

**ENVIRONMENTAL ASSESSMENT OF
THE ROBERTS BANK TERMINAL 2 PROJECT**



**PORT of
vancouver**

**CLOSING SUBMISSION
OF THE VANCOUVER FRASER PORT AUTHORITY**

AUGUST 26, 2019

Executive summary

The Roberts Bank Terminal 2 Project (**RBT2** or the **Project**) is a proposed new three-berth marine container terminal at Roberts Bank in Delta, British Columbia (**BC**), on Canada's west coast. The Project would provide 2.4 million 20-foot equivalent units (**TEUs**) of container capacity annually, which is needed by the mid-2020s to accommodate Canada's growing trade. The Vancouver Fraser Port Authority (**VFPA**), the proponent for the Project, filed an environmental impact statement (**EIS**) for the proposed Project with the Canadian Environmental Assessment Agency (**CEA Agency**) in March 2015, and a Marine Shipping Addendum (**MSA**), assessing potential effects of marine shipping associated with the Project, in October 2015. The Project was subsequently reviewed by a federally appointed independent review panel (the **Review Panel**), and the VFPA responded to over 350 information requests (**IRs**) from the CEA Agency and the Review Panel between 2015 and 2019. In May and June of 2019, the Review Panel held a five-week public hearing, including general, topic-specific, and community sessions.

1. Project rationale

RBT2 has national importance. Based on independent expert third-party container traffic forecasts, and existing capacity on the west coast of Canada, the VFPA predicts that there will be a container capacity shortfall by the mid-2020s. Without the Project, the container gateway through both the ports of Vancouver and Prince Rupert, and Canada's trade, will become increasingly constrained. Some of that trade may be forced to divert through the USA, resulting in hundreds of millions of dollars of lost economic opportunity (GDP) to Canada. The purpose of the Project is to meet increasing demand for containerized trade on the west coast of Canada and to continue to provide for the potential economic and competitive benefits of trade to Canadians.

The Project would play a vital strategic role in Canada's trade network, and is aligned with federal and provincial government strategies to strengthen Canada's trade links with Asia. RBT2 will play a critical role in meeting consumer, industrial, and construction demand for imports, supporting Canadian businesses shipping resources and goods to and from global markets, and will ensure that Canada does not run out of capacity to take advantage of growing trade with Asia.

The Project is also essential to promote competition within the Port of Vancouver. The VFPA has an objective to introduce a new terminal operator at Roberts Bank, consistent with the port authority's mandate to ensure the gateway provides service to customers at a reasonable cost. A third operator will support a healthy and competitive container-handling market within the Port of Vancouver for years to come because it will ensure that no one terminal operator will control a significant majority of the large-ship container terminal capacity at the Port of Vancouver.

As a long-term steward of the Fraser River estuary, and as the public authority charged with the administration of the Port of Vancouver, the VFPA is the most suitable proponent to

undertake the development of RBT2. Unlike other proponents, the VFPA is guided by the national interest and environmental protection as set out in the *Canada Marine Act*, as opposed to commercial profit-taking. The VFPA will ensure the Project is designed to meet Canada's trade needs. The VFPA will also ensure that the Project will be built in an environmentally responsible fashion. The VFPA will have long-term responsibility and ability to fulfill commitments for monitoring and the Follow-up Program to verify the environmental assessment conclusions and to determine the effectiveness of mitigation measures.

Container capacity growth is also expected at the Port of Prince Rupert, however it will not be enough to satisfy forecast trade because the port is much smaller and served by only one railroad.

RBT2 is the only major container capacity project on the west coast currently going through an environmental assessment and is therefore the only project in a position to provide significant container terminal capacity by the late 2020's.

2. Project description and alternative means

There are three main components of the proposed Project: 1) a new three-berth marine container terminal, 2) a widened causeway to accommodate additional road and rail infrastructure, and 3) an expanded tug basin to accommodate additional tugs and a second tug operations contractor.

