is available in the Vancouver area.
- The Regional Response Planning pilot project running from 2017-2019 in Northern British Columbia. Canadian Coast Guard said that Regional Response Planning is a collaborative and integrated approach to environmental response planning for marine spills. Parties involved include the Canadian Coast Guard, Fisheries and Oceans Canada, Transport Canada, Environment and Climate Change Canada, the Province of British Columbia, Indigenous and coastal communities, industry and other stakeholders. Canadian Coast Guard said that the methodology being developed and lessons learned in the Northern British Columbia Pilot are applicable to ongoing environmental response planning efforts in the rest of the country, including southern B.C.
- Increased emergency response staffing and improved interoperability and coordination between Canadian Coast Guard, Transport Canada, and Environment and Climate Change Canada.
- Modernization of the Canadian Coast Guard's environmental response assets including mobile incident command posts and pollution response equipment and a new logistics depot near Port Hardy, B.C.
- Development of The Greater Vancouver Integrated Response Plan for Marine Pollution Incidents. This plan serves as the guide for multi-agency on-water response to serious oil pollution events in the area of English Bay and Burrard Inlet. It was developed cooperatively by Federal Departments, First Nations, Provincial Ministries, Municipalities, the Port Authority, industry (including the Western Canada Marine Response Corporation), and non-governmental organizations, such as the Vancouver Aquarium.
- Collection of pre-shoreline cleanup and assessment technique shoreline data sets by Environment and Climate Change Canada.
- Revision of the Canada-United States Joint Marine Pollution Contingency Plan in 2017 by the Canadian Coast Guard and the United States Coast Guard to include an International Coordinating Officer position. Canadian Coast Guard said that the International Coordinating Officer role will be built into future exercises and this position will be utilized during transboundary spills where necessary.

The Vancouver Fraser Port Authority said that it co-chairs the Marine Emergency Response Coordination Committee with Canadian Coast Guard. The Marine Emergency Response Coordination Committee provides a venue for interested organizations to dialogue on the coordination of marine assets in the Metro Vancouver area during emergency or security response and recovery activities. Under the Marine Emergency Response Coordination Committee is the Environmental Response Sub-Committee which addresses emergency response planning in the Greater Vancouver area. The Environmental Response Sub-Committee also serves as the primary source of subject matter expertise relating to any changes to the Greater Vancouver Integrated Response Plan.

The Vancouver Fraser Port Authority noted that it cooperates with the Canadian Coast Guard, Western Canada Marine Response Corporation, first responders, and other agencies in emergency response through training and exercises and by providing information through its operations centre and patrol boats.

Trans Mountain said that it has made numerous enhancements to its Emergency Management Program since the date of the Board's OH-001-2014 Report. These enhancements strengthen marine oil spill prevention, emergency preparedness, and response measures. It noted that its Westridge Marine Terminal Emergency Response Plan has been updated to be operationally aligned with the Greater Vancouver Integrated Response Plan.

The Pacheedaht First Nation said that it and Makah Tribal Council were part of the Transboundary Indigenous Caucus of the Canada-United States Joint Marine Pollution Contingency Plan, Annex 3, Pacific Geographical Annex. The purpose of the Annex is to identify the processes to be used by the Canadian and US Coast Guards to communicate, consult and coordinate in response to spills in contiguous waterways. Pacheedaht also said that emergency response capacity in the Port Renfrew area is "grossly insufficient" and needs to be significantly improved, particularly if the Project was to be approved.

Washington State Department of Ecology said that vessel traffic separation lanes in the Strait of Juan de Fuca require all ships en route to Canadian or U.S. ports to navigate inbound predominately within U.S. waters and predominantly within Canadian waters when exiting the U.S. This scheme requires ships entering the Strait bound for Canada to comply with Washington State law when inbound; vessels must comply with Canadian law when outbound. It said there is a reciprocal arrangement between the Washington State Maritime Cooperative, the National Response Corporation, and the Western Canada Marine Response Corporation to facilitate vessel operators meeting the oil spill contingency plan requirements of both the *Canada Shipping Act, 2001* and the Washington State oil spill contingency plan regulations, respectively. The agreement ensures that contingency plan coverage exists for all vessels transiting in and out, and ensures an immediate response to spills.

The District of North Vancouver expressed concerns regarding potential effects on human health during oil spill response activities. Health Canada and Canadian Coast Guard said that they prioritize the health and safety of first responders and the public during spill response. Within the Incident Command System, air quality impacts on health and safety, are the direct responsibility of the Safety Officer within the Command Staff of the Incident Command organization. The Safety Officer is responsible for developing and recommending measures to ensure personnel safety and occupational health of not only response workers, but also the public, and to anticipate, recognize, assess, and control hazards and unsafe conditions or situations. Canadian Coast Guard noted that potential members of the Environmental Unit and Health Unit within the Incident Command System structure include Environment and Climate Change Canada, BC Ministry of Environment and Climate Change Strategy, Health Emergency Management BC, Health Canada, First Nations Health Authority, Vancouver Coastal Health, and other agencies as needed. These agencies ensure that the health and safety of First Responders and the public are taken into consideration with regard to all aspects of the incident, including air quality impacts.

Western Canada Marine Response Corporation said that it is developing site specific geographic response strategies for the coast of B.C. WCMRC said that geographic response strategies are operational documents that detail the location of vulnerable and sensitive shoreline areas and describe how to protect them. It said that the geographic response strategies align with the federal government's transition to a risk-based approach to response planning. To date, more than 400 have been developed for the Salish Sea and they are publically available on WCMRC's website. WCMRC also noted its use of oil spill trajectory models to continually inform responders as to an incident's potential credible worst-case.

WCMRC discussed response exercises required as part of its certification by Transport Canada. These include on-water equipment deployment exercises and table top exercises conducted on a three year cycle. It said that WCMRC personnel and contractors also regularly participate in WCMRC member exercises as well as exercises hosted by the Canadian Coast Guard, Department of Defense and Emergency Management BC, and by regional partners and entities in the United States.

Response measures

In the OH-001-2014 hearing, The Cowichan Tribes said that the physical properties associated with weathered diluted bitumen significantly reduce response tactic options and effectiveness in areas such as mechanical recovery, shoreline cleanup and reduced natural recovery. It said that there is a high likelihood that weathered bitumen-based crude oil will either sink or submerge in conditions of the Salish Sea or Pacific Ocean. The Cowichan Tribes said that there are no practical on-water solutions to contain and recover a large oil release if it sinks or submerges. It also said that a much higher number of shore-based workforce personnel would be needed for cleanup of a bitumen-based crude oil that has emulsified, than compared to a conventional crude oil. This is because of the need for more labour -intensive shoreline cleanup using shovels, rakes and buckets.

Mechanical recovery - booms and skimmers

In the OH-001-2014 hearing, Trans Mountain said that the existing response planning standards focus on mechanical recovery such as booming and skimming.

Trans Mountain said that in spill response, booms have three purposes: to protect resources; to concentrate oil into thicker patches; and to increase the encounter rate between the oil and skimmer.

The Village of Belcarra said that it is important that Trans Mountain consider wind and wave conditions within Burrard Inlet in its design and selection of containment booms for deployment around tankers when loading at the WMT. In response, Trans Mountain said that the boom deployed around the tanker could contain up to 12 000 m³ of oil depending on the type of boom used and environmental conditions. Trans Mountain said its risk assessment had not identified any viable circumstance that could require the containment to hold more than 103 m³, which is the credible worst-case scenario spill volume during cargo transfer.

Spill treating agents and in-situ burning

In the OH-001-2014 hearing, Trans Mountain said dispersants and in-situ burning have proven effective in minimizing environmental harm in the event of a spill. Trans Mountain said that pre-approval for the use of other response techniques would avoid delays that diminish the effectiveness of these techniques in situations where their use would offer a desirable means of diminishing environmental harm. Trans Mountain submitted that response organizations should be empowered with conditional pre-approvals for in-situ burning, the use of dispersants and beach-cleaning agents.

Trans Mountain said that dispersants are not approved for use in Canada and in-situ burning is not pre-approved. In the event of a spill response, strategies for use of these counter-measures would be developed under an Incident Command System structure and approved by Unified Command. This structure would be expected to include ECCO and the B.C. Ministry of Environment who would provide advice on environmental priorities. Any decision to use dispersants or in-situ burning would be based on a net environmental benefit analysis and would need approval of the appropriate regulatory authorities. Trans Mountain said that a net environmental benefits analysis assesses the net environmental benefits gained by clean-up and remediation, in consideration of the environmental injuries caused by those activities, with the objective of enhancing recovery outcomes while minimizing further environmental damage.

Trans Mountain said that its research indicated that dispersants tested were only marginally effective on free-floating diluted bitumen for up to six hours, and were not effective on diluted bitumen that had weathered for over one day.

Trans Mountain said that because in-situ burning creates a dense smoke plume, burning in or near population centers is unlikely to be approved. It said that the effectiveness of in-situ burning can diminish as weathering of the oil progresses.

In the MH-052-2018 hearing, Raincoast Conservation Foundation submitted a report, prepared by toxicologist Kate Logan, on the potential impacts of dispersant use on the marine environment. Raincoast noted that since publication of the Board's OH-001-2014 Report, the chemical dispersant Corexit 9500 had been approved for use in Canadian waters. Raincoast said that research conducted by the Government of Canada and Trans Mountain indicates that use of dispersants on a diluted bitumen spill, particularly after weathering, is not likely to be an effective oil spill response tool. NS NOPE also filed a report prepared by Dr. Riki Ott on potential human health effects related to dispersant use, particularly in urbanized areas such as Burrard Inlet.

Trans Mountain said that use of chemical dispersants in response to any oil spill would only be considered on a case-by-case basis, in consultation with federal regulators, local authorities and other experts, and where this use would result in net environmental benefit. It also said that the use of Spill Treating Agents in Canadian waters is prohibited under federal law except under certain conditions in relation to offshore oil exploration and production.

Environment and Climate Change Canada also said that the use of spill treating agents is limited by legislation and that they would not be used as a response tool under Canada's existing Marine Oil Spill Preparedness and Response Regime. It noted that the Government of Canada is considering legislative changes to strengthen environmental response to oil spills in water by expanding the available response options to include Alternative Response Measures such as spill treating agents. The use of any Alternative Response Measures would be subject to a Net Benefit Analysis test on a case-by-case basis.

Response to marine vessel fires

In the OH-001-2014 hearing, Trans Mountain said that all tankers are required to carry firefighting systems that consist of water, foam, and other chemicals. It said that private tug operators operate fire-fighting capable tugs from their bases in Vancouver Harbour.

The City of Vancouver said that in the event of an oil spill resulting in a fire or explosion on board a tanker, the City does not currently have the training or equipment to fight shipboard fires on tankers. It said that it was in the process of finalizing an

agreement with Vancouver Fraser Port Authority that it would provide fire-fighting support (e.g., external hull cooling, and supply delivery) for vessels over 75 feet. Firefighting support would be on a response-available basis.

Response to diluted bitumen spills

In the OH-001-2014 hearing, Trans Mountain filed information from WCMRC which said that submerged oils are defined as those products that are either neutrally buoyant or have slight negative buoyancy such that they lie below the surface of the water, often migrating vertically in the water column. Sunken oils are those products that have fallen to the bottom; some submerged oils eventually become sunken oils. Spilled heavy oils, including heavy crudes and fuels such as Bunker C, have the potential to become submerged or sunken during weathering when exposed to the right combination of overwash, sediment load and mixing energy. Exposure to a single condition is unlikely to cause heavy oils to become submerged or to sink. Oils that have fallen below the surface of the water can also resurface elsewhere in the water plane as environmental conditions influencing the oil change its fate and behavior. Heavy oils can submerge or sink in both freshwater and marine environments.

WCMRC said that since any type of oil could eventually submerge, responding to floating oil has the highest priority. At the same time, technologies and techniques are used to track submerged oils so that appropriate response tactics can be applied. Depending on the level of submergence, some oil may be within the recovery range of conventional technologies such as brush skimming systems. Otherwise, based upon tracking results, a response can be set up at suitable containment, impoundment and recovery locations to intercept submerged oil.

The Shxw'ōwhámél First Nation said that when spilled oil sinks, or becomes submerged in the water column, it can often be very difficult to detect. It also provided information on various detection and recovery methods for submerged and sunken oil. It said that there are varying degrees of success with the use of such methods.

The Living Oceans Society submitted an overview of spill response technologies for viscous oils that submerge. The report concluded there is a need to improve countermeasures for these oils. It outlined the challenges in locating, containing and removing submerged oil and said that, if spilled oil becomes suspended between the water's surface and the bottom, it is unlikely that any commercially available response technologies can be successfully applied to significantly control the spill. Shoreline cleanup operations would have to be initiated in the event the oil stranded on shore. It said that there are some possible recovery techniques for sunken oil, but it noted that each has specific limitations.

Trans Mountain said that its spill contingency plans for the expanded Trans Mountain Pipeline system would consider mitigation and remediation of suspended or sinking oil for spills in a marine environment. It said that various studies and tests indicate that responding to a diluted bitumen spill is no different than responding to a spill of bunker fuel or other heavy crude oil. Trans Mountain said that WCMRC maintains, and will continue to maintain in future, the capability and capacity to respond to all types of oil spills¹³².

Trans Mountain said that relative to oil that remains floating, locating oil that has sunk or submerged is more difficult and that the difficulty increases in proportion with the difficulty of accessing the submarine environment. Where it is extremely difficult to access the submarine environment it would be extremely difficult to locate oil that has submerged. If located, Trans Mountain summarized potential recovery technologies and techniques for submerged and sunken oil. Trans Mountain said that remediation of submerged and sunken oil would likely carry on after the emergency phase of a spill response.

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Federal departments and agencies referred to research on the fate and behaviour of diluted bitumen (see Chapter 8) and said that like conventional oil products, diluted bitumen has a range of potential fates within different environmental components and that environmental conditions affect the fate and behaviour of the product. They said that existing response measures are effective on diluted bitumen, in general, to the same extent as they would be for other petroleum products of similar properties.

Natural Resources Canada said that there is consensus that the behaviour of diluted bitumen products falls within the range of behaviours found for petroleum crude oils and products and so current spill response technologies for recovery of both floating and sunken oils can be used. However, as diluted bitumen viscosity increases relatively quickly after a spill, use of spill treatment agents such as dispersants have relatively short windows of opportunity for use. Equipment for recovery of floating viscous oil will be needed. It also noted that research approximating field spill scenarios has shown that although portions of spilled diluted bitumen have submerged, the majority has been found to float allowing time for surface recovery.

¹³² Additional information on the fate and behavior of diluted bitumen is provided in Chapter 8 of this Report.

Environment and Climate Change Canada said that the potential for submergence of diluted bitumen is influenced by several factors including oil density, water and oil temperature, salinity, sediment loading, wave and current energy. Research has found that diluted bitumen products will generally not sink or become submerged under the water surface in marine conditions. It noted that extensive evaporation may result in some diluted bitumen submerging or even sinking in fresh water. Interaction with sediment has also been found to result in oil/sediment aggregates that provide a mechanism for sinking or submergence. Environment and Climate Change Canada noted the need to consider the possibility for a portion of any spill of diluted bitumen to sink or submerge.

Environment and Climate Change Canada noted research that it has undertaken to advance the collective understanding of the fate and behaviour of diluted bitumen on shoreline sediments and a review of response tactics. It said that it makes its research available to Transport Canada and the Canadian Coast Guard to support risk assessments. Environment and Climate Change Canada also works with Response Organizations and the Canadian Coast Guard to conduct exercises specific to spills of diluted bitumen.

In its annotated bibliography of heavy oil fate and effects literature, the Province of B.C. highlighted challenges in detecting and cleaning up submerged and sunken oil. It also highlighted ongoing research in this area and the need to consider sunken and submerged oil in response planning.

Based on the findings in Dr. Short's report (see Chapter 8) which said that diluted bitumen could sink or submerge within 24 hours of a spill, in its report prepared for Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation, and the City of Vancouver, Nuka Research and Planning Group stressed the need for appropriate planning and specialized equipment and resources to support tracking, containment, and recovery of sunken or submerged oil.

Numerous participants, such as Living Oceans Society, noted the need for rapid spill response measures based on the potential fate and behavior of spilled diluted bitumen and the potential for submergence and sinking.

WCMRC said that it is widely known, and supported by research, that diluted bitumen spills will float at least for days to weeks. It noted that it had completed a draft Sunken and Submerged Oil Plan and that it had enhanced its knowledge in sunken and submerged oil cleanup through participation in the development of a methodology for the identification and delineation of sunken oil. WCMRC discussed the techniques, tools and equipment that it would rely on for detection and tracking and recovery of submerged and sunken oil. WCMRC also noted that the issue of recovery of submerged and sunken oil was adjudicated in the OH-001-2014 hearing.

Trans Mountain filed a copy of its Submerged and Sunken Oil Plan. It said that the Submerged and Sunken Oil Plan was exercised in September 2018 as part of the Westridge Marine Terminal full-scale exercise conducted to fulfill the requirements of NEB Condition 136(a)(i).

Trans Mountain said that equipment used to recover submerged and sunken oil resides within the existing inventories of WCMRC, supplemental oil spill response contractors, Trans Mountain and the marine construction industry. Trans Mountain's inventory of emergency and spill response equipment includes a Submerged Oil Response Trailer, which contains emergency and spill response equipment specifically selected for water-based spill containment and recovery.

Proposed improvements to marine oil spill preparedness and response measures on the west coast

In the OH-001-2014 hearing, the Mayne Island Conservancy Society recommended that, if the Project is approved, oil spill response capacity be greatly improved along the entire shipping route. These improvements should include stationing equipment in the Southern Gulf Islands and providing training to locals to ensure an ability to deploy equipment at a spill site within one tide change, as compared to the 72-hour standard contained in regulation. Mr. Paul Petrie and Mayne Island Conservancy Society said that sufficient response capacity should be in place to respond to entire loss of cargo from an Aframax tanker.

Trans Mountain said that it engaged WCMRC to review its risk assessment and fate and behavior studies, and to describe enhancements to the existing planning standards that would better accommodate the tanker traffic resulting from the Project. It said that the results of studies indicate that a prompt response can significantly reduce the consequences of a spill. As diluted bitumen tested during Trans Mountain's studies remained floating over the 10-day test period, Trans Mountain said that to be effective, planning standards for on-water operations should be based on removing free oil within 10 days.

Trans Mountain said that it asked WCMRC to develop emergency response measures capable of handling one credible worst-case oil spill of 16 500 m³ (15,500 tonnes) at any location along the tanker route within Canada's territorial sea. Trans Mountain said that WCMRC, in consultation with Trans Mountain, examined its current equipment locations and capacity, the mandated response times against the results of the Gainford study, the results of the quantitative risk assessment, known meteorological and oceanographic data, and hypothetical accidental oil spill locations and concluded that certain improvements could be undertaken to improve the effectiveness of its current emergency preparedness and response capacity with respect to the increase in Project-related tankers.

Due to other potential tanker traffic in the area, WCMRC based its assessment on a potential 21 000 m³ or a 20,000 tonne release of heavy crude oil. WCMRC and Trans Mountain also consulted with other spill and response organizations including other response organizations in Canada, the US and Norway. Trans Mountain outlined a number of potential enhancements to current planning standards and WCMRC's current response capacity to achieve a more effective response to a 21 000 m³ spill. More stringent response times formed part of the proposed enhancements.

The enhanced response regime would be capable of delivering 20,000 tonnes of capacity within 36 hours with dedicated resources staged within the study area. Trans Mountain noted that this would represent a response capacity that is double, and a delivery time that is half, the existing planning standards. These enhancements would reduce times for initiating a response to two hours within Vancouver Harbour, and six hours for the remainder of the study area and parts of the West Coast of Vancouver Island. These reduced times would be achieved by creating new base locations along the tanker route. Trans Mountain noted that meeting the response capacities within the designated times would require redundancy of equipment, and as a result of the redundancy, the overall capacity of dedicated response equipment available in the Salish Sea region would be in excess of 30,000 tonnes equivalent when calculated under the current Federal guidelines for response organizations. Trans Mountain said that while the probability of the total loss of containment for an Aframax tanker is so low that it is not a credible planning scenario, such an event could be addressed by cascading equipment from other areas. Trans Mountain said that the enhanced response regime would cost approximately \$100 million. Trans Mountain said that its commitment to enhancing marine spill response capacity in the region would benefit the entire shipping community in the Salish Sea.

Trans Mountain said that it had undertaken a project to collect, update and store information about the shoreline and backshore environment in the vicinity of the WMT. The data collected would be used to inform the Shoreline Cleanup Assessment Technique process and the shoreline protection and cleanup response functions in the event of a future oil spill.

Trans Mountain said that it agreed with the Tanker Safety Expert Panel, which recommended the need for Canada to tailor its preparedness efforts for each sector of the country, as the risks across the country are demonstrably different. The Tanker Safety Expert Panel recommended that the Government of Canada implement a risk-based area response planning model to prepare for ship-source oil spills. Trans Mountain submitted that the planning process described by the Panel is similar to that used to develop the marine spill response enhancements described by Trans Mountain and would be expected to result in similar standards.

The TERMPOL Review Committee said that it supported risk-based area response planning and WCMRC's efforts to increase capacity and reduce response time to ensure it is prepared to respond to a credible worst-case scenario as identified by Trans Mountain. The Committee also said that as part of measures to achieve a world-class tanker safety system, appropriate authorities would work with WCMRC and other stakeholders to develop and implement response plans tailored to the southern portion of B.C. The plans would help to ensure the appropriate spill cleanup equipment is in place and readily available.

The Canadian Coast Guard said that in assessing the proposed project and by participating on the TERMPOL Review Committee, it does not foresee undue burdens placed on its response capability. It considers the current configuration and placement of the response organization and its own assets to be sufficient to meet the demands of increased tanker traffic. It noted that the TERMPOL Review Committee did not identify any regulatory concerns with the proposed oil spill preparedness and response procedures at this time. It also said that Trans Mountain proposed a number of enhanced marine oil spill prevention and preparedness measures in its submission to the Board and these were reviewed by the TERMPOL Review Committee. It said that although these measures are voluntary in nature, the Canadian Coast Guard supports any such enhancements.

In the MH-052-2018 hearing, Trans Mountain said that it provided comments on requirements for oil spill response organizations to Transport Canada in 2018, as part of the government's consultation on the Oceans Protection Plan. Trans Mountain had proposed that the planning standard for response times of response organizations in a local area should be commensurate to the level of risk contributed by industry in the local area. Trans Mountain submitted that this was Trans Mountain's approach in facilitating the largest-ever expansion of spill response personnel and equipment on the B.C. coast by WCMRC.

Enhanced marine oil spill response regime

Trans Mountain and Western Canada Marine Response Corporation provided an update on the status and implementation of the enhanced marine oil spill response regime that was the subject of Condition 133 in the OH-001-2014 Report. Trans Mountain noted:

- the regime is focused on early response including containment of the casualty, which remains the primary countermeasure to mitigate and limit the effects of a large or credible worst-case spill in the Salish Sea;
- that it had entered into a funding agreement with WCMRC in 2017 to allow WCMRC to proceed to implement the enhanced regime; and

- since the Board's OH-001-2014 Report, the estimated cost for implementation of the regime has risen from \$100 million to \$150 million.

Trans Mountain noted several programs, bases, personnel and equipment that are currently suspended due to suspension of Project activities. Trans Mountain has instructed WCMRC to maintain a caretaker status over the work done so far so that work on the enhanced response regime can be revived should the Project proceed.

WCMRC said that unless certified by Transport Canada, the enhanced response regime would be verified by Lloyds Register Consulting, an independent third party, to verify final implementation of the enhancements. It said that it had completed extensive work in areas related to project management, development of plans and base and equipment designs, human resources and training, and procurement planning and processes. It also noted that work on the regime has been suspended and will remain so until it is revived by Trans Mountain.

WCMRC said that the planning standards for the enhanced response regime require that response is initiated within 2 hours for spills in Vancouver Harbour and within 6 hours for the remainder of the Salish Sea shipping route to the 12-nautical-mile limit. It noted that the regime would be available to all users of the marine network in B.C. for any type of oil spill.

WCMRC said the regime would be comprised of the following (Figure 31):

- 43 new response vessels, doubling the current WCMRC fleet to 88 vessels. Vessels would include coastal response vessels, response barges, mobile skimmers, an offshore response vessel, landing craft, storage barges, and work boats.
- Eight new spill response bases in the Salish Sea. The proposed bases would include 24/7 onwater bases in Vancouver Harbour and North Saanich.
- Approximately 120 new employees, most of who would be assigned to new bases on Vancouver Island.
- Operating infrastructure to integrate the enhancements into a functional system.

WCMRC said that the following programs and plans would be reviewed and updated during implementation of the regime:

- International Safety Management System
- Convergent Volunteers Guide
- Geographic Response Strategies Program
- Shoreline Cleanup Plan
- Sunken and Submerged Oils Plan
- Waste Management Plan to address potential increased waste volumes
- Wildlife Management Plan (including birds and marine mammals)
- Vessels of Opportunity Program (VOO) that uses nearby vessel to support spill responders

Referencing the sinking of the MV Sanchi, as discussed in Section 14.11.2, Gerald Graham said that the Board's Condition 133 should require Trans Mountain to confirm that the enhanced marine oil spill response regime is sufficient to clean up a marine oil spill involving a total loss of cargo plus bunker fuel.

The federal government departments and agencies said that Environment and Climate Change Canada, because it supports Canada's marine spill prevention and response regime, and Parks Canada Agency, because it manages potentially affected lands and waters, should be added to the list of departments in Condition 91 that Trans Mountain must consult with in developing a plan describing how it will meet the requirements of Condition 133. Numerous participants such as the T'Sou-ke Nation, Ditidaht First Nation, Malahat First Nation, and the IAMC Indigenous Caucus recommended that Condition 91 be amended to also include the requirement for consultation with Indigenous groups and the IAMC in developing the plan. The IAMC said that it should be given a formal role in co-developing the Condition 91 plan.

Figure 31: Enhanced Response Regime Bases and Equipment Allocation



Spill response from enhanced tug escort

As part of its commitment for enhanced tug escort, Trans Mountain said that it was evaluating the feasibility of using escort tugs to assist with spill response. Since the tug would be in close proximity of the tanker, the tug may facilitate booming the casualty even before the six-hour response time of the WCMRC. Trans Mountain noted planning for escort tugs to assist in spill response was currently on hold as result of the Federal Court of Appeal decision regarding the Project.

In its reports prepared for the Cowichan Tribes, EnviroEmerg Consulting raised concerns regarding the lack of regional based salvage services to prevent or reduce oil release.

Trans Mountain said that escort tugs that accompany loaded tankers from the Westridge Marine Terminal provide equivalent support as salvage vessels. It noted Canadian Coast Guard plans to have two emergency response vessels with towing and fire-fighting capability for the west coast of Canada. Trans Mountain also said that given the level of current risk mitigation measures in place and proposed future risk mitigation measures, including increased tug escort of the tankers, the probability of a tanker requiring salvage is not a credible risk.

Transport Canada said that salvage operations take place after the threat of a spill has been addressed. Salvage operations are the responsibility of the ship owner. Transport Canada assumes an oversight role to ensure that the ship owner is meeting their obligation and that the salvage operation takes place in a safe manner that aims to minimize any further pollution risk. It noted potential legislative changes regarding salvage requirements and it said that issues related to salvage are also addressed in the National Places of Refuge Contingency Plan.

On-water recovery, response effectiveness, and response time

For the OH-001-2014 hearing, using its oil spill model, Trans Mountain assessed the effectiveness of the proposed enhanced response regime. A 16 500 m³ spill event resulting from a tanker grounding incident at Arachne Reef near Turn Point was compared with and without spill response mitigation. Trans Mountain said that the oil spill model was revised to include consideration of various response measures and techniques over the four day simulation period. Trans Mountain noted that the four day simulation period was selected based on the slick thickness on water. After the end of the fourth day, the slick became too thin to be efficiently recoverable and although some oil could still be recovered, it became difficult to

quantify. Trans Mountain said that a primary response technique assessed was double booming¹³³ of the tanker. Trans Mountain said that this tactic is highly effective in containing the spread of oil and assisting in its recovery, since oil within the boom would be thick and fresh and amenable to skimming and pumping.

The City of Vancouver, Tsleil-Waututh Nation and Tsawout First Nation prepared a marine oil spill response capacity analysis. This work estimated the percentage of a worst-case oil spill that could be recovered at each site modeled during the first 72 hours of the response, showing how response capacity varies by location and time of year. Spill volumes modeled were 8 000 m³ for a ship at berth at the WMT and 16 000 m³ for four locations along the tanker routes. The estimate included the additional resources that Trans Mountain noted that WCMRC would be obtaining. The participants said that the modelling approach does not incorporate other limiting factors, such as the likelihood that oil will strand on shorelines before it can be recovered, or the potential for diluted bitumen to submerge or sink so that it cannot be recovered using oil skimmers. The highest recovery estimate was for a summer spill at the Central Harbour site in Burrard Inlet, with the model showing that 78 per cent of the oil could be recovered using skimmers. The lowest modeled recovery estimates were for winter spills at Georgia Strait and Haro Strait, where the model estimates that only 15-16 per cent of a 16 000 m³ spill would be recovered within 3 days of the spill. Overall the work concluded that on-water oil spill recovery capacity is reduced during winter months by as much as 50 per cent compared to summer and that the spill response forces currently available in Southern B.C. have the capacity to recover only 10-20 per cent of a worst-case oil spill under favourable conditions.

The Shxw'owhámel First Nation noted that during the Deepwater Horizon spill response, approximately 3 per cent of the oil spilled was recovered in open water.

Trans Mountain said summer weather conditions were simulated for the hypothetical incident. It said that the weather conditions selected were based on the representativeness of the resulting spill in terms of environmental and human-health consequences. In the summer season, warmer water and air temperatures would facilitate more rapid dissolution or volatilization of lighter pseudo-components of the oil into water or air, respectively. It said that this was a conservative approach, as the concentration in water or air would be increased by rapid dissolution or volatilization. Generally lower wind speeds during the summer would result in less wave action and hence, less vertical mixing of the water column and higher concentrations of dissolved hydrocarbons in the surface water layer. Trans Mountain said that there would also be less dilution of vapours in air. Trans Mountain said that the weather conditions modeled were amenable for response activities.

Under the conditions modeled, Trans Mountain said that, after 4 days, there was almost no oil inside the containment boom as a result of recovery operations and less than 10 per cent of the spilled oil was left on the water. The fraction of spilled oil that contacted shorelines was reduced from about 70 per cent in the unmitigated case after 15 days, to 25 per cent in the mitigated case. Over half the oil was recovered from the water surface during Trans Mountain's modelling analysis. Trans Mountain said that this amount was very high compared to historical recoveries at large spill incidents. Trans Mountain and the Province of British Columbia referred to information from the International Tanker Owners Pollution Federation that said that oil recovery rates at sea vary depending on circumstances but typically, they range from 10-15 per cent or less. Trans Mountain noted a few reasons explaining the high rate of recovery in its study including proper planning, the addition of equipment staging and additional bases along the shipping route, and the use of leading edge oil spill modelling.

Transport Canada said that it is not possible to provide a standard estimate of the percentage of oil recovered from a spill. The size of the spill, oil type, response methods and the environmental conditions at the time of the incident all affect how much oil is recovered. Depending on the type of product, a significant portion is lost to evaporation. Similarly, ECCC said as there are many factors that affect recovery rates and due to the fact that each spill incident is unique, it is extremely difficult to predict recovery rates.

Trans Mountain said that the key to meeting proposed response thresholds is reaching the spill site quickly and responding to the spill in an effective manner. Trans Mountain provided a response gap analysis which found that the annual percentage of time that on-water oil spill response in the marine environment may be halted, or limited in effectiveness due to environmental conditions such as wind, waves and tides/ currents varies based upon the location along the shipping route. The analysis indicated that effective on-water response could be mounted the majority of time along the tanker routes with potential effectiveness diminishing towards the western portion of the route in the Strait of Juan de Fuca. In the event that environmental conditions temporarily limit on-water response operations, Trans Mountain outlined other spill response activities that could occur away from the spill site.

The City of Vancouver, Tsleil-Waututh Nation and Tsawout First Nation also prepared a response gap analysis that concluded that on-water recovery efforts combined with aerial reconnaissance would be limited to varying degrees throughout the tanker routes. Depending on the location assessed, a response gap (i.e., no response possible) ranged from

¹³³ Primary and secondary containment, essentially sufficient boom to wrap the stranded vessel twice.

56 to 78 per cent of the time in the winter and 34 to 49 per cent of the time in the summer. Response conditions were generally more favorable in the Burrard Inlet inner harbour area as compared to open water sites.

The District of North Vancouver said that the weathering characteristics of spilled diluted bitumen indicate the importance of a rapid response time to a spill within Burrard Inlet. Without a rapid, effective response and quick containment and recovery of a spill within the first few hours, it is likely impossible to avoid the formation of tar balls and the spread of oil on the water surface and sub-surface with subsequent shoreline impacts as well. The Cowichan Tribes and District of North Vancouver said that initial spill response could be delayed due to health and safety concerns for responders resulting from chemical characteristics of spilled dilbit. Trans Mountain said that site safety and health procedures for spilled dilbit are no different than for any other spill of heavy crude oil and it outlined procedures to safeguard personnel working on- water and on-shore.

Canadian Coast Guard said that weather conditions, including rough sea-states, strong winds, snow, and ice coverage can all impact response operations, and Canadian Coast Guard, in collaboration with its response partners, supported by scientific expertise coordinated through ECCC, takes weather conditions into consideration as part of all response activities.

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The Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation, and the City of Vancouver submitted an updated assessment of oil spill response capabilities and limitations associated with marine shipping prepared by Nuka Research and Planning Group. The report considered the times within which marine spill response could occur (marine oil spill response gap analysis) and the required resources (marine oil spill response capacity analysis). Nuka said that the conclusions it reached in its 2015 report continue to apply to the Project which said that there are periods of time when response may not be possible due to environmental and other conditions and that there is a lack of resources available for spill response. Nuka said that even with implementation of the enhanced marine oil spill response program, the on-water recovery capacity in the Canadian Salish Sea region would still be less than half the present capacity in the US Salish Sea. Nuka also discussed additional approaches and methodologies to spill response planning based on work completed since the Board's OH-001-2014 Report.

Trans Mountain compared oil spill response regulations in Canada and the US. Trans Mountain concluded that with implementation of its proposed enhanced marine oil spill response regime, WCMRC's response capacity would be commensurate with the legislated worst-case discharge planning standards in the US. It said that the intent of the Canadian regime is to ensure that a level of preparedness exists such that a suitable response is in place and ready to be deployed in the event of any spill, regardless of size and condition. National and international mutual aid agreements are also part of a response organization's capability for spills that exceed their capacity.

Georgia Strait Alliance expressed similar concerns regarding environmental conditions that could limit on-water response. It provided an analysis as to wind, wave, and tidal conditions that could lead to potential containment boom failure. Georgia Strait Alliance said that the regulations governing Response Organizations such as WCMRC are broad rather than prescriptive, and do not set out the amount and type of resources that WCMRC must maintain. It said that a lack of assessment or prescription of the amount or type of response capacity for equipment and personnel does not allow for an effective response. Georgia Strait Alliance recommended that the federal government should assess regulatory requirements for marine spill response related to areas such as response capacity, prescription of requirements, response gap analysis, and clean-up standards.