The VFPA has engaged with regulators, Indigenous groups, scientific and engineering experts, non-governmental environmental organizations, and other public stakeholders to refine the design of the Project to further mitigate environmental effects. In particular, the VFPA designed the Project to primarily avoid environmental effects. Following engagement with Fisheries and Oceans Canada (**DFO**) and Environment and Climate Change Canada (**ECCC**), the VFPA has proposed that the RBT2 marine terminal be located in deeper water to protect intertidal areas that provide important habitat for birds, fish, and invertebrates. The placement of the terminal in subtidal water is not the simplest or most economical option, but it is the right option because of its environmental advantages. The VFPA has also optimized the design of the widened causeway and tug basin expansion to reduce adverse environmental effects, while ensuring the Project operates safely and efficiently.

(a) Alternative means assessment

In accordance with the CEA Agency's guidance, the EIS Guidelines, and the requirements of the *Canadian Environmental Assessment Act, 2012*, the VFPA accounted for alternative means in the assessment of the Project by first identifying the alternative means to carry out the Project, then identifying the effects of each technically and economically feasible alternative means, and lastly identifying the preferred means of carrying out the project. After engagement with DFO, the VFPA eliminated expansion areas east of the existing Deltaport Terminal because of valuable and highly sensitive ecosystems in that area. Environmental and technical work indicated that the terminal location option that was

furthest offshore, located in subtidal waters, would avoid negative effects on sensitive intertidal habitat. Ultimately, the VFPA selected the proposed location, orientation, and design as its preferred means to meet the Project purpose, as it would best serve growing capacity demand while minimizing environmental effects.

During the public hearing, in response to a motion brought by Global Container Terminals (**GCT**), the Review Panel scheduled an additional topic-specific session on alternative means of carrying out the Project. The VFPA is confident that RBT2 Project—the only project that is before the Review Panel—is the best option for meeting the Project purpose.

(b) Marine shipping associated with the Project

In April 2015, the CEA Agency issued Updated EIS Guidelines for RBT2 that required consideration of environmental effects of marine shipping associated with the Project beyond the care and control of the VFPA and extending to the 12 nautical mile limit of Canada's territorial sea. In accordance with this requirement, in October 2015 the VFPA submitted the MSA, which described potential changes to the physical, biophysical, and human environments resulting from Project-associated vessels transiting the marine shipping area. Since submission of the MSA, the VFPA has responded to numerous IRs both from the CEA Agency and the Review Panel.

In 2018, the VFPA retained Mercator International, an independent consulting firm, to provide an updated forecast of vessel calls. Based on Mercator International's findings, the VFPA expects that by 2035 container ship traffic through Segments A, B, C, D, and G of the marine shipping area will decrease by 24% compared to the traffic levels assumed in the MSA. Therefore, based on the decrease in container vessels transiting the marine shipping area and the fact that there will be no additional vessels transiting the marine shipping area as a result of RBT2, the assessments presented in the EIS and MSA either adequately or over-predict the environmental effects anticipated from RBT2 during operation.

Furthermore, Mercator International projects that larger vessels will be arriving sooner than assumed in the MSA, and that the same classes of vessel will transit through the marine shipping area in 2035, with or without the Project. The effects assessments presented in the MSA will not change as a result of the trend toward larger vessels.

(c) Consultation with the public and Indigenous groups

The VFPA has engaged in a comprehensive consultation and engagement program with Indigenous groups, local communities, regulators, industry, and stakeholders since the early stages of Project planning. This includes, among other things, a community liaison committee, comprised of Delta residents and representatives of industry, City of Delta and Tsawwassen First Nation, community outreach programs, a Project website and other online resources to facilitate public engagement, and the establishment of a community office in Delta.

(d) Public consultation

The VFPA's public consultation activities go beyond the requirements of the CEA Agency's Public Participation Guide. The VFPA recognizes the value and importance of engaging with all levels of government, local communities, and stakeholders in achieving its vision to be the world's most sustainable port by delivering economic prosperity through trade, maintaining a healthy environment, and enabling thriving communities.

The environmental assessment process has also provided a number of opportunities for public participation. The CEA Agency and the Review Panel have provided eight public comment periods to allow members of the public to provide feedback and request further information from the VFPA.

All of the information submitted by the VFPA during the course of the environmental assessment is available to the public on the CEA Agency public registry for the Project. The registry includes over 2,000 documents, comprised of: technical and scientific studies; environmental reports; public comments; submissions by federal, provincial, and regional regulators; the VFPA's responses to IRs; and presentations and transcripts from the public hearing and information sessions held by the Review Panel.