WCMRC discussed concerns that it had with Georgia Strait Alliance's assessment of the effectiveness of booms under certain environmental conditions. It did not agree with the wave and wind data used or how it was interpreted. WCMRC said that it believes that intervenors should be "cautious" in relying on the information contained in the Georgia Strait Alliance report. It also said that questions related to response limitations due to environmental conditions were considered in the OH-001-2014 hearing.

A recent spill event on the West Coast that WCMRC responded to was the grounding and subsequent sinking of the tug Nathan E. Stewart near Bella Bella, B.C. in October 2016. WCMRC said that response operations were halted due to weather conditions for 11 days out of 40 (27.5 per cent). It said that during the response, WCMRC boom, vessels and skimmers were positioned correctly and continually adjusted according to the prevailing conditions. WCMRC said that on two occasions, containment boom around the Nathan E. Stewart was damaged due to wave action during stormy weather and required replacement. WCMRC said that the weather conditions encountered during the Nathan E. Stewart were not unusual and are well within the Planning Standards for Response Organizations. It said that it would be able to implement an effective spill response in case of a spill from a Project-tanker under similar circumstances. In its report on the incident, the Transportation Safety Board said there was no delay by Canadian Coast Guard and WCMRC in their reaction to the incident and the oil spill response, and that the recovery efforts of both organizations met the prescribed time standards.

The Lyackson First Nation also expressed concerns regarding unfavorable weather conditions and difficult access limiting or halting spill response efforts.

In its reports prepared for the Cowichan Tribes, EnviroEmerg Consulting said that there is significant uncertainty regarding the efficacy and efficiency of current response technologies and tools used to manage a spill of diluted bitumen, an unconventional oil, in the Salish Sea. It said that there may be periods of time where oil response activities cannot be undertaken due to environmental conditions and for responder safety reasons. Among other topics, the reports also expressed concerns regarding oily waste management. EnviroEmerg provided updated evidence to support its conclusions from its report filed in the OH-001-2014 hearing. EnviroEmerg said that the new evidence does not fundamentally change the issues and concerns that it raised in the OH-001-2014 hearing and that rather, it intensifies them.

WCMRC discussed potential oil spill recovery rates and associated oily waste management. It said that current recovery technologies are more efficient in terms of oil to water recovery ratio. It noted that each oil spill is unique and the response would be commensurate with many factors including those which may affect recovery rates and oily waste management. In addition to its own resources for storage of oily waste, it said that it maintains relationships with certified waste haulers and disposal facilities as well as shore and floating storage providers. These resources would be assigned as per the Waste Management Plan approved by Unified Command.

Canadian Coast Guard said that it maintains storage capacity in the region to store and transport oily waste and that additional Canadian Coast Guard capacity could be cascaded to the impacted area from other regions of Canada, if required. Additional storage capacity, such as tankers and barges, could also be contracted during a response operation to meet any anticipated volume of oily waste. It said that incident-specific waste management plans are developed at the time of an incident based on the specific products, volumes and locations, and are reviewed to ensure that they meet local, provincial and federal laws and regulations. Canadian Coast Guard also described methods for transferring highly viscous oils such as weathered diluted bitumen as part of oily waste management.

Transport Canada noted that a response organization must demonstrate that it has sufficient storage capacity to maintain oil/oil water waste recovery operations 24 hours a day. In addition, through mutual aid agreements and arrangements with other response organizations and contractors, responders have access to cascading resources that expand capabilities beyond the Transport Canada-mandated spill threshold of 10,000 tonnes

Environment and Climate Change Canada said that the recovery rate or efficacy for any spill is a challenge to quantify. Each incident is unique and the response efficacy varies with the circumstances of the incident. It said that the recovery of oil from shorelines can be quite high under favourable conditions but that the actual recovery rate will depend on spill conditions and aggressiveness of clean-up operations. The selection of clean-up objectives and endpoints is key in determining the extent of recoverable oil. Environment and Climate Change Canada noted that clean-up objectives and endpoints are established based on net environmental benefit analysis in consultation with the responsible party, regulatory agencies and operational group.

Inclusion of Indigenous peoples in oil spill planning and response

During the MH-052-2018 hearing, evidence was filed regarding initiatives aimed at including Indigenous people in marine spill response planning since the Board's OH-001-2014 Report.

A number of First Nations such as the Cheam, Chawathil, Kwantlen, Seabird Island Band, and Pacheedaht Nations and Stó:lō Tribal Council noted the importance of including Indigenous people in marine oil spill planning and response.

The IAMC Indigenous Caucus said that Indigenous peoples and interests must be fully integrated into the oversight of the Project, including in areas related to emergency preparedness and response. It noted the work of the IAMC Marine Shipping Subcommittee which addresses meaningful Indigenous inclusion in spill preparedness and response and Indigenous inclusion in marine Stewardship, planning, and monitoring.

Government of Canada initiatives

The federal departments and agencies discussed a number of initiatives aimed at strengthening partnerships and launching co-management practices with Indigenous communities under the Oceans Protection Plan. They said that partnerships and agreements will be jointly developed, reflect the priorities and interests of Indigenous communities and Canada, advance common issues and achieve tangible outcomes that meaningfully contribute to reconciliation.

The Canadian Coast Guard said that it has been working with First Nations communities to build capacity for incident response and it noted the following:

- Indigenous Community Response Training - This initiative under the Oceans Protection Plan is enhancing Canada's community-based marine emergency preparedness and response capacity by providing training to the individuals who are frequently the first responders to a marine emergency in B.C., particularly in remote/northern coastal

areas. It has funded a variety of training programs, including Coastal Nations Search and Rescue, Marine Advanced First Aid, Small Vessel Operators' Proficiency, Incident Command System (ICS) and Marine Oil Spill Response. Canadian Coast Guard listed a number of coastal B.C. nations that had participated in the training. This training is then applied in joint operational exercises that incorporate all on-water first response partners, such as the Coast Guard Auxiliary, First Nations communities, Parks Canada, other federal, provincial, and municipal partners and any other implicated organizations.

- Indigenous Coast Guard Auxiliary – The Coastal Nations Coast Guard Auxiliary was established in 2018. This organization enhances the already established Auxiliary capacity in B.C. It has two units that are operational in the Ahousaht and Gitxaala Nations. Each community represents an Auxiliary unit with vessels and volunteer crews that are trained and ready to respond to marine emergencies/Coast Guard taskings. Establishment of units on the south coast will be based on an analysis of the maritime search and rescue needs in that area, and take into account the interest and capacity of Indigenous Nations to participate in the Auxiliary.
- Geographically Specific Response Plans - The Canadian Coast Guard is working directly with Indigenous Groups to develop Geographically Specific Response Plans in the South Coast. This process is ongoing and as plans are developed, they will be jointly exercised, updated, and collaboratively maintained going forward. For alerting and notification purposes, the Canadian Coast Guard maintains a contact list for Indigenous groups throughout coastal waters of B.C. The Coast Guard will notify Indigenous groups directly during an incident, as/when appropriate.
- Environmental Response Internship – This pilot program between 2016 and 2018 trained eight members of seven First Nations to date (Gitga'at, Gitxaala, Tsawwassen, Tsleil-Waututh, Pacheedaht, Musqueam, and Beecher Bay First Nations). The objectives were to increase a community's capacity and capability to respond to pollution incidents, reduce response times to pollution incidents, enable Coast Guard to expand its network of trained personnel to assist with incidents, and support long-term collaboration between the Coast Guard and coastal First Nations. At the end of each internship, the participating communities were provided with funding to secure a container of response equipment to enable it to respond and integrate with Coast Guard and other response partners on clean-up and monitoring operations. These First Nations were also offered the opportunity to participate in Incident Command System and marine oil spill response training for additional community members.

Canadian Coast Guard said that as a result of training and exercise programs and response planning initiatives, Indigenous groups are pre-established as Incident Commanders in Canadian Coast Guard contingency response plans. Consequently Indigenous governments may choose to participate and lead in environmental response operations activated by the Canadian Coast Guard within their traditional territories in B.C.

WCMRC initiatives

WCMRC said that it works closely with First Nations and coastal communities in order to integrate their input into areas of spill response pre-planning and readiness in their area. There are many ways communities become involved, including participating in response training, contributing local knowledge and expertise, storing specialized spill response equipment caches in their communities (Coastal Response Packages), becoming a response contractor, or helping to identify local sensitivities to ensure vital resources are accounted for. WCMRC noted:

- Training – WCMRC offers training opportunities to interested Indigenous nations to support their understanding of spill response and the Incident Command System.
- Geographic Response Strategies - WCMRC said that it is committed to ongoing engagement with interested groups to develop geographic response strategies for sites that are important to them. WCMRC has reached out to all Indigenous Nations with traditional marine territory with offers to collaborate on the development of geographic response strategies. WCMRC has had representatives from six different First Nations during actual geographic response strategies field deployments and it has engaged with numerous other First Nations during data collection and when identifying sensitive sites.
- Capacity Building and Employment - WCMRC has a number of Indigenous Nations as long term contractors and intends to develop an oil spill response base in the traditional territories of the Sc'ianew (Cheanuh) First Nations' at Beecher Bay. WCMRC has reached out to other Indigenous Nations to assess the practicality of locating response bases on their reserves and it has discussed other employment and contracting opportunities such as those available in the Vessels of Opportunity (VOO) programs including marine contractors. WCMRC said that it works with and employs members of First Nations and coastal communities along B.C.'s entire coastline.
- Coastal Response Program – WCMRC launched the Coastal Response Program in 2017 to ensure coastal communities are integrated into spill response. As part of the program, WCMRC works with First Nations, local communities and governments to ensure they are prepared should a spill occur in their area. Opportunities for community involvement include supporting spill responders during an incident, deploying coastal protection

strategies, contributing local marine expertise, and participating in the mapping of coastal areas to ensure vital resources are accounted for. WCMRC currently has custodial agreements with First Nations and coastal communities to store coastal spill response packages throughout the geographic area of response. WCMRC owns the equipment in these packages and trains local Vessels of Opportunity members to properly deploy, store and maintain the equipment. A Vessel of Opportunity is a vessel whose crew is trained by WCMRC to respond to marine oil spills. Vessels of Opportunity support spill responders, deploy coastal protection strategies and provide invaluable marine expertise during a spill. WCMRC said that it has begun the process to identify locations for packages in the Increased Response Area of the enhanced marine oil spill response regime and will begin to deploy packages in 2019.

Views of the Reconsideration Panel

The Board finds that Trans Mountain's application met the requirements outlined in the Board's 10 September 2013 "Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities" and the Board's 12 October 2018 Filing Requirements for the MH-052-2018 hearing regarding marine emergency preparedness and response planning.

As noted in Section 14.11.2, the evidence indicates that tanker spills are not likely events. Nonetheless, it is prudent and standard practice to prepare an appropriate response to small and large spill events in any industrial endeavor, such as the Project and related marine shipping.

General principles of marine spill response

The Board accepts evidence filed by Trans Mountain and numerous participants, which in its view, indicates that there are principles that are generally applicable to marine spill response. For example, the Board agrees with The District of North Vancouver which said that spills can happen even with the best possible measures in place and even the best possible spill response system cannot guarantee that resources at risk will be protected from negative impacts if a spill occurs. The Board summarizes these principles as follows and notes that these statements are applicable broadly, and are not necessarily limited to spills associated with the Project and related marine shipping or to a diluted bitumen spill:

- The circumstances associated with each spill event would affect the success of the response and there is no guarantee that a spill response would result in the on-water recovery of a significant portion of the oil spilled.
- On water spill response may not always be possible due to environmental conditions but during such times, other response measures such as shoreline protection and clean-up or tracking of oil would likely be possible.
- Response could be delayed due to responder safety.
- Even with response efforts, any large spill event would result in significant adverse environmental and socio-economic effects.

In providing the following views, the Board has considered these General Principles of Marine Spill Response.

Marine spill response regulatory framework

The Board recognizes the regulatory framework that applies to marine oil spill preparedness and response. The Board summarized this framework in Section 14.3.

As previously noted, the evidence before the Board indicates that there are competent authorities responsible for the marine oil spill preparedness and response regime and that the regime is functioning appropriately. Any changes to the existing regime would be the responsibility of these competent authorities. The evidence indicates that the regime is reviewed periodically and in fact, evidence filed by the federal government departments and agencies and WCMRC during the MH-052-2018 hearing indicates that there have been improvements to the regulatory framework since the Board's OH-001-2014 Report. Some of these improvement initiatives have been completed and some are ongoing. The Board accepts that such improvements will further contribute to spill response associated with Project and non Project-related vessels and recognizes that a number of initiatives are still ongoing.

Trans Mountain does not own the ships associated with the Project-related shipping and therefore, has limited control over the ship owner's pollution response planning. Evidence filed by Trans Mountain, Transport Canada and Canadian Coast Guard confirms that vessel owners must have an agreement in place for spill response WCMRC and that the vessels must also have a Shipboard Oil Pollution Emergency Plan.

Oil handling facilities, such as the Westridge Marine Terminal, must have an agreement in place with WCMRC, an Oil Pollution Emergency Plan and an on-site Oil Pollution Prevention Plan. As the Westridge Marine Terminal is regulated by the National Energy Board, it would also be subject to the response planning requirements contained within the *National Energy Board Onshore Pipeline Regulations*.

In addition to the regulatory framework improvement initiatives discussed by participants, the Board also heard concerns from participants such as Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation, the City of Vancouver, Georgia Strait Alliance, and the Cowichan Tribes regarding oil spill response planning for Project-related tankers and other vessels.

The Board recognizes that participants such as the T'Sou-ke Nation and the Friends of Ecological Reserves said that there is a need for the Government of Canada to revise the existing response organization standards. The Board notes that Transport Canada said that it is currently reviewing these standards.

Further, to increase transparency of information, the Board recognizes that the Vancouver Fraser Port Authority recommended that an annual report be filed to Parliament by the Canadian Coast Guard that addresses marine oil spill response planning and preparedness activities.

To promote continued improvement in the marine oil spill response regulatory framework, the Board included Recommendation 7 which would require that the GIC review and update federal marine shipping oil spill response requirements. This recommendation has been crafted such that it would include consideration of the concerns noted by the above parties.

Responding to a diluted bitumen spill

The Board heard concerns raised by parties such as Cowichan Tribes, Shxw'ōwhámél First Nation and Living Oceans Society regarding challenges in responding to submerged or sunken diluted bitumen. The Board agrees there is the potential for diluted bitumen to submerge in water but it notes that sinking of diluted bitumen in large, contiguous amounts is not likely. The potential fate and behavior of diluted bitumen is discussed in Chapter 8.

The Board acknowledges that the physical and chemical characteristics of diluted bitumen, like other similar heavier oil products, present response challenges. The Board is of the view that Trans Mountain has provided sufficient information as to how the potential fate and behavior of diluted bitumen would be considered in spill response planning. Evidence filed by Trans Mountain and parties such as Living Oceans Society and the Shxw'ōwhámél First Nation indicates that there are tools and techniques available for responding to heavy oils like diluted bitumen. These tools and techniques are primarily focused on detection and recovery, on-water mechanical recovery and shoreline clean-up. The success of each would depend on the specific circumstances associated with the spill.

The Board found in Chapter 8 that diluted bitumen is likely to weather quite quickly to a Group IV oil state for response purposes. The Board also found that weathered diluted bitumen has potential to emulsify or potentially submerge in water. Due to its weathered state, and the physical geography within Burrard Inlet and along the tanker routes, diluted bitumen would also likely strand on shorelines if not recovered on water. A portion could also submerge and wash up on shore some distance from the spill site. A rapid on-water response would assist in mitigating shoreline impacts. The Board notes that Trans Mountain's proposed marine oil spill response improvements would substantially reduce response times along the tanker routes and within Burrard Inlet.

Based on the report by Logan, the Raincoast Conservation Foundation said that the use of dispersants on a weathered diluted bitumen spill is not likely an effective response tool. The Board agrees. The Board notes that in its OH-001-2014 Report, it concluded as follows: "... the Board is of the view that diluted bitumen could pose particular challenges in response and clean-up due to its potential for submergence and emulsion formation, persistent chemical and physical properties, and potential for shoreline stranding. These characteristics also lessen the potential for use of counter measures, such as dispersants and in-situ burning. Environmental conditions and spill-specific factors would influence the use of such response tactics. The Board is of the view that these response challenges are not unique to diluted bitumen spills, but can be associated with heavier oil products in general." Upon consideration of the relevant evidence from the OH-001-2014 hearing, MH-052-2018 hearing and findings in Chapter 8, the Board affirms this view.

The Province of B.C. and other participants stressed the need to consider sunken and submerged oil in response planning. The Board agrees that this is an important consideration. The Board finds that evidence presented by Trans Mountain, WCMRC, and the federal departments and agencies confirms that the potential for submerged and sunken oil has been considered in response planning.

Proposed improvements to spill preparedness and response measures

The Board notes that the Canadian Science Advisory Secretariat concluded that prompt response actions are of utmost importance for any spill (Chapter 8). Other evidence presented in Chapter 8 indicates that the physical and

chemical properties of diluted bitumen can change relatively rapidly once spilled in water and that viscosity and density change more rapidly for diluted bitumen compared to conventional oil.

The Board is of the view that Trans Mountain, in conjunction with WCMRC, is proposing appropriate measures to respond to potential oil spills from Project-related tankers. The enhanced oil spill response regime committed to by Trans Mountain was informed by Trans Mountain's marine shipping risk assessment and would result in a substantial improvement to marine oil spill response on the west coast that exceeds current regulatory requirements. This enhanced marine oil spill response regime would be capable of delivering 20,000 tonnes of capacity within 36 hours of notification, with dedicated resources staged within the study area in place. The regime would also be capable of initiating response within 2 hours for spills in Vancouver Harbour and within 6 hours for the remainder of the Salish Sea shipping route to the 12-nautical-mile limit. Implementation of the enhanced response regime would result in a response capacity that is double, and a delivery time that is half, that required by the existing planning standards.

The Board is of the view that the marine spill response measures proposed by Trans Mountain are in line with the Board's application of the precautionary principle. Although an oil spill from Project-related vessels that would result in significant environmental effects is not likely, this does not mean that the risk of an oil spill is zero. Thus, it is imperative that appropriate spill response measures are in place to mitigate the potential negative effects associated with a spill.

The Board has already concluded that there are competent authorities responsible for the marine oil spill preparedness and response regime and that the regime is functioning appropriately. In light of this, the Board gives substantial weight to the evidence presented by the parties primarily responsible for marine shipping spill response (Canadian Coast Guard, WCMRC, and Environment and Climate Change Canada) regarding marine shipping spill response planning and implementation, including that for Project-related tankers. The Board recognizes the expertise of these parties.

The Board notes that oil spill response would be further augmented by oil spill response improvements discussed by the federal departments and agencies, particularly the Canadian Coast Guard, that have occurred since the Board's OH-001-2014 Report. The Board recognizes Trans Mountain's efforts to date to also evaluate the feasibility of using escort tugs to assist with spill response to further contribute to enhanced spill response measures. Should it come to fruition, spill response from the escort tugs would further contribute to enhanced spill response measures by reducing response times with readily available equipment on the escort tugs. However, the Board notes that this was only at the stage of early consideration and this work is currently on hold.

In Section 14.11.2, the Board said that the purpose of marine shipping risk assessments is to inform marine shipping safety and spill response planning. Trans Mountain used its marine shipping risk assessment to inform its enhanced marine spill response measures. As noted in Section 14.3, the Board does not have regulatory jurisdiction over marine emergency preparedness and response planning. However, the Board would impose Conditions 91, 133, and 144 to ensure implementation of Trans Mountain's proposed emergency preparedness and response measures that exceed regulatory requirements.

Evidence filed by Trans Mountain and WCMRC confirms that appropriate planning was being undertaken to implement the enhanced marine oil spill response regime. The Board requires that this planning would continue should the Project receive approval.

The Board heard concerns that sufficient resources should be in place to respond to the complete loss of a tanker's cargo. The evidence presented in Section 14.11.2 indicates that complete loss is not a likely scenario. However, should such an event occur, evidence filed by Trans Mountain, WCMRC, and the Canadian Coast Guard indicates that WCMRC and the Canadian Coast Guard have the ability to mobilize resources to respond to a spill that is larger than the credible worst-case scenario. Such resources could be mobilized from around the world, if necessary.

Many participants, such as Georgia Strait Alliance, Lyackson First Nation, Tsleil-Waututh Nation, Squamish Nation, and the City of Vancouver expressed concerns regarding spill response under varying environmental conditions. The Board notes that response gap analyses were prepared by Nuka and Trans Mountain and issues pertaining to potential response gaps were considered in the OH-001-2014 hearing. The Board recognizes the need to consider potential response gaps in response planning and in fact, Trans Mountain's response gap analysis was provided at the request of the Board through an information request. The Board is of the view that Nuka's response gap analysis supports the Board's conclusions in its 2016 report regarding general principles of marine spill response as noted above. The Board is of the view that the response gap analyses indicate that environmental conditions are conducive to oil spill response the majority of time along the tanker routes depending on location, time of year, and site-specific environmental conditions. It is a generally accepted principle of marine spill response that the circumstances associated with each spill event would affect the success of the response and there is no guarantee that a spill response would result in the on-water recovery of a significant portion of the oil spilled. Further, on water spill response may not always be possible due to environmental conditions but during such times, other response measures

such as shoreline protection and clean-up or tracking of oil would likely be possible. To the extent that response planning approaches and methodologies noted by Nuka would further enhance marine oil spill response, the Board recommends that the GIC consider such approaches and methodologies as part of any work undertaken in response to Recommendation 7.

The Board is of the view that most of the issues raised in the updated technical evaluation report prepared by EnviroEmerg Consulting and filed as part of the MH-052-2018 hearing are not materially different than those included in the report filed in the OH-001-2014 hearing. These include concerns related to response technologies for diluted bitumen spills, response gaps, and oily waste management which were considered by the Board in the OH-001-2014 hearing and informed its views and recommended conditions regarding response planning. Updated evidence filed in the MH-052-2018 hearing also included information that related to oil fate and behaviour and associated response planning and response gaps. The Board's views on the environmental behaviour of spilled oil are provided in Chapter 8. Its views regarding response planning and response gaps are discussed throughout this section. The evidence provided by EnviroEmerg, on behalf of Cowichan Tribes, has also informed the Board's Recommendation 7 as discussed below.

The evidence in Section 14.11.2 indicates that a large spill of 8 000 m³ for a tanker at the WMT or a 16 000 m³ spill within Burrard Inlet and English Bay area are not credible worst-case spill scenarios. The Board has therefore given little weight to evidence showing potential effects associated with such a scenario or the response capacity analysis commissioned by the City of Vancouver, Tsleil-Waututh Nation and Tsawout First Nation for these areas. Any spill in these areas would also be subject to response efforts.

The Board notes that some participants appear to have misunderstood Trans Mountain's commitment regarding enhanced marine oil spill response and the intent of the related Conditions 91, 133, and 144.

NS NOPE said that a 36 hour response time was inadequate as such a time period would encompass three entire tidal cycles. Barkley Sound Stewardship Alliance said that the 36 hour response time is too long to facilitate an effective response. The Board notes that the 36 hours is in reference to delivering 20,000 tonnes of capacity within 36 hours of notification. Under the enhanced response regime, the time for initiating a response within Vancouver Harbour would be a maximum of two hours and for the rest of the shipping route, response would be initiated within 6 hours. The Board has clarified this commitment through revisions to Condition 133.

Many participants referred to the need to include Indigenous groups as a party to be consulted with in Condition 91. The federal government departments and agencies said that Environment and Climate Change Canada and Parks Canada Agency should be added to the list of parties to be consulted. The Board notes that the intent of Condition 91 is to ensure proactive planning on the part of Trans Mountain as to how it will meet the requirements of Condition 133 which addresses two specific commitments of Trans Mountain regarding enhanced tug escort and enhanced marine oil spill response that exceed regulatory requirements. Condition 91 does not address an assessment of specific plans associated with these commitments. Further, the Board notes that the parties listed for consultation are government bodies with specific regulatory authority and expertise for marine safety and spill response and those that were involved in the TERMPOL Review Committee or previous discussions with Trans Mountain regarding its commitments. Therefore, the Board does not see the need to broaden the list of parties to be consulted with in Condition 91. The Board notes that all filings associated with any Conditions will be publically available on its website.

The Indigenous Caucus for the IAMC said that it should be given a formal role in co-developing the Condition 91 plan and it made a number of suggested revisions to Condition 91. The Board notes that the Terms of Reference for the IAMC were co-developed amongst the parties comprising the IAMC. Among other things, the Terms of Reference address the potential inclusion of the IAMC in condition compliance monitoring for the Project. The Board is of the view that it would not be appropriate to specifically include the IAMC in condition compliance and monitoring activities beyond those that have already been agreed to or currently under discussion amongst the broader membership of the IAMC.

The Board notes that it has also developed Recommendations 7 and 11 that speak specifically to the inclusion of Indigenous people in marine safety and spill response initiatives.

Gerald Graham recommended that the Board's Condition 133 should require Trans Mountain to confirm that the enhanced marine oil spill response regime is sufficient to clean up a marine oil spill involving a total loss of cargo plus bunker fuel. The Board does not agree that Condition 133 needs to be revised in this regard. The Board notes that Condition 133 addresses a specific commitment made by Trans Mountain regarding implementation of the enhanced marine oil spill regime as defined. The Board notes that, although not a likely event, it considered the issue of response to the complete loss of a tanker's cargo in the OH-001-2014 hearing. Further, as discussed above, the Board notes that Transport Canada is reviewing the Response Organization Standards and the Board has included this in its Recommendation 7 regarding marine oil spill response.

In response to comments received from parties such as the Province of B.C., Georgia Strait Alliance, Living Oceans Society, T'sou-ke First Nation, and the Cowichan Tribes, the Board has revised Recommendation 7. The need to consider response planning for SARA-listed species, salvage requirements, and oil fate and behaviour research has been added. These parties also expressed concerns regarding issues such as response times, waste management, and recovery capacity. The Board notes that the Response Organizations Standards address these issues and it expects that they will be considered as part of Transport Canada's ongoing review of the Response Organizations Standards.

The Board heard several comments from municipal governments and the North Shore Emergency Management Office that they were not sufficiently engaged in the marine spill response planning process and that they were not receiving sufficient information regarding their potential role in marine spill response. The Board shares the view of these participants that engagement with local governments, including Indigenous groups and emergency responders, is important and those potentially involved in the response should be engaged, to the extent that they choose, in the planning process. Therefore, the Board would impose Condition 90 requiring Trans Mountain to engage with various parties when preparing its Emergency Management Program as it applies to the WMT.

The Board has no jurisdiction to compel consultation regarding marine spill response planning with potentially affected municipal governments and Indigenous groups along the Project-related tanker routes. The Board is of the view that engagement with competent authorities, such as Canadian Coast Guard and Transport Canada, WCMRC, municipal governments and Indigenous groups, would further inform the spill response planning process. The evidence indicates that such consultation is ongoing.

Inclusion of Indigenous peoples in oil spill planning and response

The evidence before the Board indicates that since its OH-001-2014 Report, there have been substantial investments made by the federal departments and agencies and WCMRC aimed at including Indigenous people in marine oil spill planning and response. The Board also heard concerns from First Nations regarding the actual implementation of such initiatives. The Board notes that the IAMC has been operational since 2017 and as discussed in Chapter 5, is already participating in emergency management and marine exercises. The Board sees value in the role of this existing committee and encourages its participation in ongoing spill planning and response efforts.

To promote the continued participation of Indigenous people in marine oil spill planning and response, the Board has specifically included the need for such inclusion in Recommendation 7. Recommendation 11 addresses engagement with, and feedback from, the Indigenous Advisory and Monitoring Committee on the marine safety system and Project-related marine shipping activities that intersect with Canadian Coast Guard operational programs.

Future spill response research and initiatives

The Board notes that evidence filed by Trans Mountain, WCMRC, and the federal departments and agencies indicates that there has been substantial progress in spill response research and initiatives since the Board's OH-001-2014 Report. This includes work related to geographic-specific response plans, geographic response strategies and coastal mapping, oil fate and behaviour (see Chapter 8) and response strategies research, and inclusion of Indigenous people in response planning.

The Board is of the view that this work has already contributed to marine spill response planning for the Project and future work should continue to do so.

The Board notes Washington State Department of Ecology's suggestion regarding establishment of a joint geographic response plan with Washington State Department of Ecology for vessels carrying diluted bitumen through shared waters in the Salish Sea. The Board understands that Trans Mountain would not be responsible for completing this task. Competent authorities such as Canadian Coast Guard and Transport Canada, and the certified response organization WCMRC, could engage Washington State further should they see merit in this suggestion.

Chapter 8 includes a discussion on research related to the fate and behaviour of spilled oils and how this research could inform spill response planning.

14.12 Financial responsibility, liability, and insurance

14.12.1 *Marine Liability Act* - Financial responsibility and compensation

In the OH-001-2014 hearing, Transport Canada and Trans Mountain said that the *Marine Liability Act* establishes the framework for marine liability and compensation in Canada and reflects Canada's role as a signatory to the International Oil Pollution Compensation Funds and the Civil Liability Convention. The *Marine Liability Act* also establishes the Ship-source Oil Pollution Fund that provides funding for spills from all classes of vessels in Canadian waters. The Ship-source Oil Pollution

Fund provides funding in addition to the funding available under the international funds. The classes of claims for which the Ship-source Oil Pollution Fund may be liable include:

- claims for oil pollution damage;
- claims for costs and expenses of oil spill cleanup, preventive measures and monitoring; and
- claims for oil pollution damage and cleanup costs where the cause of the oil pollution damage is unknown.

Trans Mountain said that there is also a widely defined class of parties in the Canadian fishing industry that may claim against the Ship-source Oil Pollution Fund for loss of otherwise unrecoverable income caused by an oil spill from a vessel under the *Marine Liability Act*.

Transport Canada and Trans Mountain said that both the Canadian and international frameworks are based on the “polluter pays” principle, which makes the polluter liable for all response costs and damages associated with an oil spill. In the event of an oil spill from a tanker in Canadian waters, the owner of a tanker (i.e., the Responsible Party) would be liable for the cost of cleanup and compensation to affected parties subject to the limits of their liability.

Trans Mountain described co-insurance or cost-sharing provisions that may apply in the circumstances of a spill at WMT where there is ambiguity as to the source of the spill. Trans Mountain said that co-insurance refers to the sharing of costs associated with a spill event among responsible parties, insurers, and others. It said that co-insurance does not affect or complicate response to the spill but cost sharing among insurers may not be settled until long after claimants have been paid compensation or damages.

Trans Mountain acknowledged the concern raised by several intervenors, that tanker spills would have long-term to permanent effects on their resource-based economy, commercial and traditional harvest activities, culture, and community well-being. It also said that intervenors expressed concern that tanker spills would affect city parks and public spaces, recreational marine use, human health, cultural and historic resources, municipal services, and community well-being. Trans Mountain noted that some intervenors provided estimates of potential spill related damages. Trans Mountain said that the estimates of magnitude and duration provided by intervenors appear to reflect worst-case assumptions and that the effects of a spill would depend on the unique circumstances of a spill, were one to occur.

Trans Mountain said that it is not liable for a tanker-based marine spill and that it had not estimated any costs associated with such a spill. It said that the responsibility for a tanker-based marine spill lies with the tanker owner. Trans Mountain said that, because each spill is different, it is not possible to provide breakdowns or aggregates of costs for a hypothetical event.

Trans Mountain noted the NEB's September 2013 filing requirements regarding environment and socio-economic effects for increased marine shipping activities that specified: “The assessment of accidents and malfunctions must also provide a description of the liability and compensation regime that would apply in the case of a spill.” It noted where this information could be found in its application. Trans Mountain submitted that Canada's marine shipping liability and compensation regime is among the most robust in the world and it would be further improved through proposed amendments.

The City of Vancouver said there are a number of potential costs to the City arising from a catastrophic spill. It concluded that a catastrophic spill could present significant costs to the City government of close to \$1 billion. In addition, Vancouver said that ocean-economic activities could suffer total losses in excess of \$1 billion in the event of a 16 000 m³ oil spill at the First or Second Narrows within Burrard Inlet.

The City of Vancouver critiqued a number of gaps in the existing national and international compensation regimes, as well as several factors which limit the regime's effectiveness in compensating for the full socio-economic costs of an oil spill. It said that in the event of a large oil spill in Burrard Inlet, the existing compensation regime would be inadequate to fully compensate Vancouver, its businesses and residents, for the associated socio-economic impacts. It said that Vancouver would be only one of many claimants who would be submitting significant compensation claims.

The Tsawout First Nation said costs of tanker spills can vary significantly depending on the characteristics of the area impacted, the conditions at the time of the spill, the spill response and the characteristics of the oil spilled. The Tsawout estimated costs of tanker spills associated with the Project and said that tanker spills from the project could result in significant damage costs that exceed existing compensation schemes. For a tanker spill, it estimated a worst-case spill of 103,782 bbl and that such a spill could exceed available compensation from domestic and international spill compensation funds by \$2.9 billion.

Conversations for Responsible Economic Development said that in the case of a major tanker spill, taxpayers would likely be responsible for the burden of costs, as a company's liability is limited to \$1.3 billion and a major spill could easily cost ten times this amount.

Trans Mountain reviewed the spill cost estimate reports provided by intervenors and submitted that none of the reports should be used to provide reliable costs potentially associated with a tanker spill. Among other reasons for this conclusion, Trans Mountain said:

- the past incidents used in estimating spill costs were not appropriate;
- inappropriate methods and assumptions were used for estimating spill costs;
- passive use values and ecosystem goods and services were overestimated and inappropriately included in spill cost estimates; and
- spill costs were based on potential spill volumes which were deemed to not be credible.

MH-052-2018 hearing

In October 2018, the Government of Canada introduced legislation to modernize Canada's Ship-Source Oil Pollution Fund, which includes a number of changes from what was described in the OH-001-2014 Hearing.

- First, the Ship-Source Oil Pollution Fund's per-incident limit of liability would be removed, ensuring that unlimited compensation would be available to all eligible claims from victims and responders of oil spills from ships. The Ship-Source Oil Pollution Fund would compensate any eligible costs above the amounts available from ship owner's insurance and the international funds, instead of pro-rating compensation based on the total amount of claims and the amount of funding available.
- Second, if the Ship-Source Oil Pollution Fund contained insufficient funds to fully pay for a spill, then the Minister of Finance could grant a loan to the Ship-Source Oil Pollution Fund to pay all eligible claims. This loan would be repaid through a levy paid by oil receivers and exporters.
- Third, the Ship-Source Oil Pollution Fund can be replenished through an annual levy on oil receivers and exporters, as well as providing the option to impose a temporary supplementary levy if the annual levy is insufficient. However, there is no proposal to reinstate the annual levy unless the Fund is depleted.
- Fourth, the Ship-Source Oil Pollution Fund would provide emergency funding to the Canadian Coast Guard to respond to a significant oil spill. The Canadian Coast Guard would use these funds to respond to the oil spill and compensate third parties for their response activities under its direction.
- Finally, a simplified and expedited process for claims under \$35,000 would be established, allowing the Ship-Source Oil Pollution Fund to accept small claims without conducting a full investigation and assessment.

Transport Canada described the types of losses and damages compensable under the *Marine Liability Act* to include measures to prevent or minimize damage; clean-up and containment costs; property damage; environmental damage limited to loss of profit, post-spill studies and costs of reasonable measures of reinstatement undertaken or to be undertaken; and economic losses. An economic loss occurs when oil pollution has caused a loss of earnings to persons whose property has not been polluted. Transport Canada listed a number of examples: individuals who derive income from fishing, from the production, breeding, holding or rearing of fish, or from the culture or harvesting of marine plants; owners of fishing vessels, derives income from the rental of fishing vessels to holders of commercial fishing licenses issued in Canada; individuals who derives income from the handling of fish on shore in Canada directly after they are landed from fishing vessels; any person who rents or charters boats in Canada for sport fishing; and workers in a fish plant in Canada.

In the case of an incident, Transport Canada noted that any person, entity, or organization, including local governments, may make a claim for costs or damages resulting from a ship-source oil pollution spill either directly to the ship owner and their insurer, or with the Ship-Source Oil Pollution Fund.

Some parties commented on the *Marine Liability Act* and the compensation available in the case of a marine spill.

Heiltsuk Nation said that Canada's current oil spill compensation regime does not compensate for Indigenous food, social and ceremonial losses, nor does it address communal rights. Heiltsuk Nation argued that, regardless of the fact that Canada has removed the cap on compensation under the Ship-Source Oil Pollution Fund these amendments are meaningless in that they do not change the limited definition of what is compensable in the event of a spill, specifically excluding natural resource damage and other non-market commercial losses that affect Indigenous people's rights and title. Heiltsuk Nation argued that the federal spill compensation regime excludes compensation for Indigenous food, social, ceremonial and other cultural losses, and therefore, the Board cannot reasonably rely on that regime as a mitigation measure.

The Maa-nulth First Nations, Equimalt Nation, Scia' new First Nation and Pauquachin First Nation supported proposed amendments to the *Marine Liability Act* in Bill C-86, currently before Parliament, to modernize the Ship-Source Oil Pollution Fund.

T'Sou-ke Nation argued that current compensation regimes do not cover harms to Treaty and Indigenous rights, including Indigenous title. T'Sou-ke Nation urged the NEB to recommend the establishment of a compensation fund to guarantee compensation to coastal Indigenous Nations should an oil spill occur from the marine shipping associated with the Project. In the case of a spill, T'Sou-ke Nation said that the compensation fund should extend to harms to section 35 rights, as well as non-pecuniary harms. By establishing a compensation fund in advance, Indigenous Nations would not be obliged to pursue damages through uncertain and expensive court litigation.

The City of Vancouver said that it has not received any compensation for its costs related to the Marathassa spill four years later. The City of Vancouver argued that the likelihood of compensation as well as the percentage of actual costs recovered from any Project-related oil spill remained uncertain in view of the outstanding claims related to the Marathassa spill.

Tsleil-Waututh Nation, Squamish Nation, Stz'uminus First Nation, Snuneymuxw First Nation, and the City of Vancouver filed a report by Dr. Gunton and Dr. Joseph titled "Trans Mountain Expansion Project Reconsideration Hearing: Assessment of Oil Spill Risks" (Gunton-Joseph Report). The Gunton-Joseph Report discussed the costs from a marine oil spill. The Gunton-Joseph Report estimated the cost of spill from a Project marine tanker would range from \$2.3 to \$4.7 billion (2018 \$CDN) excluding passive use losses, or \$3.8 to \$26.8 billion (2018 \$CDN) including passive use losses. Spill size ranged from 51,891 bbl to 103,782 bbl. Damage costs were \$37,500 per bbl (2012 \$CDN) comprised of \$15,000 per bbl clean-up costs and \$22,500 per bbl damage costs. Estimates of passive use damage costs relied on a report filed by Tsleil-Waututh Nation, Tsawout First Nation, and Upper Nicola Band in the OH-001-2014 hearing entitled An Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Gunton and Dr. Broadbent.

The Gunton-Joseph Report estimated the damage costs, excluding passive use damages, from a credible worst-case tanker spill to exceed the funds explicitly identified for tanker spill compensation by between approximately \$750 million and \$3.1 billion. While Canada has attempted to address current compensation limits and related concerns through proposed amendments to relevant legislation, like removing the cap on the liability for marine spills and covering any damage liability that exceeds the amount available in the compensation funds, the Gunton-Joseph Report concluded that the proposed federal changes do not fully mitigate the deficiency that the responsible party may lack sufficient financial resources to cover damage costs of a credible worst-case scenario. Instead, any shortfall will be covered by Canada, with no assurance that it will be able to fully recoup the costs from the responsible parties via additional levies on the shippers in the event of a large oil spill. The Gunton-Joseph Report argued that the only means to ensure that the polluter pay principle is met is to require the responsible party to provide financial assurances equivalent to the credible worst-case damage costs.

Views of the Reconsideration Panel

The Board finds that Trans Mountain's application met the requirement to provide a description of the liability and compensation regime that would apply in the case of a spill.

As outlined in Sections 14.3 and 14.11, there is an existing regulatory regime in place related to marine financial liability and compensation in the event of a spill event. As stated throughout this hearing process, this area is not under the Board's regulatory jurisdiction.¹³⁴

On 13 December 2018, Bill C-86 received Royal Assent and amendments to the *Marine Liability Act* came into force, including the changes to the Ship-Source Oil Pollution Fund described the Government of Canada's evidence. The changes to the *Marine Liability Act* should strengthen the Government of Canada's ability to compensate any person, entity, or organization for oil pollution damage resulting from a ship.

The Board heard from Indigenous communities who supported changes to the *Marine Liability Act* and Ship-Source Oil Pollution Fund, as well as Indigenous communities who were concerned about the exclusion of Indigenous food, social, ceremonial, other cultural losses and losses to section 35 rights from eligibility under the Ship-Source Oil Pollution Fund. The Board notes that the *Marine Liability Act* allows individuals who fish or hunt for food or animal skins for their own consumption or use to claim for losses under the Ship-Source Oil Pollution Fund. The Board notes that Transport Canada held consultations with Indigenous groups regarding the recent changes to the *Marine Liability Act*, where concerns regarding the scope of the Ship-Source Oil Pollution Fund was discussed.

The Board also heard a request for a recommendation for the establishment of a compensation fund to guarantee compensation to coastal Indigenous Nations should an oil spill occur from the marine shipping associated with the Project. The Board is of the view that the Ship-Source Oil Pollution Fund is a compensation fund where Indigenous communities who have sustained loss or damage, or incurred costs and expenses, in respect of oil pollution may file a claim.

¹³⁴ In the event of a spill originating at the Westridge Marine Terminal (WMT), Trans Mountain would be responsible for costs associated with the spill.

However, the Board agrees that it is unclear if all losses are eligible to be claimed under the Ship-Source Oil Pollution Fund. The Ship-Source Oil Pollution Fund does not appear to compensate for losses to non-use values, for Indigenous and non-Indigenous communities. In the event of an oil spill from a ship, not just a Project-related tanker, these losses may occur. The Board notes that section 48.12 of the NEB Act establishes that pipeline operators are liable for the loss of non-use values relating to a public resource affected by a release and that the Crown may institute proceedings to recover the loss of non-use values. Thus, the Board has included Recommendation 15, which encourages GIC to work with Transport Canada to determine how a federal marine oil spill compensation regime, existing or otherwise, can include compensation for non-use values, for Indigenous and non-Indigenous communities, including any non-coastal communities that may be impacted as a result of a marine oil spill.

In the OH-001-2014 hearing, there were concerns expressed that the cost of a marine oil spill from a Project-related vessel may exceed available compensation. Some intervenors filed evidence regarding the potential cost of a spill from Project-related vessels. Trans Mountain argued that there were inappropriate methodological and technical assumptions associated with intervenor evidence which resulted in overly hypothetical or inflated potential spill costs. These include the reliance on costs associated with past spill incidents that were not tanker-based spills; the assumption that a large spill event is likely to occur; the use of hypothetical passive use values; and emphasis on extreme spill events.

In the MH-052-2018 hearing, new evidence regarding the cost of a credible worst-case oil spill from a tanker was filed as part of the Gunton-Joseph Report, estimating the cost of the spill to be \$2.3 to \$4.7 billion (2018 \$CDN) without passive use values included. The Board is of the view that these cost estimates are of significantly less importance in the MH-052-2018 hearing. Changes to the *Marine Liability Act* have eliminated the per-incident limit of liability for an oil spill originating from a vessel. Parties damaged will be compensated fully and the Government of Canada has the ability to recover any funds that exceed the Ship-Source Oil Pollution Fund through an annual levy on oil receivers and exporters and, if the annual levy is insufficient, a temporary supplementary levy. Therefore, the Board is of the view that concerns expressed in the OH-001-2014 hearing regarding the cost of a spill exceeding available compensation have been addressed.

14.13 Other CEEA 2012 factors

14.13.1 Effects of the environment on the Project

This section addresses the requirements of the CEEA 2012 paragraph 19(1)(h) regarding any change to the designated project that may be caused by the environment. The evidence indicates that there are effects of the environment on Project-related shipping. The effects of the environment include navigational hazards along the shipping routes and weather-related considerations such as wind, waves, and fog.

The TERMPOL Review Committee said that Project-related tanker traffic would use established shipping routes. Transport Canada said that the shipping routing tied to the project was selected by Transport Canada to ensure the safest passage for all vessels, and as it focuses on prevention, it reduces the probability of groundings. Trans Mountain said that the sailing route from the Westridge Terminal to the high seas outside the mouth of the Strait of Juan de Fuca is a relatively uncomplicated route. The most challenging part of the route is from the Westridge Terminal to the Second and First Narrows in the Movement Restricted Area (Traffic Control Zones) within Vancouver Harbour.

Trans Mountain said the proposed route is deep and wide enough to ensure that geographic and geological factors are not a concern. In addition, weather conditions and oceanographic factors along the route are considered to be mild and should not cause delays or alterations to the vessel route, except for reduced visibility due to fog.

The Federal departments and agencies said that Environment and Climate Change Canada is able to provide weather conditions in advance, and tankers would be advised by Marine Communications and Traffic Services (MCTS) to take appropriate measures. The TERMPOL Review Committee noted a number of factors that an oil tanker crew considers when dealing with poor weather conditions and rough seas. Such factors include the vessel's performance characteristics; the shipping route's navigation characteristics; long-term weather forecasts; real-time weather; vessel owner requirements; terminal operator requirements; and pilot and Vessel Traffic Services advice and guidance. Establishing weather and environmental restrictions on vessel operations can help ensure vessels do not exceed safe operating limits and take undue risks as wind, visibility, and sea conditions deteriorate.

The TERMPOL Review Committee said that with respect to the oil tanker transits, there are no restrictions in place along the proposed route aside from those within Port Metro Vancouver's Movement Restriction Area (Traffic Control Zones), where vessels are not permitted to continue transit if weather prevents them from staying on course. The Pacific Pilotage Authority said that since its inception, it has not aborted a transit due to poor weather, and ensures its pilots exercise the practices of good seamanship in adverse weather conditions. The TERMPOL Review Committee found weather related restrictions beyond existing requirements were not currently necessary.

The Vancouver Fraser Port Authority filed its updated Port Information Guide detailing practices and procedures to establish safe limits for the vertical, horizontal and under keel clearances of each respective Traffic Control Zone within the Port of Vancouver. The Port Information Guide also details other Traffic Control Zone established practices and procedures impacting the timing and movement of tankers including restrictions related to tidal current windows, vessel transit restrictions, speed, visibility and wind.

Environment and Climate Change Canada described its Marine Weather Information Services Demonstration Project which involves enhanced marine weather services to support marine traffic operations and improve safety in higher-risk areas. Environment and Climate Change Canada said its forecasts provide mariners with a two-day forecast and an outlook to five days based on winds, weather and sea-state information. Under this Oceans Protection Plan initiative, Environment and Climate Change Canada will give mariners enhanced weather information, including a short-term forecast of wind speed, wind direction and wave height. Information from buoys, coupled with the most advanced numerical models, will be used to develop the new forecasts.

Trans Mountain said that it would develop a tug matrix to define the capabilities and number of escort tugs required for foreseeable meteorological and ocean conditions such as wind, waves, and currents, based on tanker and cargo size. Trans Mountain said should conditions be forecast to exceed the criteria established in the tug matrix or the capabilities of available tugs, a tanker will be required to delay its departure until the weather subsides or a sufficient escort is available and that such delays are expected to be brief and infrequent.

See Sections 14.11.1 and 14.11.2 and related Views of the Board for additional discussion regarding concerns and mitigation related to the effects of the environment on marine shipping:

- Pilotage;
- Marine Communications and Traffic Services (MCTS) improvements;
- Emergency Towing and Places of Refuge;
- Vancouver Fraser Port Authority requirements; and
- Tug Escort.

Views of the Reconsideration Panel

As discussed in Section 14.11, the Board is of the view that there is an acceptable level of safety in place regarding marine shipping associated with the Project. This includes consideration of potential effects of the environment on Project-related marine shipping.

The Board accepts Trans Mountain, the TERMPOL Review Committee, B.C. Coast Pilots, Canadian Marine Pilots' Association and Pacific Pilotage Authority's views that shipping along the south coast of B.C. is accomplished safely the vast majority of the time under a variety of weather conditions, in the absence of many of the mitigation measures that would be in place for the Project. The Board is satisfied with the findings and recommendations of the TERMPOL Review Committee.

The TERMPOL Review Committee said it did not identify regulatory concerns for the tankers, tanker operations, the proposed route, navigability, other waterway users and the marine terminal operations associated with tankers supporting the Project. The Board finds that Trans Mountain's commitments and enhancements to the existing marine safety regime will provide for a higher level of safety for tanker operations commensurate with the increase in traffic. These would include reduced vessel speeds, escort tugs, redundant navigational systems, enhanced marine traffic and weather communication services and avoiding congestion in the narrower parts of the shipping channels.

The Board notes that some participants expressed concerns regarding the effects of the environment on Project-related vessels based on their personal experiences in smaller craft such as fishing boats. The evidence before the Board indicates that there is a significant difference in the effect of wind and waves on smaller vessels, compared with the vessels proposed for the Project-related marine shipping.

14.13.2 Requirements of follow-up programs

As noted in Chapter 10, paragraph 29(1)(b) of the CEAA 2012 requires a follow-up program. This is intended to verify the accuracy of the predictions regarding potential environmental effects and to determine if mitigation measures are working as intended.

The Board notes that the monitoring recommended to the GIC in Recommendations also satisfies the requirement of monitoring under section 79 of the SARA.

For the Project-related marine shipping, the follow-up program is discussed in each section for each valued component, it is embedded in the recommendations, and includes all the monitoring, determining further mitigations, and adaptive management over time. Specifically, Recommendation 2 requires GIC to report, on an annual basis, on the progress on implementing all recommendations, including results of monitoring to determine the effectiveness of measures and any adaptive management as part of a follow-up program.

Appendix 3: Conditions applied to legal instruments

In these conditions, the following terms are defined as:

Appropriate Government Authorities	Federal, Provincial, Regional or Municipal government departments or agencies with jurisdiction, statutory obligations, regulatory oversight or a decision-making role in relation to the subject-matter of the specific condition. For location-specific conditions or phased filings, this is limited to those with such a role in relation to the geographic location to which the condition filing applies. (Indigenous groups are treated separately and listed separately in each applicable condition.)
Commencing operations	The Project is opened for oil storage and transmission. Unless otherwise specified, “prior to commencing operations” means an action must be completed prior to commencing operation of any component of the Project, and “after commencing operations” means an action must be completed after all components of the Project are operating.
Construction	<p>Any in-field activity that may have an effect on the environment and that is necessary for installing, deactivating, reactivating¹³⁹ or decommissioning, or preparing to install, deactivate, reactivate¹ or decommission, any component of the Project. Construction activities include, clearing, mowing, grading, trenching, drilling, boring, and blasting. Construction activities <u>do not</u> include activities associated with routine surveying operations or data collection activities, such as geotechnical investigations (e.g., geophysical surveys, bore holes, and test pits), activities required to obtain integrity information on the reactivation pipeline segments, or operations and maintenance activities (to which NEB “Operations and Maintenance Activities on Pipelines under the <i>National Energy Board Act – Requirements and Guidance Notes</i>” apply).</p> <p>Construction at the Westridge Marine Terminal also includes construction activities occurring in the marine environment that are necessary for installing, or preparing to install, any component of the Westridge Marine Terminal expansion. This includes dredging, blasting, and pile drilling.</p>
Consultation	<p>Unless otherwise specified in a condition, Trans Mountain’s consultation must be carried out in a manner that:</p> <ol style="list-style-type: none"> a) provides, to those to be consulted: <ol style="list-style-type: none"> i) notice of the matter in sufficient form and detail to allow them to prepare their views or information on the matter; ii) a reasonable period for them to prepare those views or information; and iii) an opportunity to present those views or information to Trans Mountain; b) considers, fully and impartially, the views or information presented; c) provides, to those in a) who request it, a draft summary of the consultation undertaken with that party, and a reasonable period for them to provide feedback to Trans Mountain; and d) provides, to those in a) who request it, a copy of the NEB filing receipt for, or notice of, the condition filing to which the consultation pertained.
Dry commissioning	Dry commissioning involves the systematic inspection and testing of mechanical, piping, electrical, instrumentation, control, and communications systems, prior to the introduction of process fluids , to ensure that they are ready for the introduction of fluids and are expected to function as intended.
For approval	Where a condition requires a filing or filings for NEB approval, Trans Mountain must not commence the indicated activity until the NEB issues its written approval of that filing or filings.
Including	Use of this term, or any variant of it, is not intended to limit the elements to just those listed. Rather, it implies minimum requirements with the potential for augmentation, as appropriate.
Line 1	<p>After the expansion, the 1 147 km Line 1 pipeline will consist of, combined, the following pipeline segments, including segments to be reactivated and currently operating TMPL segments:</p> <ul style="list-style-type: none"> • the existing 229 km of 609.6 mm outside diameter (NPS 24) and 89 km of 762.0 mm outside diameter (NPS 30) pipeline segments from Edmonton, AB, to Hinton, AB; • the reactivated 150 km of NPS 24 pipeline segment from Hinton, AB, to Hargreaves, B.C. (built in 1957); • the existing 273 km of NPS 24 pipeline segment from Hargreaves, B.C., to Darfield, B.C.; • the reactivated 43 km of NPS 24 pipeline segment from Darfield, B.C., to Black Pines, B.C. (built in 1953); • the existing 325 km of NPS 24 and 38 km of NPS 30 pipeline segments from Black Pines, B.C., to the Burnaby Terminal, B.C.

¹³⁹ Excluding engineering assessment and operations and maintenance activities required to meet Conditions 19 and 31.

Line 2	<p>After the expansion, the approximately 1,180 km Line 2 pipeline will consist of, combined, the new transmission pipeline segments and the two currently operating TMPL segments transferring to Line 2 service:</p> <ul style="list-style-type: none"> · approximately 339 km of new 914 mm outside diameter (NPS 36) pipeline from Edmonton, AB, to Hinton, AB; · the existing 150 km of NPS 36 pipeline segment from Hinton, AB, to Hargreaves, B.C. (built in 2008); · approximately 121 km of new 1 067 mm outside diameter (NPS 42) pipeline from Hargreaves, B.C., to Blue River, B.C.; · approximately 158 km of new NPS 36 pipeline from Blue River, B.C., to Darfield, B.C.; · the existing 43 km of NPS 30 pipeline segment from Darfield, B.C., to Black Pines, B.C. (built in 1957); and · approximately 368 km of new NPS 36 pipeline from Black Pines, B.C., to the Burnaby Terminal, B.C.
Monitoring	<p>Observing the environmental and socio-economic effects of the Project for the purposes of assessing and measuring the effectiveness of mitigation measures undertaken, identifying unanticipated environmental and socio-economic issues, and based on the results of these activities, determining any remedial actions required.</p> <p>From an engineering perspective, monitoring involves regularly observing pipelines, terminals and pump stations (e.g., through surveys, patrols, inspections, testing, instrumentation) to ensure their operation is within defined parameters, with the goal of identifying any issues or potential concerns (e.g., pipeline integrity, geohazards, erosion, security) that may compromise the protection of the pipelines, terminals, pump stations, property, persons, and the environment.</p>
Monthly (in relation to a condition filing or posting)	<p>Unless otherwise specified in a condition, a monthly filing shall be made on the 5th working day of the calendar month following the month to which the filing pertains.</p>
NEB or Board	National Energy Board
New delivery pipelines	<p>Collectively, the two new NPS 30 oil delivery lines between Trans Mountain's Burnaby Terminal and its Westridge Marine Terminal (approximately 2.6 km for the tunnel option and 3.6 km for the street option).</p>
Officer of the company	<p>Where a condition requires a filing to be signed by an officer of the company, the filing must include a statement confirming that the signatory to the filing is an officer of the company duly authorized for that purpose.</p>
Project	<p>The Trans Mountain Expansion Project in all its components, including pipeline construction, reactivation, and changes to operating conditions resulting in operation as Line 1 and Line 2; deactivation, reactivation, construction and operation of or at the respective pump stations; decommissioning of 2 tanks and construction and expanded operation at the existing Edmonton, Sumas and Burnaby Terminals and the Westridge Marine Terminal; construction and operation of the new delivery pipelines; and all infrastructure.</p> <p>The Project does not include Project-related marine shipping.</p>
Quarterly (in relation to a condition filing or posting)	<p>Unless otherwise specified in a condition, a quarterly filing shall be made on the 10th working day of the quarter following the quarter to which the filing pertains.</p>
Temporary infrastructure	<p>All structures or sites necessary for pipeline, terminal and pump station construction, reactivation, deactivation, modification and expansion approved as part of the Project. Examples of infrastructure include construction camps, stockpile sites, contractor yards, laydown areas, borrow pits, roads, bridges, snow pads, and temporary power supply lines necessary for operating infrastructure and equipment during the construction phase.</p>
Third party (in relation to a report, review or assessment)	<p>An independent consultant, expert, or contractor that, except for receiving payment for acting as a third party, is unaffiliated with Trans Mountain, Kinder Morgan Canada Inc., the principal consultants of either, or any other corporate entity with a financial interest in the Project. A third party is, because of their knowledge, training, and experience, qualified and competent to perform an assessment or review, and was not involved in developing the manual, report, plan, program, or policy being assessed or reviewed.</p>
TMPL	The existing operating Trans Mountain Pipeline system.
Trans Mountain	Trans Mountain Pipeline ULC, as general partner of Trans Mountain Pipeline L.P.

Government authorities are mentioned in certain conditions. If a particular authority's name changes in the future, Trans Mountain's requirements relating to that authority would rest with its successor. Similarly, if a particular authority's function is assumed by another authority, Trans Mountain's requirements relating to that function would rest with the new authority.

Note: Appendix 2 provides a summary of work/activities authorized under each legal instrument.

No.	Overarching conditions	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
1	Condition compliance Trans Mountain must comply with all of the [certificate/order] conditions, unless the NEB otherwise directs.	X	X	X	X	X	X	X	X
2	Compliance with commitments Without limiting Conditions 3, 4 and 6, Trans Mountain must implement all of the commitments it made in its Project application or to which it otherwise committed on the record of the OH-001-2014 proceeding, as well as the MH-052-2018 proceeding.	X	X	X	X	X	X	X	X
3	Environmental protection Trans Mountain must implement or cause to be implemented, at a minimum, all of the policies, practices, programs, mitigation measures, recommendations, and procedures for the protection of the environment included or referred to in its Project application or to which it otherwise committed on the record of the OH-001-2014 proceeding.	X	X	X	X	X	X	X	X
4	Engineering and safety Trans Mountain must cause the Project to be designed, located, constructed, installed, and operated in accordance with, at a minimum, the specifications, standards, policies, mitigation measures, procedures, and other information included or referred to in its Project application or to which it otherwise committed on the record of the OH-001-2014 proceeding.	X	X	X	X	X	X	X	X
5	Certificate expiration (sunset clause) Unless the NEB otherwise directs prior to 30 September 2021 , this [certificate/order] will expire on 30 September 2021 , unless construction of the Project has commenced by that date.	X	X	X	X	X	X	X	X
No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
6	Commitments tracking table Without limiting Conditions 2, 3 and 4, Trans Mountain must implement the commitments contained within its commitments tracking table and must: a) file with the NEB, at the following times, an updated commitments tracking table including the status of each commitment: i) within 3 months after the [certificate/order] date; ii) at least 30 days prior to commencing construction; iii) monthly, from the commencement of construction until the first month after commencing operations; and iv) quarterly thereafter until: 1. all commitments on the table are satisfied (superseded, complete or otherwise closed), at which time Trans Mountain must file confirmation, signed by an officer of the company, that the commitments on the table have been satisfied; or 2. 6 years after commencing operations , at which time Trans Mountain must file with the NEB a summary of any outstanding commitments and a plan and implementation timeline for addressing these commitments; whichever comes earlier; and b) post on its company website the same information required by a), using the same indicated timeframes; and c) maintain at each of its construction offices: i) the relevant environmental portion of the commitments tracking table listing all of Trans Mountain's regulatory commitments, including those from the Project application and subsequent filings, and environmental conditions or site-specific mitigations or monitoring measures from permits, authorizations, and approvals for the Project issued by federal, provincial, or other permitting authorities; ii) copies of any permits, authorizations, and approvals referenced in i); and iii) copies of any subsequent variances to permits, authorizations, and approvals referenced in i).	X	X	X	X	X	X	X	X

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
7	<p>Environmental and socio-economic assessment - route re-alignments</p> <p>As applicable, Trans Mountain must file with the NEB <u>for approval</u>, concurrent with its filing of the Plan, Profile and Book of Reference pursuant to section 33 of the National Energy Board Act, an environmental and socio-economic assessment for each proposed detailed route re-alignment that extends beyond the applied-for corridor width of Trans Mountain's preferred route in proximity to:</p> <ul style="list-style-type: none"> - Ohamil Indian Reserve 1; - Tzeachten Indian Reserve 13; and - Surrey Bend Regional Park. <p>Any assessment must include:</p> <ol style="list-style-type: none"> a) environmental alignment sheets at an appropriate scale, clearly depicting the proposed route re-alignments; b) results of any pre-construction surveys within the areas that were not previously subject to such surveys, and an indication of potential residual effects; c) all associated mitigation measures that are beyond those identified during the OH-001-2014 proceeding; d) analysis supporting the use of the measures in c), including any supplementary reports; e) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information based on any supplemental surveys completed; and f) a summary of consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants, as well as copies of all written comments that may be provided to Trans Mountain by those consulted. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the assessment. 	X			X				
8	<p>Design temperatures – terminals and pump stations</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to ordering pipe for terminals and pump stations, confirmation, with rationale, that:</p> <ol style="list-style-type: none"> a) the selected maximum and minimum design temperatures are in accordance with CSA Z662-15, Clause 5.2.1; b) the selected design temperatures are based on historical, location-specific extreme daily maximum and minimum temperatures, as opposed to average temperatures; and c) the extent of the historical weather data used is commensurate with the expected operational life of the Project. 	X				X	X	X	
9	<p>Quality Management Plan</p> <p>Trans Mountain must file with the NEB, at least 4 months prior to manufacturing any pipe and major components for the Project, a Project-specific Quality Management Plan that includes:</p> <ol style="list-style-type: none"> a) material/vendor qualification requirements; b) quality control and assurance of pipe, fittings, and components that ensure all materials meet Trans Mountain's specifications (i.e., processes, procedures, specifications, random testing, inspection, and test reports); c) mandatory documentation of process conditions during manufacture and verification of the conformance of manufacturer material test reports with Trans Mountain's requirements; d) mandatory inspection requirements, inspector competency training, and qualifications; e) non-conformance reporting and correction procedures; f) change management process; g) commissioning requirements; and h) material handling requirements during transportation. 	X				X	X	X	
10	<p>Phased filings</p> <p>Due to the Project's large spatial extent, Trans Mountain may wish to commence Project construction activities at specific locations at different times (i.e., using a phased approach). This may entail doing so on the basis of pipeline spreads of defined lengths, or by regions, or work areas of Trans Mountain's choosing (such as terminals or pump stations). If Trans Mountain intends to use a phased approach for Project construction, it must undertake the following:</p> <ol style="list-style-type: none"> a) Trans Mountain must file with the NEB, at least 7 months prior to commencing construction, a complete list of construction spreads, regions, or work areas that, for the duration of Project construction, will serve as the basis by which Trans Mountain may submit condition filings in a phased approach. Each spread, region, or work area must be clearly delineated (e.g., by 	X	X	X	X	X	X	X	X

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>kilometre posts).</p> <p>b) As part of its filing for a), to aid the NEB in anticipating future submissions, Trans Mountain must indicate the specific conditions and related spread(s), region(s) or work area(s) for which it expects to apply this phased approach. Trans Mountain must file updates to this list as they are available.</p> <p>c) When submitting a filing for any condition using this phased approach, Trans Mountain must clearly indicate which spread(s), region(s), or work area(s) that filing applies to.</p> <p>d) Construction of a particular spread, region, or work area must not proceed until all pre-construction conditions using this phased approach have been satisfied for that spread, region, or work area. Prior to commencing construction of the initial spread, region, or work area, all applicable conditions with more general pre-construction timing elements must also be satisfied.</p>								
11	<p>Indigenous, local, and regional skills and business capacity inventory</p> <p>a) Trans Mountain must file with the NEB, at least 6 months prior to commencing construction, an Indigenous, local, and regional skills and business capacity inventory for the Project. The skills and capacity inventory must include:</p> <ol style="list-style-type: none"> a description of the information and data sources; a summary of Indigenous, local, and regional skills and business capacity; an analysis of the Indigenous, local and regional capacity for employment and business opportunities for the Project; plans for communicating employment and business opportunities to Indigenous, local, and regional communities; a description of identified or potential skills and business capacity gaps, and any proposed measures to address them or to support or increase skills or capacity; and plans for communicating identified gaps regarding skills and business capacity with Indigenous, local, and regional communities and businesses, and any proposed measures to support or increase skills or capacity. <p>b) Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, any updates to the elements of the inventory described in a)i) through vi).</p>	X							
12	<p>Training and Education Monitoring Plan</p> <p>a) Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, a plan for monitoring the implementation and outcomes of Indigenous, local, and regional training and education measures and opportunities for the Project. The plan must include:</p> <ol style="list-style-type: none"> a description of, and rationale for selecting, the indicators that will be monitored to track the implementation of training and education measures and opportunities; the monitoring methods and schedule, including information and data sources for the indicators being monitored; plans for consulting and reporting on the implementation and outcomes of training and education measures and opportunities with Appropriate Government Authorities, potentially affected Indigenous groups, business, industry, and education and training organizations; and a summary of consultations with Appropriate Government Authorities, potentially affected Indigenous groups, business, industry, and education and training organizations on the development of the plan. <p>b) Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, any updates to the elements of the Training and Education Monitoring Plan described in a)i) through iii) above.</p>	X							
13	<p>Socio-Economic Effects Monitoring Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, a plan for monitoring potential adverse socio-economic effects of the Project during construction. The plan must include the following:</p> <ol style="list-style-type: none"> the factors or indicators to be monitored; the methods and rationale for selecting the factors or indicators; a description of the baseline, pre-construction socio-economic conditions; the monitoring methods and schedule, including third party data source identification; data recording, assessment, and reporting details; 	X	X		X	X	X	X	

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>f) a discussion of how measures will be implemented to address any identified adverse effects, including:</p> <ul style="list-style-type: none"> i) the criteria or thresholds that will require measures to be implemented; ii) how monitoring methods and measures implementation to address adverse effects, as necessary, are incorporated into Construction Execution Plans; and iii) a description of the roles and responsibilities of construction prime contractors, sub-contractors, and community relations staff in monitoring socio-economic effects and implementing measures to address adverse effects; <p>g) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and</p> <p>h) plans for regular consultation and reporting on effects during construction with potentially affected communities, Indigenous groups, local and regional authorities, and service providers.</p>								
14	<p>Technical working group (TWG) – Terms of Reference</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing construction, Terms of Reference for TWGs established in order to address specific technical and construction issues with affected municipalities. The Terms of Reference must be developed in consultation with participating municipalities, and facility owners and operators that will be affected by the Project. The Terms of Reference must, at a minimum:</p> <ul style="list-style-type: none"> a) identify how TWG membership will be determined; b) identify the TWG structure; c) identify an officer of the company who will be accountable for implementing the Terms of Reference; d) describe the scope and mandate to be addressed or implemented by the TWG, including: <ul style="list-style-type: none"> i) the TWG's goals; ii) the issues and activities that will be within the TWG's mandate; iii) the protocols and mechanisms for implementing TWG recommendations or decisions; and iv) the protocols for reporting and communicating with TWG members, and other potentially-affected or interested parties; and e) provide a summary of any outstanding concerns raised by participating municipalities, and facility owners and operators regarding the Terms of Reference. 	X							
15	<p>Pipeline risk assessment</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing construction, the following information for Line 2 and the new delivery pipelines:</p> <ul style="list-style-type: none"> a) the results of the updated risk assessment in a tabular format similar to that provided in its Line 2 Consequence Report (Filing A3Z8G5). The risk assessment tables must also include: <ul style="list-style-type: none"> i) any updates to High Consequence Areas; ii) the risk mitigation method(s); iii) the mitigated Environmental Risk Scores; iv) pre-mitigation maximum outflow volumes; and v) the outflow volumes after mitigation; b) Environmental Risk Score acceptance criteria, with supporting rationale; and c) a detailed description of the adequacy of the following from its Line 2 Consequence Report (Filing A3Z8G5): <ul style="list-style-type: none"> i) the coefficients used in the scoring system equations; and ii) the values from the scoring tables. 	X							
16	<p>Quantitative Geohazard Frequency Assessment</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing construction, an updated Quantitative Geohazard Frequency Assessment for the new Line 2 and delivery pipeline segments that contains a re-assessment of the Frequency of Loss of Containment (FLoC) values based on the results of site-specific field assessments and any required mitigation as determined in the detailed engineering and design process.</p> <p>Trans Mountain must provide in the assessment a plan to manage and mitigate geohazards at any location where the FLoC value is greater than 10^{-5} events per year to reduce the level of risk to As Low As Reasonably Practicable (ALARP), including a detailed explanation of how the ALARP level has been attained at each location.</p>	X							

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
17	<p>Valve locations on Line 2</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, its final valve location assessment for Line 2. This assessment must include:</p> <ol style="list-style-type: none"> a table showing each valve's location, function, and description (the description must include valve type, valve closure time, and whether the valve can be remotely controlled by the control centre); confirmation that the valve closure times provided in a) will not cause unsafe transient pressures according to the final transient analysis, along with a summary of the analysis; calculated volume release and elevation plots in a format similar to that provided by Trans Mountain in its Oil Spill Outflow Model Results for Line 2 for May 2014 Route (Filing A3Z8G6); clarification of how the Outflow Volume Score for Non-Watercourse Intersects ($S_{v,Nonwatercourse}$) is considered in identifying and prioritizing pipeline segments for valve optimization; for each 5-kilometre-long section of Line 2, information demonstrating that the release volumes are minimized to manage risks within the section to a level that is ALARP, based on the valve locations provided in a); an outflow volume versus chainage graph illustrating the effectiveness of the valve locations provided in a) showing the outflow limit in a format similar to that provided in Figure 4 of Attachment 2 to Trans Mountain's response to NEB Information Request No. 3.050b) (Filing A4H2D7); mitigation measures for the locations shown to exceed the outflow limit in the graph provided in f); and full-bore release and spill extent mapping that identifies and plots all geohazards with a FLoC greater than 10^{-5} events per year after mitigation identified by Trans Mountain at the time of its submission, in a format and scale similar to the maps provided by Trans Mountain in Filing A3Z8G7. 	X							
18	<p>Valve locations and upgrades – Line 1</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, its final valve location assessment for Line 1. This assessment must include:</p> <ol style="list-style-type: none"> a plan for upgrading existing manual block valves to automated or remotely operable valves, and a plan for adding new valves, including initiation and completion dates for the required activities; a table showing each valve's location, function, and description (the description must include valve type, valve closure time, and whether the valve can be remotely controlled by the control centre); confirmation that the valve closure times provided in b) will not cause unsafe transient pressures according to the final transient analysis, along with a summary of the analysis; calculated volume release and elevation plots in a format similar to that provided by Trans Mountain in its Oil Spill Outflow Model Results for Line 2 for May 2014 Route (Filing A3Z8G6); an outflow volume versus chainage graph illustrating the effectiveness of the valve locations provided in b), in a format similar to that provided in Figure 4 of Attachment 2 to Trans Mountain's response to NEB Information Request No. 3.050b) (Filing A4H2D7); full-bore release and spill extent mapping that identifies and plots all geohazards identified by Trans Mountain in its Natural Hazards Management Program or otherwise, at the time of its submission, in a format and scale similar to the maps provided by Trans Mountain in Filing A3Z8G7; and the associated Line 1 risk assessment used to determine the new valve locations and planned valve upgrades in a). 		X						

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19	<p>Pipeline segment reactivation (Hinton to Hargreaves; Darfield to Black Pines) – engineering assessment and certificate</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction:</p> <ol style="list-style-type: none"> an engineering assessment for the above two pipeline segments, in accordance with Canadian Standards Association (CSA) Z662-15, Clauses 3.3 and 10.15.2; and a certificate with a supporting report issued by an independent certification body,¹⁴⁰ stating unconditionally that the above two pipeline segments: <ol style="list-style-type: none"> are fit for service for the specified operating conditions;¹⁴¹ meet all applicable requirements of CSA Z662-15; and will meet the hydrostatic test requirements outlined in CSA Z662-15, Clause 8, at any time during the certified period. <p>The certificate must be valid for at least 5 years and be validated on an annual basis during the certified period.</p> <p>The supporting report must include the qualifications of the independent certification body, the justification used to grant the certificate, and the expiry date of the certificate.</p>		X						
20	<p>Existing NPS 24 delivery pipeline location</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing construction, its decision on whether it intends to “relocate” the existing NPS 24 delivery pipeline to the Burnaby Mountain tunnel (i.e., replace it with a new third pipeline in the Burnaby Mountain tunnel) and, if so, provide:</p> <ol style="list-style-type: none"> details of any required changes to the design, construction, and operation of the proposed Burnaby Mountain tunnel; a discussion of the factors Trans Mountain considered in deciding to replace/relocate the existing NPS 24 delivery pipeline; and an indication of when Trans Mountain expects to apply for NEB approval to relocate/replace the existing NPS 24 delivery pipeline. 	X							
21	<p>Transient hydraulic analysis on the existing NPS 24 delivery pipeline</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing construction, the conclusions of the transient hydraulic analysis undertaken on the existing NPS 24 delivery pipeline from the Burnaby Terminal to the Westridge Marine Terminal. The filed conclusions must:</p> <ol style="list-style-type: none"> demonstrate that the analysis considered the occurrences of maximum surge pressure in the existing NPS 24 delivery pipeline; and support Trans Mountain’s decision to either retain or eliminate the proposed relief tank at the Westridge Marine Terminal. 	X							
22	<p>Updated terminal risk assessments</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, and at the same time as Trans Mountain’s filings for Conditions 23, 24 and 25, updated risk assessments for the Edmonton Terminal West Tank Area, the Sumas Terminal, and the Burnaby Terminal. The updated risk assessments must quantify and/or include the following:</p> <ol style="list-style-type: none"> the effect of any revised spill burn rates; the potential consequences of a boil-over; the potential consequences of flash fires and vapour cloud explosions; the cumulative risk based on the total number of tanks in the terminal, considering all potential events (pool fire, boil-over, flash fire, vapour cloud explosion); 							X	

¹⁴⁰ For Conditions 19, 122 and 152, an “independent certification body” is an internationally recognized company or organization, such as Lloyd’s Register or Det Norske Veritas, which is able to certify compliance to statutory requirements. The independent certification body must have expertise in pipeline integrity. The NEB reserves the right to accept or reject the certificate. In addition, the NEB’s decision is not contingent on the results of the certificate.

¹⁴¹ For Conditions 19, 122 and 152, “operating conditions” must include the Project-specific operating conditions, possible transient flow conditions, slack flow conditions, and effects on operating pressure due to temperature changes.

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	<p>e) the domino (knock-on) effect caused by a release of the contents of one tank on other tanks within the terminal's common impoundment area(s), or other tanks in adjacent impoundment areas; and</p> <p>f) risk mitigation measures, including ignition source control methods.</p> <p>For those risks that cannot be eliminated, Trans Mountain must demonstrate in each risk assessment that mitigation measures will reduce the risks to levels that are ALARP while complying with the Major Industrial Accidents Council of Canada (MIACC) criteria for risk acceptability.</p> <p>The quantitative risk analysis must be based on recognized methodology, models, and software. Product release frequencies and event probabilities must be based on recent, documented data sources. The effect of mitigation measures on the risk results must be justified and documented.</p>								
23	<p>Secondary containment – Edmonton Terminal</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, the final design of the Edmonton Terminal West Tank Area, including a report demonstrating the following:</p> <p>a) the drainage system's capability to rapidly and safely channel a significant release from any tank in the West Tank Area Common Impoundment to the Remote Impoundment Annex and Remote Impoundment at the same time that a design precipitation event is occurring, without overtopping the diked areas;</p> <p>b) the adequacy of the design in mitigating the following consequences of an accidental release and/or ignition of hydrocarbons, both within and beyond the Edmonton Terminal property boundary:</p> <p>i) harm to personnel and the public;</p> <p>ii) environmental damage; and</p> <p>iii) damage to facilities; and</p> <p>c) the ability of the Common Impoundment, Remote Impoundment Annex, and Remote Impoundment to contain a release of hydrocarbons from a rupture of the largest tank within the West Tank Area concurrent with a 1-in-100 year, 24-hour storm event. The scenario must include an allowance for water generated from potential firefighting activities and the maximum potential amount of standing water in all areas of the secondary containment system.</p>							X	
24	<p>Secondary containment – Burnaby Terminal</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, the final design of the Burnaby Terminal, including a report demonstrating the following:</p> <p>a) the drainage system's capability to rapidly and safely channel a significant release from either Tank 96, 97, or 98 to the Partial Remote Impoundment at the same time that a design precipitation event is occurring, without overtopping the diked areas;</p> <p>b) the adequacy of the proposed design in mitigating the following consequences of an accidental release and/or ignition of hydrocarbons, both within and beyond the Burnaby Terminal property boundary:</p> <p>i) harm to personnel and the public;</p> <p>ii) environmental damage; and</p> <p>iii) damage to facilities; and</p> <p>c) the ability of the individual secondary containment areas, Common Impoundment areas, Intermediate Stormwater Retention, Partial Remote Impoundment, and Tertiary Containment to contain a release of hydrocarbons from a multiple-tank rupture scenario concurrent with a 1-in-100 year, 24-hour storm event. The scenario must include an allowance for water generated from potential firefighting activities and the maximum potential amount of standing water in all areas of the secondary containment system. The assessment may include a calculation of the probability of exceedance of on-site containment considering all possible tank rupture combinations, excluding those tanks with sufficient individual secondary containment. The calculation may be based on a tank utilization histogram most representative of the expanded terminal operations, similar to that provided in Attachment 1 of Trans Mountain's response to NEB Information Request No. 4.24a) (Filing <u>A4K4X3</u>).</p>							X	

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25	<p>Secondary containment – Sumas Terminal</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction, the final design of the Sumas Terminal, including a report demonstrating the following:</p> <ul style="list-style-type: none"> a) the adequacy of the proposed design in preventing the following consequences of an accidental release and/or ignition of hydrocarbons, both within and beyond the Sumas Terminal property boundary: <ul style="list-style-type: none"> i) harm to personnel and the public; ii) environmental damage; and iii) damage to facilities; and b) the ability of the secondary containment system to contain a release of hydrocarbons from a multiple-tank rupture scenario concurrent with a 1-in-100 year, 24-hour storm event. The scenario must include an allowance for water generated from potential firefighting activities and the maximum potential amount of standing water in all areas of the secondary containment system. The assessment may include a calculation of the probability of exceedance of on-site containment considering all possible tank rupture combinations, excluding those tanks with sufficient individual secondary containment. The calculation may be based on a tank utilization histogram most representative of the expanded terminal operations, similar to that provided in Attachment 1 of Trans Mountain's response to NEB Information Request No. 4.24b) (Filing <u>A4K4X4</u>). 							X	
26	<p>Burnaby Mountain tunnel option – design, construction, and operation</p> <p>For the tunnel between the Burnaby Terminal and the Westridge Marine Terminal and related delivery pipelines, at least 6 months prior to commencing Burnaby Mountain tunnel construction activities, Trans Mountain must:</p> <ul style="list-style-type: none"> a) file with the NEB <u>for approval</u>: <ul style="list-style-type: none"> i) a description of the selected tunnel lining method with the rationale for its selection; and ii) tunnel confined space entry procedures during construction and visual inspections, and, if applicable, following construction; and b) file with the NEB: <ul style="list-style-type: none"> i) the results of any geotechnical or geophysical feasibility surveys completed since the evidence filed in the OH-001-2014 hearing; ii) a description of the tunnel portals and permanent road access, if applicable; iii) a description of the selected tunnel excavation method with rationale for its selection; iv) a description of the tunnel backfilling method with rationale for its selection; v) a description of the methods to be used for pipe handling and welding; vi) a discussion on the adequacy of the pipe support methods for the new delivery pipelines during construction, commissioning, hydrostatic testing and operation, if applicable; vii) a discussion on the adequacy of the selected leak detection methods; viii) information demonstrating how the precautionary design of the new delivery pipelines would mitigate issues related to limited accessibility for future maintenance and repairs; and ix) the final tunnel cross-sectional design drawings. 	X							
27	<p>Burnaby Mountain tunnel option – backfilling</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing Burnaby Mountain tunnel construction activities, the following information on backfilling the tunnel between the Burnaby Terminal and the Westridge Marine Terminal:</p> <ul style="list-style-type: none"> a) a discussion of the adequacy of the measures to be taken during tunnel backfilling to eliminate or mitigate potential damage to the delivery pipelines; b) the method(s) that will be used to confirm the consistency and continuity of the tunnel backfill (i.e., backfilling is completed without any spatial gaps); c) the method(s) that will be used for holiday detection and coating repair prior to backfilling; d) the methods that will be used to confirm the integrity of the delivery pipelines in the tunnel, both prior to and after backfilling, but prior to commissioning; and e) the methods that will be used for monitoring, maintaining, and repairing backfill during operations, considering conditions such as fill deterioration and a potential increase in permeability. 	X							

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28	<p>Burnaby Mountain tunnel option – cathodic protection</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing Burnaby Mountain tunnel construction activities, the following information on the cathodic protection system for the delivery pipelines in the tunnel between the Burnaby Terminal and the Westridge Marine Terminal:</p> <ul style="list-style-type: none"> a) a description of the cathodic protection system design; b) risk mitigation measures for all potential cathodic protection performance issues, such as shielding from the backfill material; and c) a method for verifying the effectiveness of the cathodic protection system during operations. 	X							
29	<p>Burnaby Mountain tunnel option – rock mass and waste rock management</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing Burnaby Mountain tunnel construction activities, the following details on rock mass expected to be encountered during construction of the tunnel between the Burnaby Terminal and the Westridge Marine Terminal:</p> <ul style="list-style-type: none"> a) the characterization of the rock mass quality; b) waste rock management methods during construction and operations, if applicable; c) proposed acid rock mitigation measures, such as the treatment or disposal of acid rock, if encountered; d) the locations, sizes, and designs of all confirmed waste rock disposal areas; and e) plans for disposing any waste rock that is not expected to be stored in the confirmed waste rock disposal areas. 	X							
30	<p>Power system protection for pump stations and terminals</p> <p>Trans Mountain must file with the NEB the following details of its electrical power system design for each pump station and each of the following: Westridge Marine Terminal, Burnaby Terminal, Edmonton Terminal, and Sumas Terminal:</p> <ul style="list-style-type: none"> a) Descriptions of the overcurrent and ground fault protection schemes including: <ul style="list-style-type: none"> i) a summary of coordination studies between the upstream and downstream protective devices, at least 3 months prior to commencing dry commissioning; ii) relay settings and time-current curves, at least 3 months prior to commencing dry commissioning; iii) the specification of neutral grounding resistors, at least 6 months prior to commencing construction; iv) specifications of contactors, fuses, and circuit breakers, at least 6 months prior to commencing construction; and v) a description of other electrical protections, relay settings, and trip characteristics, at least 3 months prior to commencing dry commissioning. b) Consistent with the NEB's Safety Advisory SA-2015-03, dated 4 May 2015, at least 6 months prior to commencing construction, information confirming that Trans Mountain has performed the ground fault and arcing fault protection designs for each pump station and terminal, including: <ul style="list-style-type: none"> i) a means to clear ground faults without intentional time delay if the fault currents exceed the design limit set by the neutral grounding resistance; and ii) a means to block the stored energy from other running motors from feeding an electrical fault in another motor running from the same bus. <p>This filing must include a description of the ground fault and arcing fault protection designs including the above measures.</p> c) At least 6 months prior to commencing construction, either: <ul style="list-style-type: none"> i) a written confirmation that Trans Mountain determined during detailed design that electrical faults will not exceed their design limits and migrate to an arcing fault; or ii) for a station or a terminal for which Trans Mountain determined during detailed design that an electrical fault could exceed its design limit and migrate to an arcing fault, the electrical configuration of that station or terminal and the additional equipment and devices that will be used to mitigate the adverse effects of such arcing faults. d) Single-line diagrams of the electrical power systems, at least 6 months prior to commencing construction. 	X				X	X	X	

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31	Reactivation of the Niton Pump Station Trans Mountain must file with the NEB <u>for approval</u> , at least 6 months prior to commencing any pump station construction, an engineering assessment for the Niton Pump Station, in accordance with CSA Z662. The engineering assessment must demonstrate that the pump station is fit for its intended service, and meets all applicable requirements of CSA Z662.		X						
32	Sumas Terminal Geotechnical Report Trans Mountain must file with the NEB, at least 6 months prior to commencing construction at the Sumas Terminal, a geotechnical report that provides feasibility-level geotechnical design recommendations for the proposed expansion at the Sumas Terminal.							X	
33	Westridge Marine Terminal Onshore Geotechnical Report Trans Mountain must file with the NEB, at least 6 months prior to commencing construction at the Westridge Marine Terminal, a geotechnical report that provides feasibility-level geotechnical design recommendations for the proposed new onshore facilities at the Westridge Marine Terminal, including consideration of the potential for seismic damage.	X							
34	Westridge Marine Terminal Offshore Geotechnical Report Trans Mountain must file with the NEB, at least 6 months prior to commencing construction at the Westridge Marine Terminal, the final Preliminary Geotechnical Report on the offshore portion of the Westridge Marine Terminal, based on the selected pile design option, including consideration of the potential for seismic damage.	X							
35	Marine Sediment Management Plan Trans Mountain must file with the NEB, at least 6 months prior to commencing construction at the Westridge Marine Terminal, confirmation whether or not dredging is required at the Westridge Marine Terminal. In the event that dredging is determined to be unavoidable during the expansion of the Westridge Marine Terminal, Trans Mountain must file with the NEB <u>for approval</u> , at least 4 months prior to commencing construction, and also include as part of its Westridge Marine Terminal Environmental Protection Plan, a Marine Sediment Management Plan. This plan must include: a) a summary of any supplemental marine sediment survey results; b) quantification of the area and the volume of marine sediment to be dredged along with an explanation of the measures that have been taken to eliminate or reduce the dredge footprint and volume proposed for disposal at sea; c) results of sediment plume modelling for any areas to be dredged; d) options for dredged sediment management, including the volumes of sediment that will be re-used or disposed of at sea or on land, as well the criteria and methods for determining how the dredged sediment will be disposed of at sea or on land; e) criteria and methods for determining how the dredged sediment will be managed recognizing that any proposed disposal at sea will only be considered for approval under the <i>Canadian Environment Protection Act, 1999</i> , if it is demonstrated to be the most technically and environmentally preferable option; f) confirmation that Trans Mountain will update the Westridge Marine Terminal Environmental Protection Plan to include any relevant information from the Marine Sediment Management Plan; g) details of monitoring that will be undertaken during construction; h) details of monitoring (both abiotic and biotic parameters) that will be undertaken during operations, including a discussion on evaluating the level of contaminants in the marine environment and any changes from pre-construction levels, as well as a proposed reporting schedule; and i) a summary of its consultations with Appropriate Government Authorities and potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan.	X							
36	Pre-construction caribou habitat assessment Trans Mountain must file with the NEB, at least 6 months prior to commencing construction of any Project component potentially affecting each caribou range, a detailed caribou habitat assessment of the Project right-of-way through each caribou range traversed by the Project, including a 500 metre buffer on either side. The framework of the habitat assessment must use the updated critical habitat polygons delineated by the Southern Mountain Caribou Recovery Team and components of critical habitat outlined in the <i>Recovery Strategy for the Woodland Caribou, Southern Mountain Population in Canada (2014)</i> . The habitat assessment must include: a) map(s) indicating the location of the habitat;	X	X		X	X	X		

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	<ul style="list-style-type: none"> b) a description of the amount of habitat and the existing habitat alteration, in hectares; c) a description of how Trans Mountain has taken available and applicable Indigenous traditional ecological knowledge into consideration into the assessment including demonstration that those Indigenous persons and groups that provided Indigenous traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; d) a description of how Trans Mountain has incorporated input from Appropriate Government Authorities and species experts into the assessment methodology; and e) a description of the type of habitat characterized by the biophysical attributes of critical habitat, as defined in the applicable Recovery Strategy. 								
37	<p>Caribou Habitat Restoration Plan (CHRP)</p> <p>Trans Mountain must file with the NEB for approval, in accordance with the timelines below, preliminary and final versions of a CHRP for each caribou range potentially affected by the Project.</p> <ul style="list-style-type: none"> a) Preliminary CHRP – to be filed at least 6 months prior to commencing construction of any Project component potentially affecting each caribou range. This version of the CHRP must include the following: <ul style="list-style-type: none"> i) the CHRP's goals and measurable targets for each caribou range, including the goal of avoidance of critical habitat destruction; ii) a detailed description of measures that will be used to avoid or lessen Project activities that impact critical habitat, and the rationale for selecting the measures; iii) a list of criteria used to identify potential caribou habitat restoration sites; iv) conceptual decision-making tree(s) or decision framework(s) that will be used to identify and prioritize potential caribou habitat restoration sites, and mitigative actions to be used at different types of sites, including consideration of typical site factors that may constrain implementation; v) a literature review upon which the decision-making tree(s) or decision framework(s) are based, including: <ul style="list-style-type: none"> 1) an identification of applicable temporal and spatial caribou habitat restoration methodologies; 2) an assessment of the relative effectiveness of the identified methodologies; and 3) a detailed methodology of how the literature review was conducted. vi) the quantifiable targets and performance measures that will be used to evaluate the extent of predicted residual effects, CHRP effectiveness, the extent to which the goals and measurable targets have been met, and the need for further measures to offset unavoidable and residual effects on caribou habitat; vii) a schedule indicating when mitigation measures will be initiated and their estimated completion dates; viii) a description of how Trans Mountain has taken available and applicable Indigenous traditional ecological knowledge studies into consideration in identifying potential caribou habitat restoration sites including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and ix) a summary of its consultations with Appropriate Government Authorities and any potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the preliminary CHRP. b) Final CHRP – to be filed on or before 1 November after the first complete growing season after completing final clean-up. This version of the CHRP must include the following: <ul style="list-style-type: none"> i) the preliminary CHRP, with any updates identified in a revision log that includes the rationale for any changes to decision-making criteria; ii) a complete tabular list of caribou habitat restoration sites, including locations, spatial areas, habitat quality descriptions, site-specific restoration activities, and challenges; iii) a description of how selected restoration measures are consistent with the <i>Recovery Strategy for the Woodland Caribou, Southern Mountain Population in Canada (2014)</i>; iv) maps or updated Environmental Alignment Sheets showing the site locations; v) specification drawings for the implementation of each restoration method; vi) a qualitative and quantitative and assessment of the total area of direct and indirect disturbance to caribou habitat that will be restored, the duration of spatial disturbance, 	X	X		X	X	X		

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	<p>and the area-based extent of the resulting unavoidable and residual effects to be offset, including indirect disturbance; and</p> <p>vii) a summary of its consultations with Appropriate Government Authorities and any potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the final CHRP.</p>								
38	<p>Sowaqua Spotted Owl Mitigation Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to commencing construction of any Project component within the Sowaqua spotted owl wildlife habitat area, a Sowaqua Spotted Owl Mitigation Plan that includes:</p> <p>a) a summary of results from supplemental surveys conducted in the Sowaqua spotted owl wildlife habitat area;</p> <p>b) the area of habitat potentially directly and indirectly affected by the Project;</p> <p>c) a description of how an avoidance, mitigation, and offset hierarchy was considered in the plan;</p> <p>d) mitigation measures to be implemented, including all relevant measures committed to throughout the OH-001-2014 proceeding, any new mitigation measures resulting from supplementary surveys, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and measurable goals for evaluating mitigation success;</p> <p>e) an evaluation of offset options within or outside of the Sowaqua spotted owl wildlife habitat area, an indication of the selected option, and the rationale for the selected option;</p> <p>f) details on post-construction monitoring of mitigation measures and offset measures, including survey methods, corrective measures, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, any adjustments to the offset measures, and a proposed reporting schedule;</p> <p>g) a commitment to include results of the monitoring in the post-construction environmental monitoring reports filed under Condition 151;</p> <p>h) details on how the mitigation and monitoring measures are consistent with applicable Recovery Strategies and Action Plans;</p> <p>i) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the mitigation plan including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information;</p> <p>j) a summary of its consultations with Appropriate Government Authorities, any species experts and potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the mitigation plan; and</p> <p>k) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the mitigation plan.</p>	X	X		X	X	X		
39	<p>Hydrogeological study at Coldwater Indian Reserve (IR) No. 1</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing construction between Veale Road and Kingsvale Pump Station, a hydrogeological report relating to the aquifer at Coldwater IR No. 1 in British Columbia. The report must:</p> <p>a) describe the methodology and information sources used, including any field investigations;</p> <p>b) delineate the extent of the aquifer in the area of Coldwater IR No. 1;</p> <p>c) characterize the aquifer recharge sources and aquifer confinement;</p> <p>d) characterize the direction and speed of groundwater movement to wells on Coldwater IR No. 1;</p> <p>e) quantify the risks posed to groundwater supplies on Coldwater IR No. 1 in the event of leaks, accidents or malfunctions from the Project;</p> <p>f) based on the assessment of risks, describe proposed measures to address identified risks, including but not limited to considerations related to routing, Project design, operational measures, or monitoring;</p> <p>g) provide justification for the measures proposed to address identified potential risks to groundwater supplies on Coldwater IR No. 1; and</p> <p>h) include a summary of consultations undertaken with the Coldwater First Nation and Appropriate Government Authorities, as well as copies of all written comments that may be provided to Trans Mountain by the Coldwater First Nation or Appropriate Government</p>	X			X		X		

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	Authorities. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from the Coldwater First Nation or Appropriate Government Authorities, into the assessment.								
40	<p>Rare Ecological Community and Rare Plant Population Management Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 5 months prior to commencing construction, an updated Rare Ecological Community and Rare Plant Population Management Plan for ecological communities of concern, rare plants and lichens, and early draft, candidate, proposed, or final critical habitat for plant and lichen species under the <i>Species at Risk Act</i>, that are potentially affected directly or indirectly by the Project during construction or operations, that includes:</p> <ol style="list-style-type: none"> a) a summary of supplementary survey results, and a demonstration of the overall adequacy of the rare ecological community and rare plant surveys, including the adequacy for the identification of biophysical attributes for any early draft, candidate, proposed, or final critical habitat under the <i>Species at Risk Act</i>; b) avoidance and mitigation measures to be implemented during construction and operations, including all relevant measures committed to throughout the OH-001-2014 proceeding and any new measures resulting from supplementary surveys, with rationales and unambiguous criteria explaining under what circumstances each measure will be applied, and measurable goals against which the success of each measure will be evaluated; c) a description of how the avoidance, mitigation, and offset hierarchy was considered in developing the plan, with rationales for progressing from avoidance to mitigation to offsets; d) details on post-construction monitoring, including survey methods, the appropriate number of years of monitoring to determine the success of each type of avoidance and mitigation measure, corrective actions that might be necessary, and the circumstances under which each such action would be taken; e) a Preliminary Rare Ecological Community and Rare Plant Population Offset Plan for any ecological communities and rare plant and lichen species that have an at-risk status of S1, S1S2 or S2, or that are listed under federal or provincial legislation for protection, and for any early draft, candidate, proposed, or final critical habitat under the <i>Species at Risk Act</i>, and that, after five years of operations, have ongoing effects. This preliminary plan must include: <ol style="list-style-type: none"> i) a rationale for why the community, species, or critical habitat cannot be avoided by a sufficient distance to avoid both direct and indirect residual effects; ii) the expected residual effects on that community, species, or critical habitat, including a discussion of the potential for time lags between when Project effects occur and when mitigation measures would become fully functional, and taking into account the success on past projects of the proposed mitigation and corrective measures in b) and d) above; iii) an analysis of the appropriateness of offsets for the community, species or critical habitat, taking their specific features into account, and of any potential limitations on offset effectiveness; iv) a description of how the avoidance, mitigation, monitoring, corrective and offset measures are consistent with any applicable recovery, action or management strategies or plans for the community, species or critical habitat; v) an explanation with rationales of how the need for offset measures will be determined and how quantitative offset objectives will be developed, including the use and selection of offset ratios, with the aim of achieving no-net-loss; vi) the potential types of offset measures, the process for selecting which will be implemented, an estimation of the probability of their success, and how compensation sites will be selected; and vii) a discussion of how the effectiveness of offset measures will be monitored, assessed, and reported on, and problems corrected; f) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; g) a summary of its consultations with Appropriate Government Authorities, any species experts and any potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and h) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Rare Ecological Community and Rare Plant Population 	X	X		X	X	X	X	

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	Management Plan, including confirmation that the avoidance, mitigation, monitoring, corrective, and offset measures in the Rare Ecological Community and Rare Plant Population Management Plan will be implemented to the extent feasible in the case of discovery via their inclusion in the Rare Ecological Communities or Rare Plant Species Discovery Contingency Plan.								
41	<p>Wetland Survey and Mitigation Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 5 months prior to commencing construction, a pre-construction Wetland Survey and Mitigation Plan for wetlands potentially affected directly or indirectly by the Project during construction or operations, that includes:</p> <ol style="list-style-type: none"> a) a summary of supplementary survey results and a demonstration of the overall adequacy of the wetland surveys; b) a description of any wetlands for which ground-based surveys were not possible, an explanation as to why not, attempts made to obtain access, and what further information on each wetland will be collected immediately prior to or during construction; c) a description of the functional condition of each wetland for comparison during post-construction monitoring, including individual functional conditions (e.g., habitat, hydrology and biogeochemistry, including the presence and abundance of migratory birds and species at risk), and a description of the methods used to determine the type and amount of each individual wetland function and the overall functional condition; d) a description of the crossing methods, mitigation measures and reclamation measures to be implemented during construction and operations, with rationales and unambiguous criteria explaining under what circumstances each such method and measure will be applied; e) measurable goals against which the success of wetland mitigation and reclamation will be evaluated, including a description of how such goals incorporate the aim of returning wetlands to their original functionality while allowing for reasonable natural variation, and including measurable goals for each of the first-, third- and fifth-year post-construction monitoring reporting stages for any wetland to which no-net-loss under the Federal Policy on Wetland Conservation applies; f) a description of how the <ol style="list-style-type: none"> i) avoidance, mitigation, and offset hierarchy; and ii) the goal of no-net-loss of wetland function, were considered in developing the plan, with rationales for progressing from avoidance to mitigation to offsets; g) details of the post-construction monitoring plan for wetlands for the first five years of operations, including corrective actions that might be necessary and the circumstances under which each such action would be taken; h) a Preliminary Wetland Offset Plan for any wetland that has not achieved reclamation success in terms of overall wetland function after five years of operations, and for any wetland to which no-net-loss under the Federal Policy on Wetland Conservation applies and that has had a temporary or ongoing loss in any individual functional condition – this plan must include: <ol style="list-style-type: none"> i) the expected residual effects on the wetland, including a discussion of the potential for time lags between when Project effects occur and when mitigation measures would become fully functional, taking into account the success on past projects of the proposed mitigation, reclamation and corrective measures in d) and g) above; ii) an analysis of the appropriateness of offsets for the wetland, taking its specific features into account, and of any potential limitations on offset effectiveness; iii) an explanation with rationales of how the need for offset measures will be determined and how quantitative offset objectives will be developed, including the use and selection of offset ratios and indicator species, with the aim of achieving no-net-loss; iv) the potential types of offset measures, the process for selecting which will be implemented, an estimation of the probability of their success, and how compensation sites will be selected; v) a discussion of how the effectiveness of offset measures will be monitored, assessed, and reported on, and problems corrected; and vi) for any wetland to which no-net-loss under the Federal Policy on Wetland Conservation applies, details with rationales on the offset measures that will be implemented before or during the first five years of operations to compensate for expected temporary or ongoing losses to individual functional conditions, including the amount and type of offsets required, the selection of compensation sites, identification of the parties involved in planning and implementation and their respective roles and responsibilities, a timeline for implementation, and the methods and schedule for monitoring and reporting to demonstrate offset success; 	X	X		X	X	X	X	

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	<ul style="list-style-type: none"> i) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; j) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and k) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Wetland Survey and Mitigation Plan. 								
42	<p>Grasslands Survey and Mitigation Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 5 months prior to commencing construction, a pre-construction Grasslands Survey and Mitigation Plan for native grasslands in the B.C. interior that are potentially affected directly or indirectly by the Project during construction or operations, that includes:</p> <ul style="list-style-type: none"> a) a summary of survey results for such grasslands, including but not limited to native plant species diversity, species at risk, the density and distribution of existing invasive plant species, and the presence of cryptogamic crust, together with a demonstration of the adequacy of such surveys and a summary of existing and ongoing land management impacts; b) a description (including quantification) of overlap of the Project with grasslands and of expected residual effects; c) a description of the mitigation and reclamation measures to be implemented for grasslands during construction and operations, including the extent to which native seed will be used, with rationales and unambiguous criteria explaining under what circumstances each such measure will be applied; d) measurable goals against which the success of grassland mitigation and reclamation will be evaluated, including goals related to cryptogamic crust recovery, invasive species control, and access control, and how existing and ongoing land management impacts and land-use changes by landowners outside the control of Trans Mountain will be taken into account; e) a description of how the <ul style="list-style-type: none"> i) avoidance, mitigation, and offset hierarchy, and ii) the goal of no-net-loss for grasslands, were considered in developing the plan, with rationales for progressing from avoidance to mitigation to offsets; f) details of the post-construction monitoring plan for grasslands for the first ten years of operations, including corrective actions that might be necessary and the circumstances under which each such action would be taken; g) a Preliminary Grasslands Offset Plan for those grasslands that, after ten years of operations, have not achieved reclamation success. This plan must include: <ul style="list-style-type: none"> i) expected residual effects on the grasslands, including a discussion of the potential for time lags between when Project effects occur and when mitigation measures would become fully functional, taking into account the success on past projects of the proposed mitigation, reclamation and corrective measures in c) and f) above; ii) an analysis of the appropriateness of offsets for the grasslands, taking their specific features into account, and of any potential limitations on offset effectiveness; iii) an explanation with rationales of how the need for offset measures will be determined and how quantitative offset objectives will be developed, including the use and selection of offset ratios, with the aim of achieving no-net-loss; iv) the potential types of offset measures, the process for selecting which will be implemented, an estimation of the probability of their success, and how compensation sites will be selected; and v) a discussion of how the effectiveness of offsets measures will be monitored, assessed, and reported on, and problems corrected; h) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; 	X	X		X	X	X		

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	<ul style="list-style-type: none"> i) a summary of its consultations with Appropriate Government Authorities, any species experts, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and j) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Grasslands Survey and Mitigation Plan. 								
43	<p>Watercourse crossing inventory Trans Mountain must file with the NEB, at least 5 months prior to commencing any watercourse crossing construction activities, the following:</p> <ul style="list-style-type: none"> a) an updated inventory of all watercourses to be crossed, including, for each crossing: <ul style="list-style-type: none"> i) the name of the watercourse being crossed and an identifier for the crossing; ii) the location of the crossing; iii) the primary and contingency crossing methods; iv) planned construction timing; v) information on the presence of fish and fish habitat; vi) information on the composition of riparian habitat; vii) the provincial instream work window; viii) the proposed least risk biological window and the rationale to support the proposed least risk biological window if it differs from the provincial instream work window; and ix) an indication of whether any of Fisheries and Oceans Canada's applicable "Measures to Avoid Causing Harm to Fish and Fish Habitat" cannot be implemented; b) detailed generic design drawings of trenchless, dry open-cut, frozen open-cut, and isolation crossings of various watercourse types; c) site-specific information for each watercourse crossing where any of Fisheries and Oceans Canada's applicable "Measures to Avoid Causing Harm to Fish and Fish Habitat" cannot be implemented for the primary pipeline construction method: <ul style="list-style-type: none"> i) detailed crossing-specific design drawings; ii) photographs up-stream, down-stream, and at the crossing location; iii) a description of the fish species and habitat that is present at the crossing location, and if fish spawning is likely to occur within the immediate area; iv) a description of the composition of the riparian habitat at the crossing location and an indication if the riparian habitat has a limiting effect on the productive capacity of the watercourse, and if its removal or disturbance represents a potential influence on fish communities; v) the site-specific mitigation and habitat enhancement measures to be used to minimize impacts; vi) any potential residual effects; vii) proposed reclamation measures; and viii) a discussion of the potential impacts to local fisheries resources within the immediate area as a result of the crossing's construction; d) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the inventory, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and e) a summary of consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted. 	X	X						
44	<p>Wildlife Species at Risk Mitigation and Habitat Restoration Plans Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction, Wildlife Species at Risk Mitigation and Habitat Restoration Plans for each species whose draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project. Each plan must include:</p> <ul style="list-style-type: none"> a) a summary of supplementary pre-construction survey results, including surveys for biophysical 	X	X		X	X	X		

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	<p>attributes of critical habitat;</p> <p>b) the location and type of critical habitat, for those wildlife species with early draft and candidate critical habitat, including a description of the biophysical attributes, potentially directly and indirectly affected by the Project;</p> <p>c) the location, types and total spatial area for each type of critical habitat for those wildlife species with proposed or final critical habitat, including a description of the biophysical attributes, potentially directly and indirectly affected by the Project;</p> <p>d) a detailed description of measures that will be used to avoid the destruction of critical habitat;</p> <p>e) a detailed description of mitigation and habitat restoration measures to be implemented to reduce direct and indirect Project effects on critical habitat, including all relevant measures committed to throughout the OH-001-2014 proceeding, any new mitigation measures resulting from supplementary surveys, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and measurable targets for evaluating mitigation and critical habitat restoration success;</p> <p>f) identification and review of alternative mitigation and habitat restoration measures to avoid or lessen direct and indirect Project effects on critical habitat, and the rationale for the selected measure(s);</p> <p>g) detailed description of how selected mitigation and critical habitat restoration measures address the potential for time lags between when the Project impacts occur and when mitigation and critical habitat restoration measures are implemented and are fully functional;</p> <p>h) details on post-construction monitoring of mitigation measures and critical habitat restoration measures, including survey methods, corrective measures, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and a proposed reporting schedule;</p> <p>i) details on how the mitigation, critical habitat restoration measures, and monitoring measures are consistent with applicable Recovery Strategies and Action Plans;</p> <p>j) a commitment to include the results of the monitoring in the post-construction environmental monitoring reports filed under Condition 151;</p> <p>k) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plans including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information;</p> <p>l) a summary of its consultations with Appropriate Government Authorities, any species experts, potentially affected Indigenous groups and affected landowner/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and</p> <p>m) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Wildlife Species at Risk Mitigation and Habitat Restoration Plans.</p>								
45	<p>Weed and Vegetation Management Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction, an updated Weed and Vegetation Management Plan for the Project that includes:</p> <p>a) a summary of supplementary survey results, including pre-construction weed surveys, and a demonstration of the adequacy of such surveys;</p> <p>b) measurable goals;</p> <p>c) criteria describing when and where problem vegetation will be managed for each Project phase, including pre-construction, construction, post-construction, and operations;</p> <p>d) a description of potential adverse effects related to treatment measures;</p> <p>e) management procedures and a decision-making framework for selecting appropriate prevention and treatment measures, including a description of relevant specific habitats, land uses and land management plans and how each will be considered and kept up-to-date in selecting prevention and treatment measures;</p> <p>f) the methods and schedule for short- and long-term vegetation monitoring;</p> <p>g) a summary of its consultations with Appropriate Government Authorities, invasive plant councils or committees, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and</p>	X	X	X	X	X	X	X	X

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	h) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Weed and Vegetation Management Plan.								
46	<p>Contamination Identification and Assessment Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction, a Contamination Identification and Assessment Plan that includes:</p> <p>a) a description of the procedures that have been implemented to-date, and that will be implemented prior to or during construction, to identify and assess pre-existing solid, liquid or gaseous contamination that could be disturbed by, or affect, the Project, including whether site investigations have been or will be undertaken;</p> <p>b) a demonstration of the adequacy of the procedures in a) with reference to relevant standards, guidelines, and best practices, including how historical land use has been taken into account and a discussion of the potential for chemicals of concern to not be detectable by smell or by sight;</p> <p>c) the information that has been or will be reported by Trans Mountain, including to whom and when, concerning pre-existing contamination;</p> <p>d) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and</p> <p>e) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Contamination Identification and Assessment Plan.</p>	X	X	X	X	X	X	X	X
47	<p>Access Management Plan(s)</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction, an Access Management Plan(s) to be included within the updated Environmental Protection Plans required by Conditions 72 and 78. Each plan must address issues related to soil, vegetation, fish and fish habitat, and wildlife and wildlife habitat. Each plan must also describe access control measures proposed to control both human and predator access during construction and operations, and include:</p> <p>a) objectives of the plan;</p> <p>b) measurable goals for evaluating the plan's success in achieving its objectives;</p> <p>c) a summary of any related baseline information that has been or will be collected to aid in evaluating the plan's success, and justification of the adequacy of this baseline information, or a rationale if no baseline information has or will be collected;</p> <p>d) a list of sites where access control measures will be implemented for construction and those that will remain in place throughout operations, the control measure(s) proposed at those sites, and the rationale for selecting those sites and measures;</p> <p>e) the methods for monitoring the effectiveness of access control measures implemented during construction and operations, and justification of the adequacy of such monitoring;</p> <p>f) a description of available adaptive management measures and of the criteria Trans Mountain will use to determine if and when adaptive management measures are warranted based on monitoring results;</p> <p>g) a commitment to report, as part of Trans Mountain's post-construction environmental monitoring reports (required by Condition 151), on the control measures implemented, monitoring undertaken, and the success of control measures in meeting Access Management Plan goals and objectives, as well as a schedule, with rationale, for reporting throughout operations;</p> <p>h) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge studies into consideration including demonstration that those Indigenous persons and groups that provided Indigenous traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and</p> <p>i) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the Plan/Report.</p>	X	X		X	X	X		
48	<p>Navigation and navigation safety plan</p> <p>Trans Mountain must file with the NEB, <u>for approval</u>, at least 4 months prior to commencing construction, a Navigation and Navigation Safety Plan that includes:</p> <p>a) an updated list of navigable waterways to be crossed by or affected by the Project (including power lines, marine terminal, temporary or permanent bridge crossings, or other ancillary works that are physically or operationally connected to the Project);</p>	X	X		X	X	X		

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	<ul style="list-style-type: none"> b) an updated listing of effects of the Project on navigation and navigation safety for each of the identified waterways identified in a); c) proposed mitigation measures to address Project effects on navigation and navigation safety for each of the identified waterways, including adherence to codes and standards (such as the CSA); and d) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and waterway users, regarding their navigational use of each of the identified waterways. In its summary, Trans Mountain must: <ul style="list-style-type: none"> i) describe the Appropriate Government Authorities, potentially affected Indigenous groups, and commercial and recreational waterway users consulted; ii) describe how Trans Mountain identified those consulted; and iii) provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan. 								
49	<p>Technical working group (TWG) reports</p> <p>Trans Mountain must file with the NEB, at least 4 months prior to commencing construction and every 6 months thereafter until after commencing operations, a report describing the activities undertaken by the TWGs during the reporting period and the outcomes of these activities. The reports must include, at a minimum:</p> <ul style="list-style-type: none"> a) a list of all members of each TWG; b) the methods, dates and location of all TWG activities or meetings; c) a summary of all issues or concerns raised or addressed during the TWG activities; d) a description of outcomes or measures that were or will be implemented to address the issues identified or concerns raised; or, if any measures will not be implemented, a rationale for why not; and e) a description of any unresolved issues or concerns, and a description of how these will be addressed, or a rationale for why no further measures will be required. 	X							
50	<p>High-voltage alternating current (AC) interference</p> <p>Trans Mountain must file with the NEB, at least 4 months prior to commencing construction:</p> <ul style="list-style-type: none"> a) a report confirming that Trans Mountain has achieved an engineered solution to mitigate possible damage to pipeline segments caused by the power line fault current from power line footings and other below ground fault current discharge facilities of B.C. Hydro's unshielded transmission power lines that are located less than 30 metres from those segments. The report must include: <ul style="list-style-type: none"> i) a summary of the above-mentioned engineered solution and an explanation of how the engineered solution adequately mitigates possible damage to the pipeline; ii) a list of pipeline segments where mitigation will be applied; and iii) an explanation of measures taken by Trans Mountain to reach an agreement with B.C. Hydro towards implementing the engineered solution. <p>Trans Mountain must provide a copy of the report to B.C. Hydro at the same time that it is filed with the NEB;</p> b) a report detailing how Trans Mountain's design reduces hazardous induced voltages on its pipeline segments to meet a maximum 15 VAC under all steady state operating conditions; and c) a report demonstrating how Trans Mountain would comply with the requirements of IEEE Standard 80 to limit touch and step potentials to all points of contacts to pipeline segments due to power line faults or switching surges, and include a list of affected pipeline segments. 	X							
51	<p>Field changes manual for geohazard mitigation</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction, a field changes manual for geohazard mitigation. This manual must include:</p> <ul style="list-style-type: none"> a) decision criteria for implementing mitigation for any geohazards identified during construction; b) specific criteria for implementing changes to the designs, grading, special materials, protective structures, burial depth, installation procedures, erosion mitigation measures, and monitoring; and c) details regarding the required qualifications of the field staff that will implement the manual. 	X							
52	<p>Air Emissions Management Plan for the Westridge Marine Terminal</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction at the Westridge Marine Terminal, an Air Emissions Management Plan for the Westridge Marine Terminal that includes:</p>	X							

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	<ul style="list-style-type: none"> a) locations of air monitoring sites (on a map or diagram), including the rationale for the locations selected; b) confirmation that the new fixed air monitoring stations will be installed and operating at least one year prior to commencing operations at the Westridge Marine Terminal to establish robust local baseline data; c) the methods and schedule for ambient monitoring of contaminants of potential concern in air (e.g., particulate matter [including diesel particulate matter and speciation of PM_{2.5}], nitrogen oxides (including NO₂), sulphur dioxide, hydrogen sulphide, ozone, mercaptans, reduced visibility and volatile organic compounds) following a recognized protocol (e.g., National Air Pollution Surveillance program or U.S. Environmental Protection Agency), and emissions source tracking; d) representative meteorological data (e.g., wind speed, wind direction, air temperature and relative humidity) for the monitoring period; e) description of monitoring equipment and procedures for monitoring station data recording, assessment, quality assurance and reporting details, including a description of how the real time and non-continuous air quality monitoring data will be made available to the public; f) a particulate matter management plan; g) a description of the public and Indigenous communication and complaint response processes; h) the criteria or thresholds that, if triggered or exceeded, would require implementing additional mitigation measures; i) a description of additional mitigation measures that would be implemented as a result of the monitoring data or ongoing concerns; and j) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan. 								
53	<p>Fugitive Emissions Management Plan for the Westridge Marine Terminal</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction at the Westridge Marine Terminal, a Fugitive Emissions Management Plan for the Westridge Marine Terminal that includes:</p> <ul style="list-style-type: none"> a) a description of the sources of the fugitive emissions that will be generated from the Westridge Marine Terminal during construction and operations; b) a description of the emission and odour controls that will be employed to reduce fugitive emissions during tanker loading and other sources identified in a); c) procedures for verifying, tracking, and reporting on: <ul style="list-style-type: none"> i) fugitive emissions during tanker loading; ii) volatile organic compound collection efficiency; iii) the vapour recovery unit's hydrogen sulphide and mercaptan removal efficiency, as well as its BTEX reduction efficiency; and iv) the vapour combustion unit's hydrogen sulphide and mercaptan; removal efficiency, as well as its combustion efficiency; d) procedures for identifying any leaks or equipment malfunctions during operation of the vapour recovery and vapour combustion units; e) methods for quantifying emissions of particulate matter and volatile organic compounds (with vapour recovery and vapour combustion units in operation); f) any additional mitigation measures that will be employed to further reduce fugitive emissions; g) a description of Trans Mountain's program for addressing complaints with respect to fugitive emissions, including a communication and notification plan; and h) a summary of its consultations with Appropriate Government Authorities. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan. 	X							

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54	<p>Fugitive Emissions Management Plan for Edmonton, Sumas and Burnaby Terminals</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction at each Terminal, a Fugitive Emissions Management Plan for the Edmonton, Sumas, and Burnaby Terminals. This plan must include:</p> <ol style="list-style-type: none"> a description of the fugitive emission sources within the terminals during construction and operations; a description of the emission and odour controls that will be employed to reduce fugitive emissions from the tanks, and any other sources identified in a); procedures for verifying the capture and destruction efficiency of tank vapour activation units or any other emission or odour control units at the terminals; quantification of fugitive emissions during operations, including the methods used; any additional mitigation measures that will be employed to further reduce the fugitive emissions; a description of Trans Mountain's program for addressing complaints with respect to fugitive emissions, including a public and Indigenous communication and complaint response process; and a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan. 							X	
55	<p>Fugitive Emissions Management Plan for pump stations</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction at any pump stations, a Fugitive Emissions Management Plan for the pump stations associated with the Project that includes:</p> <ol style="list-style-type: none"> a description of the procedures implemented for leak detection and the criteria used in selecting target leaking components; quantification methods considered and the rationale for the selected method(s); monitoring frequency for each target leaking component and the parameters that will be measured; a decision framework that will be implemented to repair or replace leaking components; a description of record-keeping procedures; and a discussion of additional mitigation measures that will be employed to minimize fugitive emissions. 		X			X	X		
56	<p>Grizzly Bear Mitigation Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 4 months prior to commencing construction in each vulnerable grizzly bear population unit / grizzly bear management area, a Grizzly Bear Mitigation Plan for each of these areas. Trans Mountain must provide a rationale for why any vulnerable grizzly bear population units / grizzly bear management units potentially affected by the Project are not addressed in the plan. The Grizzly Bear Mitigation Plan(s) must include:</p> <ol style="list-style-type: none"> a summary of results from any supplemental surveys conducted; potential direct and indirect effects of Project activities on vulnerable grizzly bear population units and grizzly bear management units; mitigation measures to be implemented, including all relevant measures committed to throughout the OH-001-2014 proceeding, any new mitigation measures resulting from supplementary surveys, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and measurable targets for evaluating mitigation success; details on post-construction monitoring of mitigation measures, including survey methods, corrective measures, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and a proposed reporting schedule; a commitment to include results of the monitoring in the post-construction environmental monitoring reports filed under Condition 151; a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; a summary of its consultations with Appropriate Government Authorities, any species experts and potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its 	X	X		X	X	X		

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	<p>consultation, including any recommendations from those consulted, into the plan(s); and</p> <p>h) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Grizzly Bear Mitigation Plan, including confirmation that the mitigation, monitoring, and corrective measures in this plan will be implemented in the case of discovery via their inclusion in Trans Mountain's Wildlife Species of Concern Discovery Contingency Plan.</p>								
57	<p>Commercial Support for the Project</p> <p>Trans Mountain must file with the Board, at least 3 months prior to commencing construction, confirmation, signed by an officer of the company, that:</p> <p>a) the Project has secured agreements or contracts that remain in force with shippers for a minimum term of 15-years for no less than 60 per cent of its total capacity (890,000 barrels per day); and</p> <p>b) any rights to terminate held by shippers that may have existed in any agreements or contracts between Trans Mountain and shippers (which may have reduced the Project's contracted total capacity to less than 60 per cent for a minimum term of 15 years) have lapsed and or expired because their conditions precedent have been satisfied or waived.</p>	X							
58	<p>Training and education monitoring reports</p> <p>a) Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, and every 6 months thereafter until after commencing operations, monitoring reports for the implementation and outcomes of Indigenous, local, and regional training and education measures and opportunities for the Project. The reports must include the following:</p> <p>i) a description of each training and education measure and opportunity indicator that was monitored, including duration, participant groups, education and training organization, and intended outcomes;</p> <p>ii) a summary and analysis of the progress made toward achieving intended outcomes of each training and education measure and opportunity, including an explanation for why any intended outcomes were not achieved; and</p> <p>iii) a description of identified or potential training or education gaps, and any proposed measures to address them or to support or increase training and education measures and opportunities.</p> <p>b) Trans Mountain must file with the NEB, within 6 months after commencing operations, a final report.</p>	X							
59	<p>Worker accommodation strategy</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction, a worker accommodation strategy, developed in consultation with appropriate municipal or provincial authorities. The strategy must include:</p> <p>a) a final summary of all proposed accommodations, including the location of any temporary camp(s);</p> <p>b) the number of workers that will be housed; and</p> <p>c) a description of how the strategy addresses any concerns or requests raised in consultation with municipal or provincial authorities.</p> <p>In the event that temporary camp(s) are to be used, the strategy must also include:</p> <p>i) a description of how the potential environmental and socio-economic impacts have been assessed, and a description of all associated mitigation measures;</p> <p>ii) copies of, or reference to, any mitigation or operational plans that will be required or implemented for the camp(s), including a description of how Trans Mountain has incorporated any additional mitigation measures into relevant Environmental Protection Plan(s);</p> <p>iii) copies of any necessary municipal or provincial permits for any camp(s) that have been received 3 months prior to construction. If camp permits are not yet in place 3 months prior to commencing construction, provide:</p> <p>1) a list of the outstanding camp permits and a schedule for when these camp permits will be in place; and</p> <p>2) copies of any outstanding camp permits prior to commencing construction;</p> <p>iv) copies or excerpts of all policies relating to the rules of conduct for workers housed at the camp(s);</p> <p>v) confirmation that all policies relating to the camp(s) will be provided to workers;</p> <p>vi) confirmation that all policies relating to the camp(s) were made available to all local communities and other relevant service providers in proximity to any camp(s) that will be</p>	X	X		X	X	X	X	

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>used for the Project; and</p> <p>vii) a summary of its consultations with affected landowners/tenants where any camp(s) will be located. Trans Mountain must provide:</p> <ol style="list-style-type: none"> 1) a description of the information provided to landowners/tenants; and 2) description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the Strategy. 								
60	<p>Environmental and socio-economic assessment - s.58 temporary construction lands and infrastructure</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction, an environmental and socio-economic assessment for all temporary construction lands and infrastructure approved pursuant to this Order. The assessments must include:</p> <ol style="list-style-type: none"> a) a list of the locations and dimensions of all temporary construction lands and infrastructure; b) environmental alignment sheets or as-built drawings at an appropriate scale, clearly depicting temporary construction lands and infrastructure; c) results of any pre-construction surveys within the areas that were not previously subject to such surveys, and an indication of potential residual effects; d) all associated mitigation measures that are beyond those identified during the OH-001-2014 proceeding; e) analysis supporting the use of the measures in d), including any supplementary reports; f) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information based on any supplemental surveys completed; and g) a summary of consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants, as well as copies of all written comments that may be provided to Trans Mountain by those consulted. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the assessment. 				X				
61	<p>List of temporary infrastructure sites</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, a complete list of all temporary infrastructure sites to be constructed for the Project, and must file any updates as they become available. This list must include information on each site's location, structures to be installed, the anticipated date for commencing construction, and activities involved in its construction. The initial list and any updates must also include the condition numbers (those under the "prior to commencing construction" phase heading) that are applicable to each site and an indication of whether each of those conditions has been or remains to be satisfied.</p>				X				
62	<p>Construction schedule</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, a construction schedule identifying the major construction activities expected and, on a monthly basis, on the first working day of each calendar month from the commencement of construction until after commencing operations, updated detailed construction schedules.</p>	X	X	X	X	X	X	X	X
63	<p>Security Management Programs</p> <p>Trans Mountain must file confirmation, signed by an officer of the company:</p> <ol style="list-style-type: none"> a) at least 3 months prior to commencing construction, that it has developed a Security Management Program for the construction phase of the Project; and b) at least 3 months prior to commencing operations, that it has amended its operations phase Security Management Program to include operation of the Project; <p>pursuant to the <i>National Energy Board Onshore Pipeline Regulations</i> and CSA Z246.1 (as amended from time to time).</p>	X	X	X	X	X	X	X	X
64	<p>Construction safety manuals</p> <p>Trans Mountain must file with the NEB:</p> <ol style="list-style-type: none"> a) at least 3 months prior to commencing construction, the Health and Safety Management Plan for the Project; and b) at least 2 months prior to commencing construction, Construction Safety Manuals (Project-Specific Safety Plans) for the applicable Project components. These must include separate Construction Safety Manuals for pipeline construction, terminal and pump station construction, Burnaby Mountain tunnel construction, and Westridge Marine Terminal construction. <p>These manuals must address routine construction activities, as well as blasting, tunneling, avalanche</p>	X	X	X	X	X	X	X	X

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	safety, safe work in proximity to operational pipelines and facilities, and special access procedures that may be required in areas subject to activities other than Project construction.								
65	<p>Hydrology – notable watercourse crossings</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, revised flood frequency estimates for all notable watercourse crossings, as defined by Trans Mountain in its application. These estimates must incorporate the results of field investigations and bathymetric surveys completed since the Project application was filed, and be presented in a format similar to that presented in Application Volume 4A, Appendix I – Route Physiography and Hydrology Report, Appendix B – Notable Water Crossing Catchment Details (Filing A56000).</p>	X							
66	<p>Risk Management Plan for geohazards</p> <p>Trans Mountain must develop and file with the NEB, at least 3 months prior to commencing construction, an updated Risk Management Plan for addressing the threats of existing and potential geohazards during construction of the Project.</p> <p>This plan must be updated as additional site-specific geotechnical information is obtained through detailed investigations, and modified as geohazards are encountered during construction. Trans Mountain must make any updates or modifications available to the NEB upon request.</p>	X			X				
67	<p>Outstanding horizontal directional drilling geotechnical and feasibility reports</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, Geotechnical Reports and Horizontal Directional Drilling Feasibility and Design Reports, along with final design drawings, for each of the following crossings:</p> <ul style="list-style-type: none"> a) Coldwater River 4 crossing; b) North Thompson River 6 crossing; c) North Thompson River 7 crossing; d) Pembina River crossing. e) Raft River crossing; f) Sumas River crossing (suitability for Direct Pipe® installation); g) any additional river crossing along the new Line 2 pipeline segments where horizontal directional drilling or other trenchless crossing method is being considered; and h) the Coquitlam Landfill, if Horizontal Directional Drilling or other trenchless crossing method is being considered. 	X							
68	<p>Seismic reports – liquefaction potential</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, a final report that identifies all sites along the Project, that have “Very High,” “High,” and “Moderate” liquefaction-triggered ground movement potential, and that describes how the potential for liquefaction-triggered ground movement will be mitigated at each site.</p>	X							
69	<p>Fault studies</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, the results of fault-mapping studies that were ongoing during or undertaken after the OH-001-2014 proceeding, for use in the detailed design of the Project. This filing must include conclusions regarding possible seismic activity during the Holocene epoch for Sumas Fault, Vedder Mountain Fault, Fraser River-Straight Creek Fault and Rocky Mountain Trench, and other possible hidden faults, as well as the potential for compounding risks due to the proximity of the Vedder Mountain and Sumas Faults.</p>	X							
70	<p>Strain-based design</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction, the following information related to strain-based design, where it is applied:</p> <ul style="list-style-type: none"> a) the location and rationale for selecting strain-based design in each location; b) a report summarizing the adequacy of the strain-based design for various loading scenarios during pipeline construction and operation for each location provided in a); and c) a list of standards and Project-specific specifications, including testing procedures, used in the strain-based design. 	X							
71	<p>Riparian Habitat Management Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction, a Riparian Habitat Management Plan that would apply to all defined watercourses crossed by the Project. The plan must be supported with rationales and unambiguous criteria explaining under what circumstances each such measure and strategy would apply, and must include the following.</p>	X	X						

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	<ul style="list-style-type: none"> a) a description of the methods used to determine pre-construction functionality (e.g., for fish, wildlife, and rare plants) of the riparian habitat, including a justification how such functionality is assessed; b) a description of the mitigation measures and the watercourse reclamation strategies (reclamation method, reclamation measures, and application criteria) for the range of defined watercourses crossed by the Project; c) a description of the generalized vegetation planting plans for the range of defined watercourses crossed by the Project; that includes the diversity and density of species to be planted, planting locations, and application criteria; d) clearly defined measureable reclamation goals and targets for years 1, 3, and 5, post-construction, to determine whether riparian habitat has returned, or is on a sufficient trajectory to return, to pre-construction functionality; e) a discussion of how the mitigation measures, reclamation strategies, and vegetation planting plans are anticipated to return riparian habitat to pre-construction functionality, using the goals and targets provided in d); f) a summary of the information in a)-d) for each defined watercourse crossing, that includes: <ul style="list-style-type: none"> i) watercourse crossing ID; ii) a defined riparian habitat buffer; iii) a catalogue of the pre-construction species diversity and density of the riparian habitat; iv) classification of riparian habitat functionality; v) area of the riparian habitat to be impacted; vi) the mitigation measures, reclamation strategy, and vegetation planting plan to be implemented; and vii) the measureable goals and targets; g) details of the post-construction monitoring plan for the first five years of operations, including evaluations of reclamation activities, and potential corrective actions and enhancement measures that might be necessary and the circumstances under which each such action would be taken; h) a Preliminary Riparian Habitat Offset Plan, that would apply to all defined watercourse crossings located in watersheds identified as being above the riparian habitat disturbance threshold (>18 per cent of riparian habitat disturbed in the watershed) or classified as High Sensitive fish-bearing by Trans Mountain during the OH-001-2014 proceeding, and, where, after the fifth complete growing season, riparian habitat has not returned, or is not trending towards sufficient pre-construction functionality. The plan must include: <ul style="list-style-type: none"> i) how the need for offset measures will be determined, including offset ratios; ii) potential offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success; and iii) how the effectiveness of offset measures will be assessed, monitored, and reported on; i) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and j) a summary of consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its plan, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan of updates. 								
72	<p>Pipeline Environmental Protection Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction, an updated Project-specific Pipeline Environmental Protection Plan for the construction of the pipeline.</p> <p>The updated Pipeline Environmental Protection Plan must be a comprehensive compilation of all environmental protection procedures, mitigation measures, and monitoring commitments, as set out in Trans Mountain's Project application, its subsequent filings, or as otherwise committed to during the OH-001-2014 proceeding. The updated Pipeline Environmental Protection Plan must describe the criteria for implementing all procedures and measures using clear and unambiguous language that confirms Trans Mountain's intention to implement all of its commitments.</p> <p>The updated Pipeline Environmental Protection Plan must include the following:</p> <ul style="list-style-type: none"> a) environmental procedures (including site-specific plans), criteria for implementing these 	X	X						

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	<p>procedures, mitigation measures, and monitoring applicable to all Project phases and activities;</p> <p>b) policies and procedures for environmental training and the reporting structure for environmental management during construction, including the qualifications, roles, responsibilities, and decision-making authority for each job title identified in the updated Pipeline Environmental Protection Plan;</p> <p>c) any additional measures arising from supplemental pre-construction studies and surveys;</p> <p>d) updated contingency plans and management plans;</p> <p>e) updated alignment sheets;</p> <p>f) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the Pipeline Environmental Protection Plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and</p> <p>g) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the Pipeline Environmental Protection Plan.</p>								
73	<p>Traffic Control Plans for public roadways</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction of the pipeline and at least 2 months prior to commencing construction at each terminal and pump station, Traffic Control Plans for the use of public roadways for the Project. The plans must include:</p> <p>a) information regarding the timing and location of key construction activities (including equipment mobilization and staging, pipe stockpiling, pipeline and pump station construction, and equipment demobilization);</p> <p>b) current traffic volumes and anticipated traffic volumes during the construction period for both day and night times;</p> <p>c) a description of the predicted traffic flows, including vehicle types and volumes, at key construction points, marshalling areas, access roads, and public roadways;</p> <p>d) an assessment of the potential impacts associated with the increased volume of construction-related traffic (e.g., safety hazards, noise, light, dust, etc.) and associated mitigation measures; and</p> <p>e) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plans.</p>	X	X	X	X	X	X	X	X
74	<p>Horizontal directional drilling (HDD) Noise Management Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction of each HDD crossing, a site-specific HDD Noise Management Plan that includes:</p> <p>a) proposed hours of daytime and nighttime work;</p> <p>b) baseline daytime and nighttime ambient sound levels at noise sensitive areas within 500 metres of the HDD entry and exit sites;</p> <p>c) predicted noise levels caused by HDD at the most affected receptors without mitigation measures implemented;</p> <p>d) proposed HDD noise mitigation measures, including all technologically and economically feasible mitigation measures;</p> <p>e) predicted noise levels at the most affected receptors with mitigation measures implemented, including noise contour map(s) showing potentially affected receptors;</p> <p>f) an HDD noise monitoring program, including locations, methodology, and schedule;</p> <p>g) a description of the public and Indigenous communication and complaint response process;</p> <p>h) a contingency plan that contains proposed mitigation measures for addressing noise complaints, which may include the temporary relocation of specific residents; and</p> <p>i) confirmation that Trans Mountain will provide notice to nearby residents in the event that a planned blowdown is required, and that the planned blowdown will be completed during daytime hours whenever possible.</p>	X							

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75	<p>Nooksack Dace and Salish Sucker Management Plan</p> <p>a) Trans Mountain must construct all watercourse crossings located within nooksack dace or salish sucker proposed or final critical habitat, as defined by Fisheries and Oceans Canada Recovery Strategies for the species, using trenchless crossing methods with entry and exit points located outside of the riparian habitat area, unless demonstrated to be not feasible.</p> <p>b) At least 3 months prior to commencing construction of any watercourse crossing located within nooksack dace or salish sucker proposed or final critical habitat, Trans Mountain must file a list of these watercourse crossings, and, for each, indicate whether or not a trenchless crossing method is feasible.</p> <p>c) For each watercourse crossing in b) where a trenchless crossing method is not feasible, at least 3 months prior to commencing construction of that crossing, Trans Mountain must file the following with the NEB <u>for approval</u>:</p> <ul style="list-style-type: none"> i) a summary of the trenchless crossing feasibility studies completed and a discussion of the risks and constraints associated with the trenchless watercourse crossing, and the rationale for not employing a trenchless method; ii) the updated watercourse crossing method, location of crossing, planned construction timing, and the provincial instream work window; iii) any site-specific mitigation and reclamation measures, and species-specific habitat enhancement measures; iv) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include measures listed in iii); v) a discussion of how the site-specific mitigation and reclamation measures, and species-specific enhancement measures, relate to Fisheries and Oceans Canada Recovery Strategies and Action Plans; vi) details on any monitoring to be undertaken and a commitment to include any results in the post-construction environmental monitoring reports filed under Condition 151; vii) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and viii) a summary of consultations with Appropriate Government Authorities and any species experts. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan. <p>d) For any watercourse crossing identified in b) where Trans Mountain will employ a trenched contingency crossing method, Trans Mountain must file with the NEB, <u>for approval</u>, the information listed in c), at least 30 days prior to commencing construction of the contingency watercourse crossing.</p>	X							
76	<p>Old Growth Management Areas Mitigation and Replacement Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction within old growth management areas, an Old Growth Management Areas Mitigation and Replacement Plan for these areas that are potentially affected directly or indirectly by the Project during construction or operations, that includes:</p> <ul style="list-style-type: none"> a) avoidance and mitigation measures to be implemented during construction and operations, with rationales and unambiguous criteria explaining under what circumstances each measure will be applied, and measurable goals against which the success of each measure will be evaluated; b) a description of how the avoidance, mitigation, and offset hierarchy was considered in developing the plan, with rationales for progressing from avoidance to mitigation to offsets; c) details on post-construction monitoring, including corrective actions that might be necessary and the circumstances under which each such action would be taken; d) the expected residual effects (including quantification) on old growth management areas, including a discussion of the potential for time lags between when Project effects occur and when mitigation measures would become fully functional; e) replacement or other offset measures that will be implemented to compensate for residual effects with the aim of no-net-loss to old growth forests within old growth management areas overall, including: <ul style="list-style-type: none"> i) discussion of the appropriateness of compensation for the old growth management area, taking its specific features into account, and of any potential limitations of the effectiveness of such replacement or offset measures; 	X			X	X	X		

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	<ul style="list-style-type: none"> ii) an explanation with rationales on the amount and type of replacements or other offsets required; iii) a timeline for their implementation; iv) the selection of compensation sites; v) identification of the parties involved in planning and implementation and their respective roles and responsibilities, and vi) a description of the methods and schedule for monitoring and reporting to demonstrate compensation success; f) a summary of its consultations with Appropriate Government Authorities and any potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; and g) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the Old Growth Management Areas Mitigation and Replacement Plan. 								
77	<p>Archaeological and cultural heritage assessment – Lightning Rock</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction of the pipeline between the Sumas Terminal and the Sumas Pump Station, a report on archaeological and cultural heritage field investigations undertaken to assess the potential impacts of Project construction and operations on the Lightning Rock site at Sumas, British Columbia. The report must include:</p> <ul style="list-style-type: none"> a) a detailed description of the assessment plan that was developed, in consultation with the Stó:lō Collective, for the involvement of the Stó:lō Collective in designing and undertaking surveys; b) a description of the pre-construction archaeological and cultural heritage surveys conducted at the site, including: <ul style="list-style-type: none"> i) survey methodologies used; and ii) data and information sources, including information and Indigenous traditional knowledge provided by the Stó:lō Collective; c) a site description, including maps at appropriate scales and levels of detail, confirming the site boundaries; d) an assessment of the potential environmental and socio-economic impacts of Project construction and operations on the archaeological resources and cultural heritage of the site; e) all associated mitigation measures that are beyond those identified during the OH-001-2014 proceeding to address any identified impacts; f) analysis supporting the use of the measures in e), including any additional relevant reports; g) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) and Environmental Alignment Sheets to include any relevant information based on the surveys completed; and h) a summary of consultations undertaken with the Stó:lō Collective, and Appropriate Government Authorities, as well as copies of all written comments that may be provided to Trans Mountain by the Stó:lō Collective or government authorities. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from the Stó:lō Collective or government authorities, into the assessment. 	X			X				

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78	<p>Facilities Environmental Protection Plan</p> <p>Trans Mountain must file with the NEB for approval, at least 3 months prior to commencing construction at the facilities (terminals, pump stations, temporary facilities, and associated infrastructure), an updated Project-specific Facilities Environmental Protection Plan for the construction at the facilities.</p> <p>The updated Facilities Environmental Protection Plan must be a comprehensive compilation of all environmental protection procedures, mitigation measures, and monitoring commitments, as set out in Trans Mountain's Project application, its subsequent filings, or as otherwise committed to during the OH-001-2014 proceeding. The updated Facilities Environmental Protection Plan must describe the criteria for implementing all procedures and measures using clear and unambiguous language that confirms Trans Mountain's intention to implement all of its commitments.</p> <p>The updated Facilities Environmental Protection Plan must include the following:</p> <ol style="list-style-type: none"> environmental procedures (including site-specific plans), criteria for implementing these procedures, mitigation measures, and monitoring applicable to all Project phases and activities; policies and procedures for environmental training and the reporting structure for environmental management during construction, including the qualifications, roles, responsibilities, and decision-making authority for each job title identified in the updated Facilities Environmental Protection Plan; any additional measures arising from supplemental pre-construction studies and surveys; updated contingency plans and management plans; updated facility drawings including relevant site-specific resources and mitigations; a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the Environmental Protection Plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the Facilities Environmental Protection Plan. 		X	X	X	X	X	X	X
79	<p>Air Emissions Management Plan for the Edmonton, Sumas and Burnaby Terminals</p> <p>Trans Mountain must file with the NEB for approval, at least 3 months prior to commencing construction at each of the Edmonton, Sumas, and Burnaby Terminals, an Air Emissions Management Plan for each of those terminals that includes:</p> <ol style="list-style-type: none"> a description of the baseline, pre-construction conditions informed by relevant modelling results and recent existing monitoring data; descriptions of the locations of air monitoring sites (on a map or diagram), including the rationale for the locations selected; the timing for installing air monitoring stations; the methods and schedule for monitoring ambient ground-level concentrations of potential concern (e.g., volatile organic compounds, ozone, hydrogen sulphide, mercaptans, criteria air contaminants, secondary ozone and particulate matter, and reduced visibility) and emissions source tracking; procedures for monitoring station data recording, assessment, and reporting details, including a description of how the real time and non-continuous air quality monitoring data will be made available to the public; a description of the public and Indigenous communication and complaint response process; the criteria or thresholds that, if triggered or exceeded, will require implementing additional emissions reduction measures; possible measures that will be implemented as a result of the monitoring data or ongoing concerns; and a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan. 							X	

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
80	<p>Noise Management Plan for construction at terminals and pump stations</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction at each terminal and pump station, a Noise Management Plan for construction, where residences are within 300 metres of the proposed construction activities. The plan must include:</p> <ul style="list-style-type: none"> a) proposed hours of daytime and nighttime work; b) noise mitigation measures, including all technologically and economically feasible mitigation measures; c) a noise monitoring program, including locations, methodology, and schedule; d) a description of the public and Indigenous communication and noise complaint response process; and e) a contingency plan that contains proposed mitigation measures for addressing noise complaints, which may include the temporary relocation of specific residents. 	X				X	X	X	
81	<p>Westridge Marine Terminal Environmental Protection Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing construction at the Westridge Marine Terminal, an updated Project-specific Westridge Marine Terminal Environmental Protection Plan for the construction at the Westridge Marine Terminal.</p> <p>The updated Environmental Protection Plan must be a comprehensive compilation of all environmental protection procedures, mitigation measures, and monitoring commitments, as set out in Trans Mountain's Project application, its subsequent filings, or as otherwise committed to during the OH-001-2014 proceeding. The updated Westridge Marine Terminal Environmental Protection Plan must describe the criteria for implementing all procedures and measures using clear and unambiguous language that confirms Trans Mountain's intention to implement all of its commitments.</p> <p>The updated Westridge Marine Terminal Environmental Protection Plan must include the following:</p> <ul style="list-style-type: none"> a) environmental procedures (including site-specific plans), criteria for implementing these procedures, mitigation measures, and monitoring applicable to all Project phases and activities; b) policies and procedures for environmental training and the reporting structure for environmental management during construction, including the qualifications, roles, responsibilities, and decision-making authority for each job title identified in the updated Environmental Protection Plan; c) any additional measures arising from supplemental pre-construction studies and surveys; d) updated contingency plans and management plans; e) updated facility drawings including relevant site-specific resources and mitigations; f) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the Westridge Marine Terminal Environmental Protection Plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and g) a summary of its consultations with Appropriate Government authorities and any potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the Westridge Marine Terminal Environmental Protection Plan. 	X							

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
82	<p>Light Emissions Management Plan for the Westridge Marine Terminal</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction at the Westridge Marine Terminal, a Light Emissions Management Plan for the Westridge Marine Terminal that includes:</p> <ul style="list-style-type: none"> a) a summary of the results of an area lighting study, including how potential impacts on surrounding communities and safety and operational requirements were considered; b) a description of the mitigation and best practice measures considered for the terminal lighting design and how the proposed design and operation will minimize the impacts from light on land-based residents and marine users; c) a summary of its consultations with Port Metro Vancouver, as well as copies of all written comments that may be provided to Trans Mountain by Port Metro Vancouver. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from Port Metro Vancouver, into the plan; and d) a plan for how Trans Mountain will communicate its proposed terminal lighting design and associated mitigation measures to limit any nuisance lighting disturbances to land-based residents and marine users. 	X							
83	<p>Westridge Marine Terminal (offshore) – pile design</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction at the Westridge Marine Terminal, the final design basis for the offshore pile foundation layout of the Westridge Marine Terminal.</p>	X							
84	<p>Emergency release system at the Westridge Marine Terminal</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing construction at the Westridge Marine Terminal, its conclusions on the necessity of an emergency release system for the loading arms at the Westridge Marine Terminal. The conclusions must be supported by a comprehensive study describing the advantages and disadvantages of incorporating an emergency release system. This study must:</p> <ul style="list-style-type: none"> a) consider the application of: <ul style="list-style-type: none"> i) emergency release couplers; and ii) an emergency release system, during both normal operating conditions and under abnormal conditions such as seismic events; and b) include a description of the final emergency release system design, if applicable. 	X							
85	<p>Air Emissions Management Plan – Burnaby Mountain tunnel construction</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing Burnaby Mountain tunnel construction activities, an Air Emissions Management Plan for tunnel construction. The plan must include:</p> <ul style="list-style-type: none"> a) proposed hours for daytime and nighttime work; b) sources that would generate air emissions; c) an Air Emissions and Dust Emissions Management Plan that includes mitigation measures, their predicted effectiveness, and implementation timeframes; and d) a description of Trans Mountain's program for addressing complaints received during tunnel construction with respect to air and dust emissions, including a communication and notification plan. 	X							
86	<p>Burnaby Mountain Tunnel Construction Noise Management Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing Burnaby Mountain tunnel construction activities, a Burnaby Mountain Tunnel Construction Noise Management Plan that includes:</p> <ul style="list-style-type: none"> a) proposed hours of daytime and nighttime work; b) baseline daytime and nighttime ambient sound levels at noise sensitive areas within 500 metres of the entry and exit sites for the tunnel; c) predicted noise levels at the most affected receptors caused by tunnel construction without mitigation measures implemented; d) proposed noise mitigation measures, including all technologically and economically feasible mitigation measures; e) predicted noise levels at the most affected receptors with mitigation measures implemented, including noise contour map(s) showing the potentially affected receptors; f) a tunnel construction noise monitoring program, including locations, methodology, and schedule; 	X							

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	<ul style="list-style-type: none"> g) criteria that will be used to determine when tunnel construction would be shut down due to noise; h) a summary of its consultations with Appropriate Government Authorities and any potentially affected receptors (residences and businesses), as well as copies of all written comments that may be provided to Trans Mountain by those consulted. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan; i) a description of the public and Indigenous communication and noise complaint response processes; and j) a contingency plan that contains proposed mitigation measures for addressing noise complaints, which may include the temporary relocation of specific residents. 								
87	<p>Groundwater Seepage Management Plan – Burnaby Mountain tunnel construction</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing Burnaby Mountain tunnel construction activities, a Groundwater Seepage Management Plan for tunnel construction. The plan must include:</p> <ul style="list-style-type: none"> a) an estimate quantifying the anticipated average and maximum amounts of groundwater seepage into the tunnel, and an assessment of any potential impacts on the water table; b) a discussion of Trans Mountain's proposed pumping, treatment, and disposal options; c) a description of the potential effects of dewatering of bedrock aquifers, springs and streams on local groundwater and surface water resources, and of measures that Trans Mountain would implement to mitigate such effects; and d) a description of measures that Trans Mountain would implement during the operations phase in the event that there is groundwater seepage into the tunnel. 	X							
88	<p>Project organizational structure for Project construction</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, a diagram of the Project's organizational structure (i.e., project management, design, and field staff) that clearly identifies roles, accountabilities, responsibilities, and reporting relationships for construction of the applicable Project components.</p>	X							
89	<p>Emergency Response Plans for construction</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, a Project-specific Emergency Response Plan, including the Trans Mountain Expansion Project Emergency Response Plan and site-specific Emergency Response Plans as referenced in Volume 4B, Section 5.4.2 of its Project application (Filing A3S1K6), that would be implemented during the construction phase. The plan(s) must include spill contingency measures that Trans Mountain will employ in response to accidental spills attributable to construction activities, 24-hour medical evacuation, fire response, and security.</p>	X	X	X	X	X	X	X	X
90	<p>Consultation on improvements to Trans Mountain's Emergency Management Program</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, a consultation plan for its review of its Emergency Response Plans and equipment (including its availability), as referenced in Volume 7, Section 4.8.2 of its Project application (Filing A3S4V5). This plan must include:</p> <ul style="list-style-type: none"> a) the consultation plan's scope; b) the consultation plan's objectives; c) a preliminary list of Appropriate Government Authorities, first responders, potentially affected Indigenous groups and affected landowners/tenants with whom Trans Mountain will consult; d) a preliminary list of consultation locations and timing; and e) the methods that will be used to track commitments made during consultations and to incorporate them into Trans Mountain's Emergency Management Program, including its Emergency Response Plans. 	X					X	X	
91	<p>Plan for marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, within 6 months from the issuance date of the Certificate, a plan describing how it will ensure that it will meet the requirements of Condition 133 regarding marine spill prevention and response. The plan must be prepared in consultation with Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority, Vancouver Fraser Port Authority, British Columbia Coast Pilots, Western Canada Marine Response Corporation, Fisheries and Oceans Canada and the Province of British Columbia, and must identify any issues or concerns raised and how Trans Mountain has addressed or responded to them.</p> <p>Trans Mountain must provide the plan to the above-mentioned parties at the same time as it is filed with the NEB.</p>	X							

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92	<p>Updates under the Species at Risk Act</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, a summary of any relevant updates under the <i>Species at Risk Act</i>, including new Schedule 1 listings and new or amended Recovery Strategies, Action Plans, and Management Plans for species that have the potential to be affected by the Project. For each species-specific update, the summary must include:</p> <ol style="list-style-type: none"> a discussion of the Project activities' potential effects on the listed species or its critical habitat, including an explanation as to whether additional surveys are required to locate such critical habitat; identification of all reasonable alternatives to the Project activities referred to in a), including avoidance measures, and a discussion on the potential effects of the alternatives, the chosen approach, and the rationale for selecting the chosen approach; any additional site-specific mitigation; any monitoring to be undertaken and a commitment to include monitoring results as part of the post-construction environmental monitoring reports filed under Condition 151; an explanation as to how the responses to b), c) and d) above are consistent with applicable Recovery Strategies and Actions Plans; and a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the summary of updates, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information. 	X	X		X	X	X		
93	<p>Water well inventory</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, an inventory of physically verified ("ground-truthed") water wells that are within 150 metres of either side of the centre of the pipeline right-of-way.</p> <p>The filing must contain confirmation that Trans Mountain will maintain and update the inventory until the Project is abandoned or decommissioned pursuant to the NEB Act.</p> <p>The inventory must include a description of the methods used to identify and physically verify wells, including:</p> <ol style="list-style-type: none"> each well's location in proximity to the right-of-way, including its GPS coordinates; a description of each well's type or use (e.g., drinking water, agricultural use, use by Indigenous groups, any other uses); each well's tenure or ownership (e.g., private, municipal, Indigenous community); each well's operational status, including abandoned or decommissioned wells, and information about each well, including well depth, lithology, and water depth, if available; a plan for updating the inventory over the life of the Project, including: <ol style="list-style-type: none"> the methods for identifying and verifying abandoned or decommissioned wells, and new or replacement wells; and the frequency of inventory updates; a list of any properties or sections of the right-of-way that were not physically verified, including: <ol style="list-style-type: none"> the reason why properties or right-of-way sections were not physically accessed; an estimate of the potential number of wells that have not been physically verified; and a proposed schedule for accessing properties or right-of-way sections; and a description of Trans Mountain's plans for communicating information about the locations of water wells to owners or affected users. 	X							
94	<p>Consultation reports – protection of municipal water sources</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, and on or before 31 January of each year during construction and of the first 5 years after commencing operations, a report on Trans Mountain's consultations with municipalities and regional districts, communities, and Indigenous groups related to the protection of municipal and community water sources, including those sources currently relied upon and sources identified for potential future use. Each report must include:</p> <ol style="list-style-type: none"> the name of the municipality, regional district, community, or Indigenous group consulted; the methods, dates, and locations of all meetings or consultations; a summary of all issues or concerns raised; and a summary of any steps or measures that have been or will be undertaken, including 	X	X			X	X	X	

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	<p>groundwater modelling or monitoring, as a result of consultations with municipalities, regional districts, communities, or Indigenous groups. This summary must include:</p> <ul style="list-style-type: none"> i) any updates or amendments to maintenance policies, systems, programs, procedures, practices, and activities aimed at preventing pipeline releases; ii) the criteria used to identify and select modelling or monitoring locations and parameters; iii) results of any modelling or monitoring; iv) any measures that have been taken to address modelling or monitoring results; and v) any measures to share or to make accessible to municipalities, regional districts, communities, or Indigenous groups data or issues that arise regarding drinking water (aquifers, groundwater, and well water supplies); or <p>in the alternative to i)-v) above, an explanation why no further action is required to address or respond to issues or concerns raised.</p>								
95	<p>Visual Impact Plan</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, a Visual Impact Plan that includes:</p> <ul style="list-style-type: none"> a) the results of any supplemental visual modelling surveys conducted of select locations that are highly visible to the public, identified in consultation with Appropriate Government Authorities, and potentially affected Indigenous groups and affected landowners/tenants, where the proposed pipeline corridor deviates from the existing TMPL system right-of-way; and b) mitigation measures to be implemented, including all relevant measures committed to throughout the OH-001-2014 proceeding, and any new mitigation measures resulting from supplementary surveys. 	X							
96	<p>Reports on engagement with Indigenous groups – construction</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction and every 6 months thereafter until after commencing operations, a report on the engagement activities it has undertaken with potentially affected Indigenous groups. Each report must include, at a minimum, for each Indigenous group engaged:</p> <ul style="list-style-type: none"> a) the name of the group; b) the method(s), date(s), and location(s) of engagement activities; c) a summary of any issues or concerns raised; and d) the measures taken, or that will be taken, to address or respond to issues or concerns, or an explanation why no further action is required to address or respond to issues or concerns. <p>Trans Mountain must provide a copy of each report to each group engaged (and identified in a) above) at the same time that it is filed with the NEB.</p>	X	X	X	X	X	X	X	X
97	<p>Traditional Land Use (TLU) and Traditional Marine Resource Use (TMRU) Investigation Report</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 2 months prior to commencing construction, a report describing pre-construction TLU and TMRU investigations that were not reported during the OH-001-2014 proceedings and that relate specifically to the Project (up to and including the foreshore lands and boundaries of the water lease for the Westridge Marine Terminal). The report must include:</p> <ul style="list-style-type: none"> a) the name of the potentially affected Indigenous group to which each investigation pertains; b) a description of any identified potentially affected TLU or TMRU sites, resources, or activities; c) the methods used to identify the potentially affected TLU or TMRU sites, resources or activities; d) a summary of any mitigation measures that Trans Mountain will implement to reduce or eliminate (to the extent possible) Project effects on TLU or TMRU sites, resources or activities; e) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include mitigation measures (summarized in (d)) to reduce or eliminate (to the extent possible) Project effects on TLU or TMRU sites, resources or activities; f) a summary of consultations undertaken with or concerns raised by potentially affected Indigenous groups regarding investigations on Project effects on the current use of lands and resources or marine resource use for traditional purposes, as well as copies of all written comments provided to Trans Mountain by potentially affected Indigenous groups to which each investigation pertains. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those Indigenous groups to which each investigation pertains, into the report; g) a description of any outstanding concerns raised regarding potential Project effects on the current use of lands and resources or marine resource use for traditional purposes, including a description of how Trans Mountain will or address or respond to them, or an explanation why it 	X							

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>will not address or respond to them; and</p> <p>h) a summary of any outstanding TLU or TMRU investigations or follow-up activities that will not be completed prior to commencing construction, including estimated completion date(s), if applicable, and a description of how Trans Mountain has already identified, or will identify, any potentially affected TLU and TMRU sites, resources or activities for these outstanding investigations.</p> <p>Trans Mountain must provide a copy of the report to each potentially affected group identified in a) at the same time that it is filed with the NEB.</p>								
98	<p>Plan for Indigenous group participation in construction monitoring</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, a plan describing participation by Indigenous groups in monitoring activities during construction for the protection of traditional land and resource use for the pipelines, terminals and pump stations, and traditional marine resource use at the Westridge Marine Terminal. The plan must include:</p> <p>a) a summary of engagement activities undertaken with Indigenous groups to determine opportunities for their participation in monitoring activities;</p> <p>b) a list of potentially affected Indigenous groups, if any, that have reached agreement with Trans Mountain to participate in monitoring activities;</p> <p>c) the scope, methodology, and justification for monitoring activities to be undertaken by Trans Mountain and each participating Indigenous group identified in b), including those elements of construction and geographic locations that will involve Indigenous Monitors;</p> <p>d) a description of how Trans Mountain will use the information gathered through the participation of Indigenous Monitors; and</p> <p>e) a description of how Trans Mountain will provide the information gathered through the participation of Indigenous Monitors to the participating Indigenous group.</p> <p>Trans Mountain must provide a copy of the report to each potentially affected group identified in b) above at the same time that it is filed with the NEB.</p>	X	X		X	X	X	X	
99	<p>Landowner and tenant consultation reports</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, and every 6 months thereafter until 5 years after commencing Project operations:</p> <p>a) a description of landowner and tenant consultations, including the consultation methods, dates, and a summary of any issues or concerns raised by landowners and tenants;</p> <p>b) a summary of actions that Trans Mountain has undertaken to address or respond to each of the issues or concerns raised, or an explanation for why no actions were taken, and any outstanding concerns; and</p> <p>c) confirmation that Trans Mountain will make available to a landowner or tenant, upon request, a copy of the consultation records related to that landowner or tenant.</p>	X							
100	<p>Heritage resources</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction of individual Project components as described in Condition 10(a):</p> <p>a) confirmation, signed by an officer of the company, that it has obtained all of the required archaeological and heritage resource permits and clearances from the Alberta Department of Culture and the British Columbia Ministry of Forests, Lands and Natural Resource Operations;</p> <p>b) confirmation that it has consulted with the British Columbia Ministry of Forests, Lands and Natural Resource Operations, and that the Ministry has reviewed and approved the mitigation measures for disturbance to impacted palaeontological sites within British Columbia;</p> <p>c) a description of how Trans Mountain will meet any conditions and respond to any comments and recommendations contained in the permits and clearances referred to in a) or obtained through the consultation referred to in b); and</p> <p>d) confirmation that Trans Mountain will update the relevant Environmental Protection Plan(s) to include any relevant information from the conditions or recommendations referred to in c).</p>	X	X	X	X	X	X	X	X
101	<p>Uninterruptible Power Supply (UPS) and battery systems</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction at each terminal and pump station, confirmation that the UPS system design and planned operation related to that facility, is in compliance with the requirements of CSA 22.1 – 15 or other applicable standard(s) that exceeds the requirements of CSA 22.1 – 15. If another standard is used, this filing must include the name of the standard and an explanation of why the standard was used and how it meets or exceeds the requirements of CSA 22.11 – 15.</p>	X				X	X	X	

No.	Conditions with initial filings due prior to commencing construction, or prior to commencing construction of specified Project component(s)	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
102	<p>Landowner and tenant complaint process/system</p> <p>Trans Mountain must file with the Board, at least 30 days prior to commencing construction, confirmation that it has created and will maintain, up until the Project is abandoned or decommissioned pursuant to the NEB Act, a process/system that chronologically tracks landowner and tenant complaints related to the Project.</p> <p>The filing must contain confirmation that the process/system will track:</p> <ul style="list-style-type: none"> a) a description of each complaint; b) how each complaint was received (e.g., telephone, letter, email); c) the date each complaint was received; d) subsequent dates of all contact or correspondence with each complainant; e) records of any site visits, monitoring, or inspections; f) contact information for all parties involved in each complaint; g) the date of each complaint's resolution; and h) if a complaint remains unresolved, a description of any further actions to be taken or an explanation for why no further action is required. <p>Trans Mountain must make available to a landowner or tenant, upon request, the records related to the complaint(s) that the landowner or tenant made to Trans Mountain, including any investigations, reports or surveys conducted in relation to the complaint.</p>	X							
103	<p>Utility crossings</p> <p>Trans Mountain must file with the Board, at least 30 days prior to commencing construction, a list of all underground utilities to be crossed by the Project. The list must include the location and owners of the utilities to be crossed, as well as confirmation that all the agreements or crossing permits for those utilities to be crossed have been acquired or will be acquired prior to construction.</p>	X			X				
No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
104	<p>Updated engineering alignment sheets and drawings</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing pipe installation, updated engineering alignment sheets and drawings and, as they become available and prior to their implementation, any modifications to those sheets and drawings.</p>	X							
105	<p>Quality assurance verification</p> <p>Trans Mountain must file monthly summary reports, from commencing construction until after commencing operations, outlining non-conformances with its design, materials, and construction specifications and the disposition of these non-conformances.</p>	X				X	X	X	
106	<p>Construction progress reports</p> <p>Trans Mountain must file with the NEB monthly construction progress reports from commencing construction until after commencing operations. The reports must include information on the progress of activities carried out during the reporting period, including:</p> <ul style="list-style-type: none"> a) safety, environmental and security issues or non-compliances that occurred during the reporting period; b) measures undertaken to resolve safety and environmental issues or non-compliances identified in a); c) confirmation that security issues identified in a) have been addressed; d) a description and the location of any change made to geohazard mitigation measures pursuant to Condition 51; and e) the location of any pressure tests carried out during the reporting period and a description of any unsuccessful pressure tests, including the reasons for the lack of success of each. 	X	X	X	X	X	X	X	X
107	<p>Indigenous, local, and regional employment and business opportunity monitoring reports</p> <ul style="list-style-type: none"> a) Trans Mountain must file with the NEB, within 3 months after commencing construction, and every 6 months thereafter until after commencing operations, monitoring reports for Indigenous, local, and regional employment and business opportunities for the Project. The reports must include: <ul style="list-style-type: none"> i) a summary of the elements or indicators monitored; ii) a summary and analysis of Indigenous, local, and regional employment and business opportunities during the reporting period; and iii) a summary of Trans Mountain's consultation, undertaken during the reporting period, with 	X							

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>relevant Indigenous groups and local, regional, community and industry groups or representatives, regarding employment and business opportunities. This summary must include any issues or concerns raised regarding employment and business opportunities and how Trans Mountain has addressed or responded to them.</p> <p>b) Trans Mountain must file with the NEB, within 6 months after commencing operations, a final report on employment during the construction phase.</p>								
108	<p>Contingency watercourse crossings</p> <p>a) For any watercourse crossing where Trans Mountain will employ a contingency crossing method instead of its proposed primary method, and where any of Fisheries and Oceans Canada's applicable "Measures to Avoid Causing Harm to Fish and Fish Habitat" cannot be implemented, Trans Mountain must file with the NEB at least 30 days prior to commencing construction of the contingency watercourse crossing:</p> <ol style="list-style-type: none"> i) confirmation of the contingency watercourse crossing method that will be employed, the rationale for employing that method, and a summary of the differences between the primary and contingency watercourse crossing methods; and ii) the following site-specific information: <ol style="list-style-type: none"> 1) detailed crossing-specific design drawings; 2) photographs up-stream, down-stream, and at the crossing location; 3) a description of the fish species and habitat that is present at the crossing location, and if fish spawning is likely to occur within the immediate area; 4) a description of the composition of the riparian habitat at the crossing location and an indication if the riparian habitat has a limiting effect on the productive capacity of the watercourse, and if its removal or disturbance represents a potential influence on fish communities; 5) the site-specific mitigation and habitat enhancement measures to be used to minimize impacts; 6) any potential residual effects; 7) proposed reclamation measures; and 8) a discussion of the potential impacts to local fisheries resources within the immediate area as a result of the crossing's construction; and <p>b) For all other instances where a contingency crossing method will be employed and all of Fisheries and Oceans Canada's applicable "Measures to Avoid Causing Harm to Fish and Fish Habitat" will be implemented, Trans Mountain must file with the NEB a notification, at least 15 days prior to commencing the contingency crossing, that the contingency method will be employed. With this notification, Trans Mountain must explain why the contingency method is being employed and provide a summary of the differences between the primary and contingency watercourse crossing methods.</p> <p>c) Trans Mountain must confirm, within 30 days after commencing operations, that any contingency watercourse crossing(s) identified to the NEB pursuant to a) and b) were the only contingency watercourse crossing(s) implemented for the construction of the pipeline.</p>	X							
109	<p>Authorization(s) under paragraph 35(2) (b) of the Fisheries Act – Westridge Marine Terminal</p> <p>a) In the event that Fisheries and Oceans Canada determines that the Westridge Marine Terminal expansion requires Authorization(s) under paragraph 35(2)(b) of the <i>Fisheries Act</i>, Trans Mountain must file with the NEB, at least 10 days prior to commencing works specified in the respective Authorization(s), a copy of the Authorization(s); and</p> <p>b) Trans Mountain must confirm, within 30 days after commencing operations, that any <i>Fisheries Act</i> Authorization(s) required for the Westridge Marine Terminal expansion were obtained from Fisheries and Oceans Canada and filed with the NEB pursuant to a), or notify the Board if no Authorization(s) was required.</p>	X							
110	<p>Authorization(s) under paragraph 35(2)(b) of the Fisheries Act and Species at Risk permit(s) – pipeline</p> <p>For instream activities, except for those related to the Westridge Marine Terminal:</p> <p>a) for any instream activities that will require Authorization(s) under paragraph 35(2)(b) of the <i>Fisheries Act</i>, Trans Mountain must file with the NEB, at least 10 days prior to commencing the respective instream activities, a copy of the Authorization under paragraph 35(2)(b) of the <i>Fisheries Act</i>.</p> <p>b) for any instream activities that will require a permit(s) under the <i>Species at Risk Act</i>, Trans Mountain must file with the NEB, at least 10 days prior to commencing the respective instream</p>	X	X						

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>activities, a copy of the permit(s) issued under the <i>Species at Risk Act</i>.</p> <p>c) Trans Mountain must confirm, within 30 days after commencing operations, that:</p> <p>i) any required <i>Fisheries Act</i> Authorization(s) were obtained from Fisheries and Oceans Canada and filed with the NEB pursuant to a), or notify the Board if no Authorization(s) were required; and</p> <p>ii) any required <i>Species at Risk Act</i> permit(s) were obtained from the competent minister under the <i>Species at Risk Act</i> and filed with the NEB pursuant to b), or notify the Board if no permit(s) were required.</p>								
111	<p>Joining Programs</p> <p>Trans Mountain must develop Joining Programs and file them with the NEB at least 45 days prior to commencing welding of, respectively:</p> <p>a) field circumferential production, tie-in, and repair pipeline welds, including the tie-in welds between existing segments and Line 1 or Line 2; and</p> <p>b) terminals and pump stations.</p> <p>The Joining Programs must include:</p> <p>i) welder qualification requirements;</p> <p>ii) requirements for welding inspector qualifications and duties;</p> <p>iii) welding procedure specifications;</p> <p>iv) non-destructive examination (NDE) specifications;</p> <p>v) procedure qualification records for welding procedure specifications and NDE specifications;</p> <p>vi) a quality assurance program for field welds and welding procedures; and</p> <p>vii) any additional information that supports the Joining Program.</p>	X	X			X	X	X	
112	<p>Pressure testing</p> <p>a) Trans Mountain must pressure test the new and reactivated pipeline segments, terminals, and pump stations with a liquid medium.</p> <p>b) Trans Mountain must file with the NEB, at least 3 months prior to commencing pressure testing, a Pressure Testing Program that demonstrates compliance with applicable codes, standards, and regulatory requirements.</p>	X	X			X	X	X	
113	<p>Hydrostatic Testing Plan</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing pressure testing of any Project component, a Hydrostatic Testing Plan for the Project that includes:</p> <p>a) the locations of all water withdrawal and discharge sites;</p> <p>b) a discussion of any clearing activities or any other associated works, if required, that will allow for the transportation of the hydrostatic test water;</p> <p>c) water withdrawal rates;</p> <p>d) water withdrawal volumes;</p> <p>e) the flow rate/volume of water at the withdrawal sites; and</p> <p>f) site-specific mitigation measures to be implemented at the water withdrawal and discharge sites or at any other locations required to allow for the transportation of hydrostatic test water, including a description of the water quality monitoring methods to be used on hydrostatic testing water prior to discharge; and</p> <p>g) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information.</p>	X	X			X	X	X	
114	<p>NDE of final tie-in welds</p> <p>Trans Mountain must delay NDE of final tie-in welds (i.e.: welds which will not be subjected to hydrostatic testing) and any repairs to them for at least 48 hours following weld completion. Trans Mountain must include this requirement in the NDE specification of its Joining Program required by Condition 111.</p>	X	X			X	X	X	

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
115	<p>SCADA and leak detection system design</p> <p>Trans Mountain must file with the NEB, reports describing the final design of the expanded Trans Mountain Pipeline System's SCADA and leak detection systems. These reports must include:</p> <p>a) for the commercially available external leak detection systems resulting from Trans Mountain's participation in joint industry projects, at least 45 days prior to commencing backfilling on Line 2 and the new delivery pipelines, a status update, including a timeline for implementation; and</p> <p>b) at least 3 months prior applying for leave to open the Project:</p> <p>i) a status update for the following complementary leak detection technologies that Trans Mountain is considering, including a timeline for implementation:</p> <ol style="list-style-type: none"> 1) a secondary Computational Pipeline Monitoring (CPM) system operating in parallel with the Project's proposed CPM; and 2) aerial surveillance systems resulting from Trans Mountain's participation in joint industry projects; <p>ii) an explanation of how Trans Mountain's complementary leak detection system(s) supports the leak detection capabilities of the primary CPM system(s);</p> <p>iii) for all leak detection systems applicable to the Project, performance targets for:</p> <ol style="list-style-type: none"> 1) sensitivity; 2) accuracy; 3) reliability; and 4) robustness; <p>iv) a validation plan for the performance targets in iii), including alarm testing, to be implemented within the first year of Project operation;</p> <p>v) rationale for the selected time windows(s) (i.e., averaging periods) for the CPM system(s);</p> <p>vi) a copy of Trans Mountain's public awareness program on recognizing and reporting leaks;</p> <p>vii) a description of how the leak detection system and its relevant procedures comply with CSA Z662 Annex E;</p> <p>viii) a list of other best practices such as API (American Petroleum Institute) recommended practices related to leak detection and control centre management;</p> <p>ix) a description of how Trans Mountain's revised procedures have introduced a rule directing the Control Centre Operator to perform a controlled shut down of the pipeline when a leak cannot be ruled out in a given time period; and</p> <p>x) a plan, including a timeline for implementation, for upgrading the existing measurement and data acquisition instrumentation to improve the leak detection performance of Line 1.</p>	X	X						
116	<p>Control system, SCADA, instruments, and communication</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to completing dry commissioning activities, the block diagrams of the control system for its proposed pipeline that include the interconnection between various devices and components such as:</p> <ol style="list-style-type: none"> a) programmable logic controllers; b) flow meters, and pressure and temperature measuring devices; c) critical protective elements; d) emergency shut-down systems; e) variable frequency drives; f) control valves; g) block valves; and h) local human machine interface. <p>The block diagrams must demonstrate the primary and backup communication systems, supervisory and control layers of software, firewalls, and how all elements are integrated with the SCADA system.</p>	X							
117	<p>Reporting on improvements to Trans Mountain's Emergency Management Program</p> <p>Trans Mountain must file with the NEB, at least 2 years and 1 year prior to commencing operations, detailed updates for the company's review of its Emergency Management Program (toward meeting the requirements of Condition 124). This filing must include:</p> <ol style="list-style-type: none"> a) a summary of work undertaken to-date; b) the approximate timing for completing remaining work; and c) a summary of parties that were consulted (Condition 90) and how their comments and feedback were considered in improving the program. 	X					X	X	
118	<p>Firefighting capacity at terminals</p>	X						X	

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>Trans Mountain must file with the NEB, at least 1 year prior to commencing operations at the terminals:</p> <ul style="list-style-type: none"> a) the following information regarding developing appropriate firefighting capacity for a safe, timely, and effective response to a credible worst-case fire at the Westridge Marine Terminal and at the Edmonton, Sumas, and Burnaby Terminals: <ul style="list-style-type: none"> i) an assessment of necessary resources and equipment, including an explanation of how the assessment was informed by Trans Mountain's terminal risk assessments; ii) a summary of Trans Mountain's consultation with appropriate municipal authorities and first responders, that includes any issues or concerns raised regarding each municipality's respective firefighting capacity and how Trans Mountain has addressed or responded to them; iii) a Firefighting Capacity Framework, informed by the assessment in i) and consultation in ii), and that includes a list of and timeline for completing key activities and milestones leading to the establishment of appropriate firefighting capacity; and b) a plan for responding to a fire exceeding a credible worst-case scenario. 								
119	<p>Emergency Preparedness and Response Exercise and Training Program</p> <p>Trans Mountain must file with the NEB, at least 1 year prior to commencing operations, an Emergency Preparedness and Response Exercise and Training Program for the pipeline; the Edmonton, Sumas, and Burnaby Terminals; and the Westridge Marine Terminal. The program's objective is to demonstrate the continual improvement of responder competencies (including control centre personnel) at all levels of the company to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type, including tank fires and earthquakes. The program must include the following:</p> <ul style="list-style-type: none"> a) a defined scope, other objectives in addition to those noted above, and program targets that address responder turn-over and ensure responders' ongoing training and practice; b) a list of mandatory courses for responders; c) a discussion of how Trans Mountain will train its personnel to respond to all hydrocarbon spill scenarios in various seasons, including releases of hydrocarbons in mountain regions during winter conditions, into ice covered watercourses, into watercourses under varying flow conditions and into waterbodies (aquifers or streams) that are used as municipal water supply sources; d) a description of, and schedule for, all emergency response exercises (full-scale, tabletop, drills, functional) that Trans Mountain will conduct prior to operations to test a variety of scenarios; e) a plan, including rationales, for determining the schedule and frequency of all emergency response exercises (full-scale, tabletop, drills, functional) to test a variety of scenarios during the Project's operational life; f) a discussion of how emergency response exercises will meet the objectives of testing Trans Mountain's: <ul style="list-style-type: none"> i) emergency response procedures; ii) company personnel training; iii) communications systems; iv) response equipment; v) safety procedures; and vi) the effectiveness of its liaison and continuing education programs; g) a learnings implementation plan for exercises that considers how Trans Mountain will update and amend its Emergency Response Plans and related documents following exercises. The learnings implementation plan must consider three main purposes: <ul style="list-style-type: none"> i) to validate plans; ii) to develop Trans Mountain responder competencies (including control centre personnel) and provide them with the opportunity to carry out and understand their roles in emergency response; and iii) to test Project-specific emergency response procedures; h) a plan for addressing the training requirements contained within the <i>National Energy Board Onshore Pipeline Regulations</i>; and i) confirmation that an independent third party has reviewed and assessed the Emergency Preparedness and Response Exercise and Training Program and that Trans Mountain has considered and incorporated the comments generated by that review and assessment into the program. 	X					X	X	

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
120	<p>Notification and reporting on emergency response exercises</p> <p>For any tabletop, functional, and full-scale emergency response exercises undertaken as part of its Emergency Preparedness and Response Exercise and Training Program required by Condition 119:</p> <p>a) Trans Mountain must notify the NEB and all potential exercise participants and observers, including Appropriate Government Authorities, first responders and potentially affected Indigenous groups, at least 45 days prior to the date of each exercise, of:</p> <ol style="list-style-type: none"> the exercise's date and location(s); the exercise's objectives; the participants in the exercise; and the scenario for the exercise. <p>b) Trans Mountain must file with the NEB, and provide to Appropriate Government Authorities, first responders and potentially affected Indigenous groups, within 3 months after completing each full-scale exercise, a report on the exercise that includes:</p> <ol style="list-style-type: none"> the results of the completed exercise; areas for improvement; and steps to be taken to correct deficiencies. 	X					X	X	
121	<p>Financial Assurances Plan – operations phase</p> <p>a) Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to applying for leave to open Line 2, a Financial Assurances Plan that includes details of the financial resources and secured sources of funds that will be necessary to pay, without limitation, all actual loss or damage, costs and expenses, including cleanup and remediation, and loss of non-use value relating to non-use of a public resource associated with an unintended or uncontrolled release from the Project during the operations phase.¹⁴² These costs may arise from, among other things, potential accidents, malfunctions, and failures during the Project operations phase, including all spills originating from the pipeline and the terminals.</p> <p>The Financial Assurances Plan must be signed by an officer of the company, verifying that it is accurate, complete, and, at a minimum, meets the criteria and coverage levels described below:</p> <p>i) Criteria for financial assurance instruments and plan:</p> <ol style="list-style-type: none"> Any letter of credit that forms part of the Financial Assurances Plan must be unconditional and irrevocable, segregated from Trans Mountain's day-to-day business activities, and be dedicated to providing funds to cover the costs described in sub a) above, without limitation. Third party liability insurance must be current, and broad, respecting the scope of environmental damages covered by the policy; <u>the policy will be consistent with provisions available in the insurance market</u> (i.e., only exceptional/non-standard perils, taking into account the Project's nature and scope, would be excluded from coverage). Such insurance must be structured on a multi-year basis, recognizing potential loss of income by persons sustaining damage caused by Trans Mountain, over a reasonable number of years after the event. A portion of cash reserves or a portion of future cash flows of the Project may be included as instruments in the Financial Assurances Plan, provided they are secured by a commitment letter from an officer of the company confirming that the funds will be dedicated to the Financial Assurances Plan without restrictions for the period specified by the officer. Parental and other third party guarantors must be registered within a Canadian jurisdiction and must have financial strength that is demonstrated in balance sheet values and ratios and credit ratings. For example, total assets less total liabilities of the guarantor should be several multiples of the liability assumed in the Trans Mountain guarantee. <p>ii) Financial assurance components and coverage levels:</p> <p>Trans Mountain's Financial Assurances Plan must provide a total coverage, for the Project as a whole, of \$1.1 billion¹⁴³ for the costs described in sub a) above, without limitation. The plan should include the following components and minimum coverage levels:</p>	X	X			X	X	X	

¹⁴² In the context of this condition, "operations phase" refers to the period after the Project receives leave to open approval and prior to it being fully abandoned.

¹⁴³ The NEB's basis for any final coverage level is described in its report to Governor in Council.

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>1) Ready cash: Trans Mountain must have unfettered access to at least \$100 million to cover costs, including compensation to third parties for losses and damages in the near term, while insurance claims are being processed. Once used, this source of cash must be replenished immediately to cover the costs of a potential future spill. This can be in the form of a letter of credit, surety bond or other form acceptable to the NEB.</p> <p>2) Core coverage: Trans Mountain must put in effect and maintain current at all times a core financial coverage of at least \$1 billion that includes third party liability insurance and other financial assurance instruments that comply with the criteria. Core coverage must be a portfolio approach with multiple financial instruments used and may not be composed of a single financial instrument (e.g., only third party liability insurance). At least one component of core coverage must be funds that are readily accessible to Trans Mountain (e.g., cash reserves held by the general partner and not distributed to the limited partners).</p> <p>Trans Mountain may use a number of financial and insurance instruments in its Financial Assurances Plan. However, sales of Project assets used for transporting hydrocarbon commodities will not be eligible candidates. Below are some illustrative financial and insurance instruments that could be potential candidates for the Financial Assurances Plan:</p> <ul style="list-style-type: none"> · Irrevocable, unfettered letter of credit. · Secured line of credit. · Cash reserves held by the general partner and not distributed to the limited partners (and verifiable on Trans Mountain Pipelines Limited Partnership's balance sheet). · Internal cash flow, committed by Trans Mountain to financial assurances. · Industry pooled fund. · Third party liability insurance with exclusions for only exceptional/non-standard perils. · No fault third party liability insurance. · Parental and other third party guarantees provided by parties demonstrating financial strength through balance sheets and credit ratings. · Other instruments developed by Trans Mountain and the insurance and financial markets. <p>b) Trans Mountain must file the following with the NEB:</p> <p>i) At least 6 months prior to applying for leave to open Line 2, a report from an independent third party that has assessed the Financial Assurances Plan and its key components against the criteria and actual experiences of industry damage claims. The report must summarize the key features of each financial and insurance instrument proposed for inclusion in the Financial Assurances Plan.</p> <p>ii) At least 3 months prior to applying for leave to open Line 2, a supplement to the report described in b)i) that provides verification of any third party liability insurance coverage, a copy of the insurance certificate, and a summary of the insurance policy's key features. This summary must include: limits on insurance coverage, deductible amounts, the risks and perils and properties covered by the insurance policy, the exclusions from coverage, Trans Mountain's obligations, effective dates, and names of insurers and reinsurers.</p> <p>iii) With its first leave to open application for Line 2, a report describing the steps it took to eliminate any deficiencies in its Financial Assurances Plan that were identified in the independent third party report referenced in b)i) and the NEB's subsequent review.</p> <p>iv) On or before 31 January of each year after commencing operations, a letter signed by an officer of the company verifying that all components of the Financial Assurances Plan remain as the NEB approved and sufficient to meet the financial assurance coverage levels described in ii).</p> <p>v) At least 2 months prior to any intended change(s) to the Financial Assurances Plan during the Projects operations phase, a letter, <u>for approval</u>, detailing the intended change(s) and how the change(s) provides the same or greater level of protection.</p> <p>vi) Within 30 days after accessing any component of the Financial Assurances Plan, a report detailing the component accessed, the reason for accessing it, and Trans Mountain's plan to ensure that it continues to meet the requirements of its NEB-approved Financial Assurances Plan.</p>								

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
122	<p>Changing pipeline segment operating conditions (Hinton to Hargreaves; Darfield to Black Pines) Trans Mountain must file with the NEB <u>for approval</u>, at least 6 months prior to applying for leave to open Line 2, the following:</p> <p>a) An engineering assessment in accordance with CSA Z662 for the above two pipeline segments which Trans Mountain proposes to change from operating on the existing TMPL to the proposed Line 2. The engineering assessment must demonstrate that the two pipeline segments are fit for their intended service under the operating conditions of Line 2, and that they meet all relevant requirements of CSA Z662. The engineering assessment must include a schedule of planned integrity monitoring activities.</p> <p>b) A certificate with a supporting report issued by an independent certification body¹⁴⁴, stating unconditionally that the 43-kilometre-long, 762 millimetre outside diameter (NPS 30) pipeline segment from Darfield to Black Pines, B.C. is fit for its intended service under the operating conditions¹⁴⁵ of Line 2. The supporting report must include the qualifications of the independent certification body and the justification used to grant the certificate.</p>	X							
123	<p>Evacuation Plans</p> <p>a) Trans Mountain must file with the NEB, at least 6 months prior to commencing operations at the terminals, an Evacuation Plan for people present in areas potentially affected by an incident at each of Trans Mountain's Edmonton, Sumas, and Burnaby Terminals as well as at the Westridge Marine Terminal. Each Evacuation Plan must, at a minimum:</p> <ol style="list-style-type: none"> i) describe how areas for evacuation were determined; ii) describe the circumstances under which evacuation may be required, as well as the respective methods and procedures for public notification; iii) describe specific evacuation routes, methods, and destinations; iv) be prepared in consultation with Appropriate Government Authorities, first responders and potentially affected Indigenous groups with the authority to issue evacuation or shelter in place orders during an emergency; v) state how input from Appropriate Government Authorities, first responders and potentially affected Indigenous groups, with the authority to issue evacuation or shelter in place orders during an emergency, was considered in preparing the plan; vi) define the roles, responsibilities, and jurisdictional authority of all parties involved in implementing an evacuation; and vii) confirm that an independent third party has reviewed and assessed the plan and that Trans Mountain has considered and incorporated comments generated by the review and assessment into the plan. <p>b) Trans Mountain must include with its Evacuation Plan for the Burnaby Terminal, a plan specific to Simon Fraser University that includes the requirements in a) i) to vii), above.</p>	X						X	

¹⁴⁴ For Conditions 19, 122 and 152, an "independent certification body" is an internationally recognized company or organization, such as Lloyd's Register or Det Norske Veritas, which is able to certify compliance to statutory requirements. The independent certification body must have expertise in pipeline integrity. The NEB reserves the right to accept or reject the certificate. In addition, the NEB's decision is not contingent on the results of the certificate.

¹⁴⁵ For Conditions 19, 122 and 152, "operating conditions" must include the Project-specific operating conditions, possible transient flow conditions, slack flow conditions, and effects on operating pressure due to temperature changes.

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
124	<p>Implementing improvements to Trans Mountain's Emergency Management Program</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing operations, a detailed summary of its review of its Emergency Response Plans (as noted in Conditions 125 and 126) and equipment (including its availability), as referenced in Volume 7, Section 4.8.2 of its Project application (Filing A3S4V5). This filing must include a description of changes made to Trans Mountain's Emergency Management Program, as required under the <i>National Energy Board Onshore Pipeline Regulations</i>, including changes to:</p> <ol style="list-style-type: none"> a) the Pipeline Emergency Response Plan; b) Emergency Response Plans for the Edmonton, Sumas, and Burnaby Terminals, as well as the Westridge Marine Terminal; and c) site-specific plans and documents related to a) and b), such as Geographic Response Plans, Geographical Response Strategies, control point mapping, tactical plans for submerged and sunken oil and tactical plans for high consequence areas. <p>The summary must demonstrate Trans Mountain's ability to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type and in any geographic region or season and must include the following:</p> <ol style="list-style-type: none"> i) a discussion of how the updated plans conform to the requirements contained within the <i>National Energy Board Onshore Pipeline Regulations</i>; ii) a discussion of how the plans consider, and would allow coordination with relevant federal, provincial, municipal and Indigenous community emergency response plans; iii) a discussion of how the results of research initiatives, such as the Scientific Advisory Committee work noted in Trans Mountain's response to NEB Information Request No. 1.63 (Filing A3W9H8) and other research noted during the OH-001-2014 proceeding, have been considered and incorporated into Trans Mountain's emergency response planning; iv) a description of the models used in response planning, including oil trajectory, fate and behavior, and air dispersion models; and v) confirmation that an independent third party has reviewed and assessed the Emergency Response Plans and that Trans Mountain has considered and incorporated the comments generated by the review and assessment into the plans. 	X					X	X	
125	<p>Emergency Response Plans for the Pipeline and for the Edmonton, Sumas and Burnaby Terminals</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing operations, updated Emergency Response Plans which must include:</p> <ol style="list-style-type: none"> a) the following relevant emergency preparedness and response documents: <ol style="list-style-type: none"> i) an Emergency Response Plan to include the pipeline expansion; ii) updated Emergency Response Plans for the Edmonton, Sumas, and Burnaby Terminals; and iii) all related and accompanying site-specific plans and documents, such as control point mapping, Geographic Response Plans, tactical response plans, volunteer management plans, and fire safety plans; b) an emergency response and preparedness table for the pipeline (including facilities) indicating which plans and documents referenced in a) will be referred to in an emergency response for each 10-kilometre-long pipeline segment. For each pipeline segment, the table must also identify, at a minimum: <ol style="list-style-type: none"> i) high consequence areas, including environmentally sensitive areas (e.g., wetlands), heritage sites and water supply wells (Condition 93); ii) potentially affected persons or groups; iii) available access to the right-of-way and high consequence areas; iv) nearest control point(s); v) nearest available equipment cache(s); vi) response times for deployment of equipment and Trans Mountain personnel, mutual aid personnel, and third party contractors; vii) the available equipment and trained personnel, whether employed by Trans Mountain, contracted, or available through mutual aid (including contact information); and viii) geological, meteorological, and geographical hazards (e.g., snow avalanche, mud slides, rock slides, and steep slopes); and c) maps depicting the information identified in b). 	X				X	X	X	

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
126	<p>Emergency Response Plan for the Westridge Marine Terminal</p> <p>Trans Mountain must file with the NEB, at least 6 months prior to commencing operations at Westridge Marine Terminal, an updated Emergency Response Plan for the Westridge Marine Terminal which must include:</p> <ul style="list-style-type: none"> a) all related and accompanying site-specific plans and documents, such as Geographic Response Plans, Geographic Response Strategies, tactical response plans, volunteer management plans, and fire safety plans; b) a list of high consequence areas, including environmentally sensitive areas; c) a list of potentially affected persons or groups; d) nearest available equipment cache(s); e) response times for deployment of equipment and personnel to the incident location and high consequence areas; and f) maps depicting the information identified in a) to e). 	X							
127	<p>Terminal fire protection and firefighting systems</p> <ul style="list-style-type: none"> a) Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to applying for leave to open of any Project component at each respective terminal, an independent third party report confirming the adequacy of the proposed fire protection and firefighting systems implemented or planned to be implemented at the Edmonton Terminal West Tank Area, the Burnaby Terminal, the Sumas Terminal, and the Westridge Marine Terminal. The report must demonstrate that the resources and firefighting systems are capable of suppressing fires associated with all scenarios identified in the above-mentioned terminals' final risk assessments (required by Condition 129). b) Trans Mountain must file with the NEB <u>for approval</u>, at least 2 months prior to beginning the assessment leading to the report in a), the name and qualifications of the proposed independent third party that will prepare the report in a). 	X						X	

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
128	<p>Offset Measures Plan for residual effects on caribou habitat</p> <p>Trans Mountain must file with the NEB for approval, in accordance with the timelines below, an Offset Measures Plan for each affected caribou range, the goal of which is to offset all unavoidable and residual direct and indirect Project-related effects on caribou habitat, after taking into account the implementation of the measures identified in the relevant Environmental Protection Plan(s) for the Project and the Caribou Habitat Restoration Plan (see Condition 37) measures. The Offset Measures Plan must include:</p> <p>a) A preliminary version, to be filed at least 3 months prior to applying for leave to open, with the plan's criteria and measurable goals and that includes:</p> <ul style="list-style-type: none"> i) an initial quantification of the area of caribou habitat directly and indirectly disturbed by the Project; ii) a list of the potential on-the-ground offset measures available; iii) each potential offset measure's appropriate offset ratio, based on consultation with expert federal and provincial authorities and on a review of the scientific literature on conservation offsets; iv) each potential offset measure's expected effectiveness including a discussion of uncertainty and how measures align with criteria specified in the scientific literature specific to conservation offsets; v) each potential offset measure's relative qualitative and quantitative value toward achieving the offset; and vi) a conceptual decision-making tree(s) or decision framework(s) that will be used to select which specific potential offset measures and accompanying offset ratios will be used under what circumstances. <p>b) A final version, to be filed on or before 31 January after the second complete growing season after completing final clean-up, including:</p> <ul style="list-style-type: none"> i) the contents of the preliminary Offset Measures Plan, with any updates identified in a revision log that includes the rationale for any changes; ii) a tabular list of the potential offset measures and appropriate offset ratios to be implemented or already underway, including site-specific details and maps showing the locations, and an explanation of how they meet criteria in the scientific literature for offsets; iii) a description of factors considered when determining the location of offset measures, including consideration of how the measures could maximize benefits to landscape variables; iv) a schedule indicating when potential offset measures will be initiated and their estimated completion dates; v) either an assessment of the predicted offset measures' effectiveness including a discussion of uncertainty and a quantitative compilation showing how the measures would offset the previously determined residual effects, or a plan for completing an assessment of the potential offset measures' effectiveness and value; and vi) an update on the restoration success to support offset measure decisions. <p>Both the preliminary and final versions of the plan must also include the following:</p> <ul style="list-style-type: none"> 1) a summary of its consultations with Appropriate Government Authorities and potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the Offset Measures Plan; 2) a description of how Trans Mountain has taken any available and applicable Indigenous traditional land use and traditional ecological knowledge studies into consideration in developing the plan including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and 3) evidence of Trans Mountain's consideration of any updates to the applicable Recovery Strategy, as well as to range boundaries and identified critical habitat made prior and up to the date on which leave to open is granted. 	X	X		X	X	X		

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
129	<p>Final terminal risk assessments</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to applying for leave to open for each terminal, final risk assessments for the Edmonton Terminal West Tank Area, the Sumas Terminal, the Burnaby Terminal, and the Westridge Marine Terminal, respectively, including all implemented mitigation measures. Trans Mountain must demonstrate in each risk assessment that mitigation measures will reduce the risks to levels that are ALARP while complying with the MIACC criteria for risk acceptability. The Edmonton Terminal West Tank Area, Sumas Terminal, and Burnaby Terminal must include the elements listed in Condition 22.</p>	X						X	
130	<p>Groundwater Monitoring Program</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, at least 3 months prior to commencing operations, a Groundwater Monitoring Program that pertains to all terminals and pump stations, and for any vulnerable aquifers along the pipeline route. The program must include, at a minimum:</p> <ol style="list-style-type: none"> locations of groundwater monitoring wells, their depths, the rationales for well locations (including how groundwater flow direction was considered), groundwater flow velocity, parameters to be monitored and frequency of monitoring; a description of any program changes required to meet this condition for facilities with an existing Groundwater Monitoring Program; methods, criteria and rationale for identifying vulnerable aquifers along the pipeline route; applicable regulatory criteria for comparing monitoring results, and a process outlining what steps will be followed should monitoring results indicate a negative change in groundwater quality; and a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the program. 	X	X			X	X	X	
131	<p>Marine Public Outreach Program</p> <p>As an outcome of the Board's Reconsideration hearing (MH-052-2018), this condition was removed from the list of conditions.</p>								
132	<p>Marine Mammal Protection Program</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing operations, a Marine Mammal Protection Program that focuses on mitigating effects from the Project and associated cumulative effects, and on fulfilling Trans Mountain's commitments as a terminal operator with regard to Project-related marine shipping. The program must include:</p> <ol style="list-style-type: none"> the goals and objectives of the program, including a discussion on how they align with the objectives of applicable Fisheries and Oceans marine mammal Recovery Strategies and Action Plans; a summary of the issues related to marine mammals from the Project and from Project-related marine vessels; a summary of the initiatives that Trans Mountain has supported or undertaken to-date, including the goals of each initiative and how they relate to the goals and objectives of the program; a discussion of the outcomes or progress updates of the initiatives identified in c), and how these outcomes have met or are contributing to the objectives of the program; any other initiatives that Trans Mountain intends to undertake or support in the future that are relevant to the program; and a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the program, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding, MH-05-2018 Reconsideration proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information. 	X							
133	<p>Confirmation of marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, confirmation, signed by an officer of the company, that:</p> <ol style="list-style-type: none"> Trans Mountain has included in its Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide a requirement for tankers nominated to load at the Westridge Marine Terminal to have a suitable arrangement for the proposed enhanced tug escort between the Westridge Marine Terminal and Buoy J prior to departure. The tug escort should be suitable for foreseeable meteorological and ocean conditions and be based on tanker 	X							

No.	Conditions with initial filings due during construction / prior to commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>and cargo size; and</p> <p>b) an enhanced marine oil spill response regime is in place that is capable of:</p> <p>i) delivering 20,000 tonnes of capacity within 36 hours of notification, with dedicated resources staged within the study area; and</p> <p>ii) initiating a response within 2 hours for spills in Vancouver Harbour, and within 6 hours for the remainder of the Salish Sea shipping route to the 12-nautical-mile territorial sea limit.</p>								
134	<p>Updated Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and thereafter on or before 31 January of each of the first five years after commencing operations, an updated Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide, and a summary of any revisions made to each.</p>	X							
135	<p>Slack line flow conditions</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing operation of Line 1, and at least 2 months prior to applying for leave to open Line 2, respectively, the following:</p> <p>a) a list of locations having potential for slack line flow when each of the pipelines is operated at 100 per cent of its maximum operating pressure (MOP), 80 per cent of its MOP, and 50 per cent of its MOP; and</p> <p>b) a description of the following regarding detecting and preventing slack line flow conditions:</p> <p>i) operational measures on Line 1 and Line 2; and</p> <p>ii) design measures on Line 2.</p>	X	X						
136	<p>Pre-operations full-scale emergency response exercises</p> <p>a) Prior to commencing operations, Trans Mountain must complete a full-scale exercise for each of the following scenarios:</p> <p>i) a 160-cubic-metre diluted bitumen release into Burrard Inlet as a result of a release from the Westridge Marine Terminal. The exercise must also consider emergency preparedness and response planning for a release that exceeds a credible worst-case scenario spill event; and</p> <p>ii) a credible worst-case release volume at the Burnaby Terminal.</p> <p>b) Trans Mountain must notify the NEB and all potential exercise participants and observers, including Appropriate Government Authorities, first responders, and potentially affected Indigenous groups, at least 45 days prior to the date of each exercise in a), of:</p> <p>i) the exercise's date(s) and location(s);</p> <p>ii) the exercise's objectives;</p> <p>iii) the participants in the exercise; and</p> <p>iv) the scenario for the exercise.</p> <p>c) Trans Mountain must file with the NEB and provide to Appropriate Government Authorities, first responders and potentially affected Indigenous groups, within 3 months after completing each exercise in a), a report on the exercise that includes:</p> <p>i) the results of the completed exercise;</p> <p>ii) areas for improvement;</p> <p>iii) steps to be taken to correct deficiencies; and</p> <p>iv) confirmation that an independent third party has evaluated and assessed the emergency response exercises and that Trans Mountain will consider the comments generated for future exercises.</p>	X						X	
137	<p>Tank roof design for tanks at the Edmonton Terminal</p> <p>Trans Mountain must install steel pontoon internal floating roofs and fixed roofs with odour control systems on all of its five proposed tanks at the Edmonton Terminal. Trans Mountain must file with the NEB, at least 30 days prior to applying for leave to open the five proposed tanks, a letter signed by an officer of the company that confirms that these roofs were installed.</p>							X	
138	<p>Confirmation of firefighting capacity at terminals</p> <p>Trans Mountain must file with the NEB, at least 30 days prior to commencing operations at the terminal, confirmation that appropriate firefighting capacity, in accordance with Condition 118, is in place.</p>	X						X	

No.	Conditions with initial filings due after commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
139	<p>Project completion</p> <p>Trans Mountain must file with the NEB, within 30 days after commencing operations, confirmation, signed by an officer of the company, that the Project was completed and constructed in compliance with all applicable [certificate/order] conditions. If compliance with any of the conditions cannot be confirmed, the officer of the company must include the reason(s) for this and the proposed course of action to achieve compliance.</p>	X	X	X	X	X	X	X	X
140	<p>Post-construction greenhouse gas (GHG) assessment report</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, within 2 months after commencing operations, an updated GHG assessment report specific to the Project. The report must include:</p> <p>a) the methodology used for the assessment, including the sources of GHG emissions, assumptions, and methods of estimation;</p> <p>b) the total direct GHG emissions generated from Project construction, including land-clearing;</p> <p>c) a breakdown of direct GHG emissions generated by the construction of individual Project components (pipeline, pump stations, tank terminals and Westridge Marine Terminal) and by land-clearing activities; and</p> <p>d) a comparison and discussion of the direct GHG emissions calculated in b) with the predicted emissions in Trans Mountain's application and subsequent submissions.</p>	X			X	X	X	X	
141	<p>Post-construction noise surveys</p> <p>Trans Mountain must file with the NEB, within 3 months after commencing operations, the results of post-construction noise surveys conducted at the Sumas and Burnaby Terminals and at the Westridge Marine Terminal, demonstrating compliance with the British Columbia Oil and Gas Commission's <i>British Columbia Noise Control Best Practices Guideline (2009)</i>, and any further mitigation that Trans Mountain will undertake to achieve compliance.</p>	X						X	
142	<p>GHG Emissions Offset Plan – Project construction</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, within 4 months after commencing operations, a plan for providing offsets for all direct GHG emissions generated from Project construction, as determined in Condition 140. The plan must include:</p> <p>a) a list and discussion of all possible offset options considered;</p> <p>b) the criteria against which each option was assessed for viability;</p> <p>c) a description of the offset option(s) selected for direct GHG emissions generated from Project construction, and the rationale for selecting the option(s);</p> <p>d) confirmation that the selected offset option is registered under the approved quantification protocols and has been verified by an accredited "verification body"¹⁴⁶;</p> <p>e) a schedule indicating when the selected offset options(s) will be initiated; and</p> <p>f) an accounting of offsets confirming no net GHG emissions from Project construction.</p>	X			X	X	X	X	
143	<p>Baseline inspections</p> <p>a) Trans Mountain must conduct the following pipeline inspections on Line 2 and the new delivery pipelines, at the times indicated:</p> <p>i) a high-resolution in-line caliper inspection (i.e., a GEOPIG™ inspection) within 6 months after commencing operations to establish accurate pipeline position and to detect pipe deformations;</p> <p>ii) an in-line ultrasonic crack detection inspection within 2 years after commencing operations;</p> <p>iii) an in-line corrosion magnetic flux leakage inspection in both the circumferential and longitudinal directions within 2 years after commencing operations;</p> <p>iv) an in-line ultrasonic wall measurement inspection within 2 years after commencing operations; and</p>	X							

¹⁴⁶ In these conditions, "verification body" means a competent and independent person, or persons, with responsibility for performing and reporting on the verification process (as defined by ISO 14064).

No.	Conditions with initial filings due after commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	v) a close interval survey within 2 years after commencing operations . b) Trans Mountain must file with the NEB, within 6 months after completing each inspection in a) , a report that includes a summary of the inspection results, the proposed re-inspection interval, and mitigation measures for the anomalies detected through any of the inspections, if required.								
144	Ongoing confirmation of marine spill prevention and response commitments Trans Mountain must file with the NEB, on or before 31 January of each year after commencing operations , confirmation, signed by an officer of the company, that it is continuing to meet the requirements of Condition 133 regarding Trans Mountain's marine spill prevention and response commitments. Trans Mountain must provide each filing to Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority, Vancouver Fraser Port Authority, British Columbia Coast Pilots, Western Canada Marine Response Corporation, Fisheries and Oceans Canada and the Province of British Columbia at the same time as it is filed with the NEB. If a particular party mentioned above requests that it not be provided the annual filing, Trans Mountain may cease providing it to that party.	X							
145	Community Benefits Program progress reports Trans Mountain must file with the NEB, on or before 31 January of each of the first 5 years after commencing operations , a progress report summarizing the initiatives and activities undertaken as benefits that are in addition to compensation for access and potential impacts to community lands, and/or that exceed regulatory requirements. The report must summarize initiatives supported, at a minimum, in the areas of community programs and infrastructure improvements, environmental stewardship, and education and training during the reporting period, including local emergency management enhancements, improvements to community parks, as well as support for events. The filing must contain a commitment from Trans Mountain, and a description of how Trans Mountain will make progress reports publicly available until the Project is abandoned or decommissioned pursuant to the NEB Act. The progress reports must include: <ol style="list-style-type: none"> a description of the initiatives undertaken or supported; a list of participants or beneficiaries, including Indigenous groups, local and regional communities, service providers, or others; an update on the timing, status, and outcomes of each initiative, including its estimated completion date, if applicable; and a summary of Trans Mountain's consultation activities regarding the Community Benefits Program initiatives. 	X							
146	Reports on engagement with Indigenous groups – operations Trans Mountain must file with the NEB, on or before 31 January of each of the first 5 years after commencing operations , a report on the engagement activities it has undertaken with Indigenous groups. Each report must include, at a minimum, for each Indigenous group engaged: <ol style="list-style-type: none"> the name of the group; the method(s), date(s), and location(s) of engagement activities; a summary of any issues or concerns raised; and the measures taken, or that will be taken, to address or respond to issues or concerns, or an explanation why no further action is required to address or respond to issues or concerns. Trans Mountain must provide a copy of each report to each group engaged (and identified in a) above) at the same time that it is filed with the NEB.	X	X		X	X	X	X	
147	Natural hazard assessment Trans Mountain must file with the NEB, within 1 year after commencing operations : <ol style="list-style-type: none"> the results of the baseline natural hazard assessment for the Project; and confirmation that the natural hazard assessment will be: <ol style="list-style-type: none"> updated at intervals not exceeding 5 years; and integrated into the existing Natural Hazard Management Program for the Trans Mountain Pipeline system. 	X				X	X	X	
148	Pipeline Geographic Information System (radio) data Trans Mountain must file with the NEB, within 1 year after commencing operations , Geographic Information System data in the form of an Esri® shape file that contains pipeline segment centre lines and right-of-way boundaries, where each pipeline segment has a unique outside diameter, wall thickness, MOP, external coating, field-applied girth weld coating, and pipe manufacturing specification. If the above values of the pipeline change at any point along the length of the Project, the pipeline(s) should be segmented at that point. Trans Mountain must also provide Geographic	X							

No.	Conditions with initial filings due after commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	Information System locations and names of all Project pump stations, terminals, custody transfer meters, tunnel entrances, pipeline bridges, check valves, and block valves, as applicable. The datum must be NAD83 and projection must be geographic (latitudes and longitudes).								
149	<p>Caribou Habitat Restoration and Offset Measures Monitoring Program</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, on or before 31 January after the first complete growing season after commencing operations, a program for monitoring and verifying the effectiveness of caribou habitat restoration and offset measures implemented as part of the final Caribou Habitat Restoration Plan (Condition 37) and the final Offset Measures Plan (Condition 128). This program must include:</p> <ol style="list-style-type: none"> the scientific methods or protocols for short- and long-term monitoring of the restoration and offset measures, and effectiveness of the measures; monitoring frequency, timing, and locations, and the rationale for each; protocols for how restoration and offset measures will be adapted, as required, based on the monitoring results from the program's implementation; a summary of Trans Mountain's consultation with Appropriate Government Authorities and any species experts on the design of the monitoring program; and a proposed schedule for filing reports on monitoring results and adaptive management measures to the NEB, Environment and Climate Change Canada, and appropriate provincial authorities to be contained in the Caribou Habitat Restoration and Offset Measures Monitoring Program as well as at the beginning of each report filed. 	X	X		X	X	X		
150	<p>Caribou habitat restoration and offset measures monitoring report(s)</p> <p>Trans Mountain must file with the NEB, based on the approved schedule for the Caribou Habitat Restoration and Offset Measures Monitoring Program (required by Condition 149), a report(s) outlining the monitoring program's results, including the observed effectiveness of habitat restoration and offset measures for each affected caribou range, and how those measures will be adapted, as required, based on monitoring results. Any proposed changes to the NEB-approved reporting schedule must be included within the relevant report prior to any reporting on a revised schedule.</p>	X	X		X	X	X		
151	<p>Post-construction environmental monitoring reports</p> <p>Trans Mountain must file with the NEB, on or before 31 January following the first, third, and fifth complete growing seasons after completing final clean-up, a post-construction environmental monitoring report for the Project that must include:</p> <ol style="list-style-type: none"> a description of the valued components or issues that were assessed or monitored; measurable goals for each valued component or issue; monitoring methods for each valued component or issue, results of the monitoring, and a comparison to the defined measurable goals; corrective actions taken, their observed success, and their current status; identification on a map or diagram of the locations where corrective actions were taken; any further corrective actions planned and a schedule for monitoring and reporting; and a summary of its consultations with appropriate government authorities and any potentially affected Indigenous groups and affected landowners/tenants. <p>In the post-construction environmental monitoring report filed after the fifth full growing season after completing clean-up, Trans Mountain must include:</p> <ol style="list-style-type: none"> an assessment of the effectiveness of mitigative and corrective actions and how learnings have been or will be applied to Trans Mountain's Environmental Protection Program; a detailed description of all valued components or issues for which the measurable goals have not been achieved during the duration of the post-construction monitoring program; and an evaluation of the need for any further corrective actions, measurable goals, assessments, or monitoring of valued components or issues, including a schedule for those. <p>All filed post-construction environmental monitoring reports must address issues related, but not limited, to: soils; weeds; watercourse crossings; riparian vegetation; wetlands; rare plants, lichens and ecological communities; municipal tree replacement; wildlife and wildlife habitat; fish and fish habitat; marine fish and fish habitat; marine mammals; marine birds; and species at risk.</p>	X	X	X	X	X	X	X	X

No.	Conditions with initial filings due after commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
152	<p>Pipeline segment reactivation (Hinton to Hargreaves; Darfield to Black Pines) – new certificate and certificate validation</p> <p>Trans Mountain must file with the NEB, before expiry of the previous certificate identified in Condition 19, a new certificate with a supporting report issued by an independent certification body¹⁴⁷ for the two pipeline segments identified in Condition 19. The certificate and report must demonstrate that the two pipeline segments:</p> <ol style="list-style-type: none"> are fit for service for the specified operating conditions;¹⁴⁸ meet all applicable requirements of CSA Z662; and will meet the hydrostatic test requirements outlined in CSA Z662, at any time during the certified period. <p>The certificate must be valid for at least 5 years and be validated on an annual basis during the certified period.</p> <p>The supporting report must include the qualifications of the independent certification body, the justification used to grant the certificate, and the expiry date of the certificate.</p>		X						
153	<p>Full-scale emergency response exercises during operations</p> <ol style="list-style-type: none"> Within 5 years after commencing operations, Trans Mountain must complete full-scale exercises to test each of the following five scenarios: <ol style="list-style-type: none"> a full-bore rupture under ice and snow conditions in the Coquihalla Mountain Range; a full-bore rupture into the Athabasca River during high spring flow conditions; a full-bore rupture into Fraser River at the Port Mann Bridge, under peak flow conditions; a full-bore rupture into the North Thompson River during high spring flow conditions; and a tank fire at the Burnaby Terminal. Trans Mountain must notify the NEB and all potential exercise participants and observers, including Appropriate Government Authorities, first responders and potentially affected Indigenous groups at least 45 days prior to the date of each exercise in a), of: <ol style="list-style-type: none"> the exercise's date and location(s); the exercise's objectives; the participants in the exercise; and the scenario for the exercise. Trans Mountain must file with the NEB, and provide to Appropriate Government Authorities, first responders and potentially affected Indigenous groups, within 3 months after completing each exercise in a), a report on the exercise that includes: <ol style="list-style-type: none"> the results of the completed exercise; areas for improvement; steps to be taken to correct deficiencies; and confirmation that an independent third party has evaluated and assessed the emergency response exercises and that Trans Mountain will consider the comments generated for future exercises. 	X						X	
154	<p>Riparian Habitat Reclamation Evaluation Report and Offset Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, on or before 31 January after the fifth complete growing season after completing final clean-up, a Riparian Habitat Reclamation Evaluation Report and Offset Plan.</p> <ol style="list-style-type: none"> The report must include, for each defined watercourse crossed by the Project: <ol style="list-style-type: none"> an evaluation of performed reclamation activities against the identified measureable goals and targets (required by Condition 71), that includes an identification of the defined watercourses where riparian habitat that has not returned to, or trending towards a sufficient, pre-construction functionality; a description of the proposed enhancement measures and corrective actions selected and 	X	X						

¹⁴⁷ For Conditions 19, 122 and 152, an “independent certification body” is an internationally recognized company or organization, such as Lloyd’s Register or Det Norske Veritas, which is able to certify compliance to statutory requirements. The independent certification body must have expertise in pipeline integrity. The NEB reserves the right to accept or reject the certificate. In addition, the NEB’s decision is not contingent on the results of the certificate.

¹⁴⁸ For Conditions 19, 122 and 152, “operating conditions” must include the Project-specific operating conditions, possible transient flow conditions, slack flow conditions, and effects on operating pressure due to temperature changes.

No.	Conditions with initial filings due after commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
	<p>the rationale for the selected option(s); and</p> <p>iii) a schedule for when the enhancement measures and corrective actions will be initiated and an estimated timeline for completion, including any monitoring that will be required.</p> <p>b) The plan must include, for defined watercourses crossed by the Project located in watersheds identified as being above the riparian habitat disturbance threshold (>18 per cent of riparian habitat disturbed in the watershed) or classified as High Sensitive fish-bearing by Trans Mountain, during the OH-001-2014 proceeding, and, where, after the fifth complete growing season, riparian habitat has not returned, or is not trending towards sufficient pre-construction functionality:</p> <p>i) a description of the proposed offset measures selected that includes details with rationales on the amount and type of offsets required, how the offset measures would be implemented, and the location of offset sites;</p> <p>ii) a schedule for when the offset measures will be initiated, an estimated timeline for completion, including any monitoring that will be required, and a schedule for when the results of the offsets monitoring will be filed with the Board that demonstrate offset success.</p> <p>iii) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the report/plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and</p> <p>iv) a summary of consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the report/plan.</p>								
155	<p>Rare Ecological Community and Rare Plant Population Mitigation Evaluation Report and Offset Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, on or before 31 January after the fifth complete growing season after completing final clean-up, a Rare Ecological Community and Rare Plant Population Mitigation Evaluation Report and Offset Plan for ecological communities of concern, rare plants and lichens, and early draft, candidate, proposed, or final critical habitat for plant and lichen species under the <i>Species at Risk Act</i>, that includes:</p> <p>a) an evaluation of avoidance and mitigation success with reference to the measurable goals outlined in the Rare Ecological Community and Rare Plant Population Management Plan required by Condition 40;</p> <p>b) identification of communities, species, and critical habitats that have not yet achieved the intended degree of reclamation success, and an evaluation of the need for ongoing monitoring, reporting and corrective actions;</p> <p>c) identification of any ongoing effects to ecological communities and rare plant and lichen species that have an at-risk status of S1, S1S2 or S2, or that are listed under federal or provincial legislation for protection, or on any early draft, candidate, proposed, or final critical habitat under the <i>Species at Risk Act</i>;</p> <p>d) for the ongoing effects identified in c), a Final Rare Ecological Community and Rare Plant Population Offset Plan that updates the Preliminary Rare Ecological Community and Rare Plant Population Offset Plan required by Condition 40, and that also includes details with rationales on the amount and type of offsets required, the offset measures to be implemented, the selection of compensation sites, identification of the parties involved in planning and implementation and their respective roles and responsibilities, a timeline for implementation, and the methods and schedule for monitoring and reporting to demonstrate offset success;</p> <p>e) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and</p> <p>f) a summary of its consultations with Appropriate Government Authorities, any species experts and potentially affected Indigenous groups. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the report/plan.</p>	X	X		X	X	X	X	

No.	Conditions with initial filings due after commencing operations	CPCN	OC2	OC49	Temp	Pump1	Pump2	Tanks	Deact
156	<p>Wetland Reclamation Evaluation Report and Offset Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, on or before 31 January after the fifth complete growing season after completing final clean-up, a Wetland Reclamation Evaluation Report and Offset Plan that includes:</p> <ul style="list-style-type: none"> a) the extent (in hectares), by wetland type, that was impacted by Project construction and associated activities; b) for each wetland impacted, an evaluation of mitigation and reclamation success with reference to the measurable goals outlined in the Wetland Survey and Mitigation Plan required by Condition 41; c) identification of any wetlands that have not yet achieved the intended degree of reclamation success, and an evaluation of the need for ongoing monitoring, reporting and corrective actions; d) for any wetland to which no-net-loss under the Federal Policy on Wetland Conservation applies, an evaluation of any temporary or ongoing loss of any individual functional condition (e.g., habitat, hydrology and biogeochemistry); e) for any wetland that has not achieved reclamation success in terms of overall wetland function, and for any wetland to which no-net-loss under the Federal Policy on Wetland Conservation applies and that has had a temporary or ongoing loss in any individual functional condition, a Final Wetland Offset Plan that updates the Preliminary Wetland Offset Plan required by Condition 41, and that also includes details with rationales on the amount and type of offsets required, the offset measures to be implemented, the selection of compensation sites, identification of the parties involved in planning and implementation and their respective roles and responsibilities, a timeline for implementation, and the methods and schedule for monitoring and reporting to demonstrate offset success; f) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and g) a summary of its consultations with Appropriate Government Authorities, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the report/plan. 	X	X		X	X	X	X	
157	<p>Grasslands Reclamation Evaluation Report and Offset Plan</p> <p>Trans Mountain must file with the NEB <u>for approval</u>, on or before 31 January after the tenth complete growing season after completing final clean-up, a Grasslands Reclamation Evaluation Report and Offset Plan that applies to native grasslands in the British Columbia interior and that includes:</p> <ul style="list-style-type: none"> a) the extent (in hectares) of grasslands that were impacted by Project construction and associated activities; b) an evaluation of reclamation success with reference to the measurable goals outlined in the Grasslands Survey and Mitigation Plan required by Condition 42; c) an identification of any grasslands that have not yet achieved the intended degree of reclamation success, and an evaluation of the need for ongoing monitoring, reporting and corrective actions; d) for those grasslands that have not yet achieved reclamation success, a Final Grasslands Offset Plan that updates the preliminary plan required by Condition 42, and that also includes details with rationales on the amount and type of offsets required, the offset measures to be implemented, the selection of compensation sites, identification of the parties involved in planning and implementation and their respective roles and responsibilities, a timeline for implementation, and the methods and schedule for monitoring and reporting to demonstrate offset success; e) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the plan, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information; and f) a summary of its consultations with Appropriate Government Authorities, species experts, potentially affected Indigenous groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the report/plan. 	X	X		X	X	X		

Appendix 15: Summary of comments received on draft conditions and recommendations

On 10 January 2019, the Board issued draft amendments to conditions and recommendations to parties for comment in their written argument-in-chief. The Board received a number of comments, which it considered. Some conditions and recommendations were adjusted in response to comments received. The various chapters of this MH-052-2018 Report provide reasons for changes made or not made, as do the summaries in Parts A and B below. Note that these summaries are not a comprehensive list, anyone wishing to see all submissions should review the entire record of the hearing. Part C provides a comparison of the draft and final versions of the conditions and recommendations.

A. Comments on draft conditions

Subject	Board views/comments
Response time	Some comments said that Condition 133 did not adequately address response times. The condition was changed to address these comments.
Compliance timing	Some comments said that Condition 91 did not clearly set out the timing of compliance requirements. The condition was changed to address these comments.
Specificity	Some comments requested increased specificity in certain conditions, including requests to list specific groups and people to be consulted. The Board has generally left wording broad, which accommodates the intent of the requests, and does not limit the intended scope of the conditions. Therefore, the Board has not made these changes.
Indigenous consultation	Some Indigenous intervenors requested that conditions include additional consultation with them. Consultation with, and participation of, Indigenous communities is already a part of federal government measures (enshrined as one of the pillars of the Oceans Protection Plan). Consultation and inclusion of Indigenous knowledge is already a requirement of many of conditions. Therefore, the Board has not made these changes.
Condition filings for approval	Some comments requested that certain condition filings be subject to Board approval. Regardless of whether this is indicated in a condition, the Board will assess all condition filings to ensure that Trans Mountain is in compliance prior to Trans Mountain being able to commence work on the applicable Project phase or component. If the Board is of the view that Trans Mountain is not in compliance, the Board may ask for further information until compliance is achieved. Therefore, the Board has not made these changes.
Condition commitments made by Trans Mountain	Some comments requested that certain commitments made by Trans Mountain be included in conditions, or be made into conditions themselves. Condition 2 requires Trans Mountain to meet all commitments it has made. Its commitments need not be made into, or added to, conditions for this obligation to continue. Therefore, the Board has not made this change, although it has updated Condition 2 to include commitments made during the MH-052-2018 hearing.
Rules to apply to Project-related marine vessels	Some comments suggested that more rules (e.g., further speed reductions, lighting) be applied specifically to Project-related marine vessels. In these cases, the Board considered whether they more appropriately applied to a broader range of marine vessels. The Board addressed these comments in its recommendations to the GIC, rather than in the conditions related to specifically to the Project and Project-related marine vessels. Therefore, the Board has not made these changes in the conditions.
Condition 131 should remain a condition	In response to the Board's proposal to convert Condition 131 (Marine Public Outreach Program) into a recommendation, some intervenors were of the view that it should remain a condition. Given that the work involved falls within the reach of government (and not Trans Mountain), the Board has made the conversion.

B. Comments on draft recommendations

Subject	Board views/comments
Definition of "Salish Sea"	Some comments requested that "Salish Sea" be defined in the recommendations. The Board has made changes to address these comments.
Additional consultation	Some comments requested that recommendations include additional consultation with Indigenous peoples and other stakeholders. The Board has made changes to address these comments.
Clarity regarding mitigation and monitoring	Some comments requested that recommendations include clear wording to show that they involve mitigation that was feasible and effective, and would involve monitoring. The Board has made changes to address these comments.
Clarity regarding offsets	Some comments suggested there was a lack of clarity in the recommendations regarding offsets and the distinction between them. The Board has made significant adjustments to be more specific about the purpose of these recommendations, and to add specific consultation requirements. Specifically, changes were made to clarify that Recommendation 5 is the overall offset program, whereas Recommendation 6 notes some individual potential mitigation for further consideration within that program.
Cumulative impacts on Indigenous rights and title	Some Indigenous intervenors provided comments regarding the cumulative impacts on the exercise of Indigenous rights and title, and that these matters should be addressed through consultation. While such wording has not been explicitly added to the recommendations, the inclusion of wording regarding consultation with Indigenous peoples will allow for input with respect to impacts on rights and title.
Including the Fraser Watershed in a regional study	Some comments requested that the Fraser Watershed be included in a regional study (Recommendation 1). The recommended study is to look at cumulative impacts on the Salish Sea. The geographic boundaries of the relevant cumulative effects would be determined as part of the planning process.

C. Comparison of draft and final versions of the conditions and recommendations

#	Draft wording	Final wording
Conditions		
91	<p>Plan for marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, at least 2 months prior to commencing construction, a plan describing how it will ensure that it will meet the requirements of Condition 133 regarding marine spill prevention and response. The plan must be prepared in consultation with Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority, Vancouver Fraser Port Authority, British Columbia Coast Pilots, Western Canada Marine Response Corporation, Fisheries and Oceans Canada and the Province of British Columbia, and must identify any issues or concerns raised and how Trans Mountain has addressed or responded to them.</p> <p>Trans Mountain must provide the plan to the above-mentioned parties at the same time as it is filed with the NEB.</p>	<p>Plan for marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, within 6 months from the issuance date of the Certificate, a plan describing how it will ensure that it will meet the requirements of Condition 133 regarding marine spill prevention and response. The plan must be prepared in consultation with Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority, Vancouver Fraser Port Authority, British Columbia Coast Pilots, Western Canada Marine Response Corporation, Fisheries and Oceans Canada and the Province of British Columbia, and must identify any issues or concerns raised and how Trans Mountain has addressed or responded to them.</p> <p>Trans Mountain must provide the plan to the above-mentioned parties at the same time as it is filed with the NEB.</p>
131	<p>Marine Public Outreach Program</p> <p>The Board proposed converting this condition into a recommendation (see Recommendation 12).</p>	<p>Marine Public Outreach Program</p> <p>The Board has converted this condition into a recommendation (see Recommendation 12).</p>
132	<p>Marine Mammal Protection Program</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing operations, a Marine Mammal Protection Program that focuses on mitigating effects from the Project and</p>	<p>Marine Mammal Protection Program</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to commencing operations, a Marine Mammal Protection Program that focuses on mitigating effects from the Project and associated cumulative effects, and</p>

#	Draft wording	Final wording
	<p>associated cumulative effects, and on fulfilling Trans Mountain's commitments as a terminal operator with regard to Project-related marine shipping. The program must include:</p> <ul style="list-style-type: none"> a) the goals and objectives of the program, including a discussion on how they align with the objectives of applicable Fisheries and Oceans marine mammal Recovery Strategies and Action Plans; b) a summary of the issues related to marine mammals from the Project and from Project-related marine vessels; c) a summary of the initiatives that Trans Mountain has supported or undertaken to-date, including the goals of each initiative and how they relate to the goals and objectives of the program; d) a discussion of the outcomes or progress updates of the initiatives identified in c), and how these outcomes have met or are contributing to the objectives of the program; [previous e) and f) deleted] e) any other initiatives that Trans Mountain intends to undertake or support in the future that are relevant to the program; and f) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the program, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding, MH-052-2018 Reconsideration proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information. 	<p>on fulfilling Trans Mountain's commitments as a terminal operator with regard to Project-related marine shipping. The program must include:</p> <ul style="list-style-type: none"> a) the goals and objectives of the program, including a discussion on how they align with the objectives of applicable Fisheries and Oceans marine mammal Recovery Strategies and Action Plans; b) a summary of the issues related to marine mammals from the Project and from Project-related marine vessels; c) a summary of the initiatives that Trans Mountain has supported or undertaken to-date, including the goals of each initiative and how they relate to the goals and objectives of the program; d) a discussion of the outcomes or progress updates of the initiatives identified in c), and how these outcomes have met or are contributing to the objectives of the program; e) any other initiatives that Trans Mountain intends to undertake or support in the future that are relevant to the program; and f) a description of how Trans Mountain has taken available and applicable Indigenous traditional land use and traditional ecological knowledge into consideration in developing the program, including demonstration that those Indigenous persons and groups that provided Indigenous traditional land use information and traditional ecological knowledge, as reported during the OH-001-2014 proceeding, MH-052-2018 Reconsideration proceeding and/or pursuant to Condition 97, had the opportunity to review and comment on the information.
133	<p>Confirmation of marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, confirmation, signed by an officer of the company that:</p> <ul style="list-style-type: none"> a) Trans Mountain has included in its Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide a requirement for tankers nominated to load at the Westridge Marine Terminal to have a suitable arrangement for the proposed enhanced tug escort between the Westridge Marine Terminal and Buoy J prior to departure. The tug escort should be suitable for foreseeable meteorological and ocean conditions and be based on tanker and cargo size. b) An 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 is in place. 	<p>Confirmation of marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, confirmation, signed by an officer of the company that:</p> <ul style="list-style-type: none"> a) Trans Mountain has included in its Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide a requirement for tankers nominated to load at the Westridge Marine Terminal to have a suitable arrangement for the proposed enhanced tug escort between the Westridge Marine Terminal and Buoy J prior to departure. The tug escort should be suitable for foreseeable meteorological and ocean conditions and be based on tanker and cargo size; and b) an enhanced marine oil spill response regime is in place that is capable of: <ul style="list-style-type: none"> i) delivering 20,000 tonnes of capacity within 36 hours of notification, with dedicated resources staged within the study area; and, ii) initiating a response within 2 hours for spills in Vancouver Harbour, and within 6 hours for the remainder of the Salish Sea shipping route to the 12-nautical-mile territorial sea limit.
134	<p>Updated Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide</p> <p>Trans Mountain must file with the NEB, at least 3 months prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, and thereafter on or before 31 January of each of the first five years after commencing operations, an updated Vessel Acceptance Standard and Westridge Marine Terminal Regulations and Operations Guide, and a summary of any revisions made to each.</p>	same

#	Draft wording	Final wording
144	<p>Ongoing confirmation of marine spill prevention and response commitments</p> <p>Trans Mountain must file with the NEB, on or before 31 January of each year after commencing operations confirmation, signed by an officer of the company, that it is continuing to meet the requirements of Condition 133 regarding Trans Mountain's marine spill prevention and response commitments.</p> <p>Trans Mountain must provide each filing to Transport Canada, the Canadian Coast Guard, the Pacific Pilotage Authority, Vancouver Fraser Port Authority, British Columbia Coast Pilots, Western Canada Marine Response Corporation, Fisheries and Oceans Canada and the Province of British Columbia at the same time as it is filed with the NEB. If a particular party mentioned above requests that it not be provided the annual filing, Trans Mountain may cease providing it to that party.</p>	same
151	<p>Post-construction environmental monitoring reports</p> <p>Trans Mountain must file with the NEB, on or before 31 January following the first, third, and fifth complete growing seasons after completing final clean-up, a post-construction environmental monitoring report for the Project that must include:</p> <ul style="list-style-type: none"> a) a description of the valued components or issues that were assessed or monitored; b) measurable goals for each valued component or issue; c) monitoring methods for each valued component or issue, results of the monitoring, and a comparison to the defined measurable goals; d) corrective actions taken, their observed success, and their current status; e) identification on a map or diagram of the locations where corrective actions were taken; f) any further corrective actions planned and a schedule for monitoring and reporting; and g) a summary of its consultations with appropriate government authorities and any potentially affected Indigenous groups and affected landowners/tenants. <p>In the post-construction environmental monitoring report filed after the fifth full growing season after completing clean-up, Trans Mountain must include:</p> <ul style="list-style-type: none"> i) an assessment of the effectiveness of mitigative and corrective actions and how learnings have been or will be applied to Trans Mountain's Environmental Protection Program; ii) a detailed description of all valued components or issues for which the measurable goals have not been achieved during the duration of the post-construction monitoring program; and iii) an evaluation of the need for any further corrective actions, measurable goals, assessments, or monitoring of valued components or issues, including a schedule for those. <p>All filed post-construction environmental monitoring reports must address issues related, but not limited, to: soils; weeds; watercourse crossings; riparian vegetation; wetlands; rare plants, lichens and ecological communities; municipal tree replacement; wildlife and wildlife habitat; fish and fish habitat; marine fish and fish habitat; marine mammals; marine birds; and species at risk.</p>	same

#	Draft wording	Final wording
Recommendations		
1	<p>The Governor in Council should develop and implement a regional cumulative effects management plan that assesses the overall environmental state of, and cumulative effects on, the Salish Sea, and use that better understanding to help inform a long-term approach to managing those cumulative effects, as well as informing the consideration of future proposed projects. This plan should include, but not be limited to:</p> <ul style="list-style-type: none"> a) consideration of the many impacts on the Salish Sea, including contamination from point and diffuse land-based sources, the multiple impacts on salmon and other fish stocks, and the impacts from all vessel traffic; b) incorporation of the work the federal authorities are already planning in the area, such as under the Coastal Environmental Baseline Program and the Cumulative Effects of Marine Shipping initiative (including its regional cumulative effects assessment); c) development of short-, medium-, and long-term targets for addressing cumulative effects, including consideration of the feasibility of reducing total underwater noise, strike/collision risk of vessels with marine species, and key contaminant levels over time; and d) any monitoring necessary to help determine the extent of cumulative effects, the success of measures to manage those effects, and progress towards meeting targets. 	<p>The Governor in Council should develop and implement a regional cumulative effects management plan. This plan should assess the overall environmental state of, and cumulative effects on, the Salish Sea (including the Strait of Juan de Fuca and out to the 12-nautical-mile territorial sea limit), and should include a long-term strategy for managing those cumulative effects. It should also be used to inform the consideration of future proposed projects. This plan should include, but not be limited to:</p> <ul style="list-style-type: none"> a) consideration of the many impacts on the Salish Sea, including contamination from point and diffuse land-based sources, the multiple impacts on salmon and other fish stocks, and the impacts from all vessel traffic; b) incorporation of the work the federal authorities are already planning in the area, such as under the Coastal Environmental Baseline Program and the Cumulative Effects of Marine Shipping initiative (including its regional cumulative effects assessment); c) development of short-, medium-, and long-term targets for addressing cumulative effects, including consideration of the feasibility of reducing total underwater noise, strike/collision risk of vessels with marine species, and key contaminant levels over time, and feasible and effective measures for achieving those targets; and d) monitoring to help determine the extent of cumulative effects, the success of measures to manage those effects, and progress towards meeting targets. <p>The Governor in Council should consider whether a regional study pursuant to sections 73 or 74 of the CEAA 2012 should be undertaken as part of the cumulative effects management plan, and include in its public reporting a rationale on whether this would be advantageous. The plan should be developed and implemented in consultation with Indigenous peoples, other marine users, the Province of British Columbia and local governments, Vancouver Fraser Port Authority (VFPA), and other relevant stakeholders.</p>
2	<p>The Governor in Council should report publicly, on an annual basis, on the oversight, progress, and status of initiatives and measures to address cumulative effects on, and to support the health of, the Salish Sea, including but not limited to:</p> <ul style="list-style-type: none"> a) progress on addressing Recommendation 1 above; b) the Ocean Protection Plan, the Whales Initiative, and any other relevant commitments made by federal authorities during the Board's MH-052-2018 Reconsideration hearing; c) relevant initiatives and measures being undertaken by others, such as the marine shipping measures of the Enhancing Cetacean Habitat and Observation Program (ECHO) Program; d) species status updates for Species at Risk Act-listed species, including any relevant measures proposed in recovery documents under the Species at Risk Act; e) progress on addressing Recommendations 3 through 13 below; and f) consultation activities related to these initiatives and measures, including with Indigenous peoples and other marine users. <p>The reporting should include an explanation of how these various initiatives and measures work together, the identification of any notable gaps, and plans for how those gaps will be addressed.</p>	<p>The Governor in Council should report publicly, on an annual basis, on the oversight, progress, and status of initiatives and measures to address cumulative effects on, and to support the health of, the Salish Sea (including the Strait of Juan de Fuca and out to the 12-nautical-mile territorial sea limit), including but not limited to:</p> <ul style="list-style-type: none"> a) progress on addressing Recommendation 1 above, including monitoring results and progress towards meeting targets; b) the Ocean Protection Plan, the Whales Initiative, and any other relevant commitments made by federal authorities during the Board's MH-052-2018 Reconsideration hearing; c) relevant initiatives and measures being undertaken by others, such as the marine shipping measures of the Enhancing Cetacean Habitat and Observation Program (ECHO) Program, for the duration such initiatives or measures are undertaken; d) species status updates for <i>Species at Risk Act</i>-listed species, including any relevant measures proposed in recovery documents under the <i>Species at Risk Act</i>; e) progress on addressing Recommendations 3 through 16 below, including results of monitoring to determine the effectiveness of measures and any adaptive management as part of a follow-up program; and f) consultation activities related to these initiatives and measures,

#	Draft wording	Final wording
		<p>including with Indigenous peoples, other marine users, the Province of British Columbia and local governments, VFPA, and other relevant stakeholders.</p> <p>The public reporting should include an explanation of how these various initiatives and measures work together, the identification of any notable gaps, and plans for how those gaps will be addressed.</p>
3	<p>The Governor in Council should implement, with support from industry, a marine bird monitoring program to better understand impacts of all vessel use within the Salish Sea on marine bird species, including species at risk. This program would allow for the implementation of adaptive measures by the Government of Canada to avoid or reduce marine bird mortality and sensory disturbance.</p>	<p>The Governor in Council should develop and implement, with support from industry, a marine bird monitoring and protection program to better understand impacts of all vessel use within the Salish Sea on marine bird species, including species at risk, and, if adverse effects are found, implement mitigation from those impacts. This program should include adaptive management measures by the Government of Canada where warranted by monitoring results, to avoid or reduce marine bird mortality and sensory disturbance.</p> <p>This program should be developed and implemented in consultation with relevant marine shipping stakeholders and Indigenous peoples.</p>
4	<p>The Governor in Council should expedite the work in completing the feasibility study for establishing a Southern Strait of Georgia National Marine Conservation Area, publicly report on the outcomes of that study, and (if considered feasible) proceed to establish it.</p>	<p>The Governor in Council should expedite the work in completing the feasibility study for establishing a Southern Strait of Georgia National Marine Conservation Area Reserve, publicly report on the outcomes of that study, and (if considered feasible) proceed to establish it. Its potential establishment should include consideration of other initiatives under the Oceans Protection Plan, such as the Ports Modernization Review and the National Anchorage Strategy. This work should be done in consultation with potentially affected Indigenous and coastal communities and with relevant marine shipping stakeholders including Transport Canada, Canadian Coast Guard and the VFPA.</p>
5	<p>The Governor in Council should implement a suite of measures to offset both the increased underwater noise and the increased strike risk posed to Species at Risk Act-listed marine mammal and fish species (including Southern resident killer whale) due to Project-related marine shipping, at each relevant section of the marine shipping route (i.e., Strait of Georgia, Boundary Pass, Haro Strait, Juan de Fuca Strait, and out to the 12-nautical-mile territorial sea limit), and at the relevant times of year. Each offset measure should apply to all appropriate vessels for that measure (i.e., not limited to Project-related vessels). There should be periodic reporting that includes measured or estimated underwater noise and strike risk due to Project-related marine shipping, and the extent over time to which that additional noise and strike risk has been offset by measures that apply to all appropriate vessels.</p>	<p>The Governor in Council should develop an Offset Program to offset both the increased underwater noise and the increased strike risk posed to <i>Species at Risk Act</i>-listed marine mammal and fish species (including Southern resident killer whale) due to Project-related marine shipping, at each relevant section of the marine shipping route (i.e., Strait of Georgia, Boundary Pass, Haro Strait, Strait of Juan de Fuca, and out to the 12-nautical-mile territorial sea limit), and at the relevant times of year. Each offset measure should apply to all appropriate vessels for that measure (i.e., not limited to Project-related vessels), to be determined on a case-by-case basis according to the type of measure and the type(s) of vessels it is targeted at.</p> <p>The Offset Program should be developed and implemented in consultation with Indigenous peoples, other marine users, the Province of British Columbia and local governments, VFPA, and other relevant stakeholders. The Offset Program should include any further research and data collection that is necessary to successfully undertake it, including consideration of whether further information on the number of vessel strikes on marine mammals can be gathered. There should be periodic public reporting that provides, at the appropriate times, the information necessary to demonstrate a robust Offset Program. This should include measured or estimated underwater noise and strike risk due to Project-related marine shipping, and the extent over time to which that additional noise and strike risk has been offset in each section of the route, including the monitoring/modelling used to demonstrate that.</p>
6	<p>As part of Recommendation 5 to offset the underwater noise and strike risk added by Project-related marine shipping, the Governor in Council should further consider each of the following specific measures, each applicable to all appropriate vessels (i.e., not limited to Project-related vessels), and publicly report on the feasibility of each (including consideration of socio-economic effects):</p> <ul style="list-style-type: none"> · slowdowns in each section of the marine shipping route (i.e., Strait of Georgia, Boundary Pass, Haro Strait, Juan de Fuca Strait, and out to the 12-nautical-mile territorial sea limit) and 	<p>As part of the Offset Program in Recommendation 5, the Governor in Council should further consider each of the following specific measures, each applicable to all appropriate vessels (i.e., not limited to Project-related vessels), and publicly report on the feasibility and likely effectiveness of each (including consideration of navigational safety, international coordination and socio-economic effects):</p> <ol style="list-style-type: none"> a) Slowdowns in each section of the marine shipping route (i.e., Strait of Georgia, Boundary Pass, Haro Strait, Strait of Juan de Fuca, and out to the 12-nautical-mile territorial sea limit).

#	Draft wording	Final wording
	<p>that apply to all appropriate vessels;</p> <ul style="list-style-type: none"> • potential limits on the number of whale watching boats (and/or their time on water); • explicit noise reduction targets for regularly operating ferries in the area; • identification of specific whale congregation and migration areas (including for resident killer, Humpback, Grey, and Fin whales, as well as basking shark) and consideration of specific routing and speed restrictions in those areas; and • further incentives and requirements for quiet vessel design to address underwater noise over the long term. 	<ul style="list-style-type: none"> b) Potential limits on the activities of whale watching boats (such as the number of boats and/or their time on water, and other potential ways to limit their impacts). c) Noise reduction efforts for regularly operating ferries in the area, and an accelerated schedule for implementation. d) Identification of specific foraging, congregation and migration areas of the <i>Species at Risk Act</i>-listed species (including Humpback, Grey, Fin and killer whales, as well as Basking shark and Leatherback sea turtle) and consideration of mitigations in those areas (including Swiftsure Bank). e) Further incentives and requirements for quiet vessel design and refits to address underwater noise over the long term, including maximal participation in relevant initiatives and committees of the International Maritime Organization. <p>Consideration of the above measures should include consultation with Indigenous peoples, other marine users, the Province of British Columbia and local governments, VFPA, and other relevant stakeholders.</p>
7	<p>The Governor in Council should review and update federal marine shipping oil spill response requirements. This review should include consideration of the following:</p> <ul style="list-style-type: none"> • updating response organization standards; • response planning methodologies; • public reporting by response organizations to promote transparency of information; • inclusion of Indigenous peoples and local communities in response planning; and • a requirement for additional response resources on all ocean-going vessels. 	<p>The Governor in Council should review and update federal marine shipping oil spill response requirements. This review should include consideration of the following:</p> <ul style="list-style-type: none"> a) updating the 1995 Response Organization Standards; b) response planning methodologies; c) response planning for <i>Species at Risk Act</i>-listed species, including marine mammals; d) how completed and ongoing research related to oil fate and behaviour and response methods and technology will be considered in response planning, procedures, and equipment; e) salvage requirements; f) public reporting by response organizations to promote transparency of information; g) inclusion of Indigenous peoples and local communities in response planning; and h) a requirement for additional response resources on all ocean-going vessels.
8	<p>The Governor in Council should develop a regulatory framework for making enhanced tug escort mandatory in the Salish Sea for appropriate ocean-going vessels, including Project-related tankers. The framework should include oversight and enforcement mechanisms.</p>	<p>The Governor in Council should develop a regulatory framework for making enhanced tug escort mandatory in the Salish Sea for Project-related tankers. The framework should include oversight and enforcement mechanisms. Mandatory enhanced tug escort should also be considered for other vessels as appropriate.</p>
9	<p>The Governor in Council should, in conjunction with relevant United States regulatory authorities, consider the need for a Canada/United States Transboundary Vessel Traffic Risk Assessment.</p>	<p>same</p>
10	<p>The Governor in Council should accelerate the development and implementation of greenhouse gas reduction measures related to marine shipping that would support the final International Maritime Organization Strategy in year 2023 for reducing greenhouse gas emissions. These measures could include, but not be limited to:</p> <ul style="list-style-type: none"> a) facilitating the use of low-carbon alternate fuels (such as liquefied natural gas) for marine vessels by developing any necessary marine safety regulatory framework, training programs, and bunkering infrastructure requirements; and b) market-based measures, such as providing economic 	<p>The Governor in Council should actively support the development and implementation of greenhouse gas reduction measures related to marine shipping that would align with the final International Maritime Organization Strategy by year 2023 for reducing greenhouse gas emissions. These measures could include, but not be limited to:</p> <ul style="list-style-type: none"> a) facilitating the use of low-carbon alternate fuels (such as liquefied natural gas) for marine vessels by developing any necessary marine safety regulatory framework, training programs, and bunkering infrastructure requirements;

#	Draft wording	Final wording
	<p>incentives for industry investment in the development and use of energy efficient technologies, and offsetting any increases in ship emissions.</p> <p>In implementing the measures, the Governor in Council could also consider a mechanism to establish and monitor such reductions and to develop regulations under an appropriate legislation.</p>	<p>b) use of energy efficient technologies, such as engine and propulsion upgrades and hull modifications; and</p> <p>c) market-based measures, such as providing economic incentives for industry investment in the development and use of energy efficient technologies, and offsetting any increases in ship emissions.</p> <p>In implementing the measures, the Governor in Council could also consider a mechanism to establish and monitor such reductions and to develop regulations under an appropriate legislation.</p>
11	<p>The Governor in Council should, in conjunction with Transport Canada and the Canadian Coast Guard, facilitate opportunities, as appropriate, to engage and seek feedback from the Indigenous Advisory and Monitoring Committee on the marine safety system, including on the marine inspections and enforcement regime; in addition to identifying engagement opportunities for Project-related marine shipping activities that intersect with Canadian Coast Guard operational programs.</p>	<p>same</p>
12	<p>(in place of Condition 131 from the OH-001-2014 hearing):</p> <p>The Governor in Council should, in conjunction with the Pacific Pilotage Authority and Transport Canada, continue engagement and awareness activities targeting recreational boaters, fishing vessel operators, and operators of small vessels with respect to safety of navigation and prevention of collisions with larger vessels. This should include incorporating the resources and information that Trans Mountain has already provided or will provide to the Pacific Pilotage Authority, such as applicable information on Project-related vessel timing and scheduling.</p>	<p>The Governor in Council should, in conjunction with the Pacific Pilotage Authority and Transport Canada, continue engagement and awareness activities targeting coastal Indigenous communities, recreational boaters, fishing vessel operators, and operators of small vessels with respect to safety of navigation and prevention of collisions with larger vessels. This should include incorporating the resources and information that Trans Mountain has already provided or will provide to the Pacific Pilotage Authority, such as applicable information on Project-related vessel timing and scheduling.</p>
13	<p>The Governor in Council should accelerate the development and implementation of the Enhanced Maritime Situational Awareness initiative and the proposed extension of the Automatic Identification System to smaller passenger vessels.</p>	<p>The Governor in Council should, in order to enhance the safety of all sizes of marine vessels, accelerate the development and implementation of the Enhanced Maritime Situational Awareness initiative and the proposed extension of the Automatic Identification System to smaller passenger vessels.</p>
14	<p>new</p>	<p>In order to foster a more rapid development and employment of new oil recovery technologies, the Governor in Council should administratively combine its current initiatives and investigate the use of new paths for the delivery of government grants and contributions in order to provide financial incentives to promote innovation in such developments.</p>
15	<p>new</p>	<p>The Governor in Council, in conjunction with Transport Canada, should review the federal marine oil spill compensation regimes with regards to compensation for non-use values, for Indigenous and non-Indigenous communities, including any non-coastal communities that may be impacted as a result of a marine oil spill.</p>
16	<p>new</p>	<p>The Governor in Council, in conjunction with VFPA, should develop a formal complaint resolution program that gathers community feedback, brings together diverse community stakeholders to facilitate discussions about port-related impacts, and resolves complaints about marine vessels anchored at the VFPA-managed anchorages.</p>