The environmental assessment process culminated in a five week public hearing, including general, topic-specific, and community sessions. At the public hearing, the VFPA presented the Project to the Review Panel, federal, provincial, and regional regulators and agencies, Indigenous groups, and members of the public. Participants were invited to participate, including presenting information and asking questions of the VFPA, to get a better understanding of the Project and potential Project-related effects.

(e) Indigenous group consultation

The VFPA values its relationship with local Indigenous groups and acknowledges the key role that Indigenous groups play in the stewardship of the Salish Sea and Juan de Fuca Strait.

Consultation with Indigenous groups is fundamental to project planning, review and assessment. RBT2 is proposed in an area that lies adjacent to Tsawwassen First Nation Lands, in close proximity to Musqueam First Nation, and an area in which Indigenous groups engage in the current use of lands and resources for traditional purposes (**Current Use**) and exercise asserted or established Aboriginal and treaty rights. The VFPA has engaged extensively with Indigenous groups in the Project area and throughout the marine shipping area to ensure that the VFPA has been able to fully assess the potential impacts and benefits for Indigenous groups related to the Project and marine shipping associated with the Project.

As the proponent, the VFPA is in the best position to provide Indigenous groups with information related to the Project, and to collect information from Indigenous groups with respect to the Project's potential effects on Current Use and potential impacts on rights. The

VFPA has ensured that Indigenous groups have had clear, accurate, and up to date information about the Project throughout the environmental assessment process, and has had ongoing communication, including meetings and workshops with Indigenous groups to discuss potential effects of the Project. The VFPA's engagement with Indigenous groups will not end at the close of the environmental assessment process. The VFPA remains committed to maintaining a positive relationship with Indigenous groups throughout the permitting, construction and operation phases of the Project, as evidenced in the Updated Project Commitments, submitted to the Review Panel on July 5, 2019

The VFPA wishes to express appreciation to Indigenous groups for providing Indigenous traditional knowledge (**ITK**) that supported a better assessment. The VFPA collected ITK through literature reviews, meetings and workshops with Indigenous Elders and community members, and support of additional traditional use studies. The VFPA will continue to support the ongoing integration of ITK and traditional use information during Project planning, and if approved, as the Project proceeds.

The Review Panel held eight days of community sessions between June 1, 2019 and June 24, 2019, during which the VFPA and the Review Panel heard from representatives of 19 Indigenous groups. The VFPA would like to express its sincere thanks to the Elders, leadership, technical representatives, community members, and administration that took the time to participate in the community, general, and/or topic-specific sessions.

(f) Responses to Indigenous interests and concerns

The extensive participation by Indigenous groups, including at community, general, and topic-specific hearing sessions, resulted in numerous opportunities for groups to bring forward outstanding questions, concerns, and issues and provided a further opportunity for the VFPA, and an in-person opportunity for the Review Panel, to give those concerns full, fair, and serious consideration.

Where possible, the VFPA responded to these concerns in the public hearing forum. However, the VFPA recognizes that ongoing consultation and dialogue with Indigenous groups are required to ensure that the Project proceeds in a good way.

As described during the public hearing and further described in the Updated Project Commitments, the VFPA is committed to continued dialogue with Indigenous groups potentially impacted by the Project or Project-associated shipping. In support of this commitment, the VFPA will undertake multiple consultation initiatives to advance VFPA-Indigenous group dialogue regarding issues, concerns, and opportunities related to the Project prior to, and during construction and operation. The initiatives collectively represent the VFPA's ongoing effort to ensure the acceptability of RBT2 to Indigenous groups.

These ongoing consultation initiatives include, but are not limited to, ongoing direct consultation with individual Indigenous groups; consultation on updated issues and interests tables; negotiations on mutual benefits agreements, planning for the Indigenous Legacy

Benefits Fund; offsetting workplan implementation and related consultation; additional Indigenous Advisory Forums; the creation of an Indigenous Advisory Committee; Indigenous Monitoring Plan, and Indigenous Training, Employment and Procurement Plan; and Indigenous representation on the Follow-up Program Advisory Committee.

3. Summary of remarks on the extensive environmental assessment

These Closing Remarks summarize the position of the VFPA on several key issues raised during the public hearing. The Closing Remarks are organized to correspond to the topic-specific sessions in the public hearing. The summary below provides an overview of the central themes of the VFPA's Closing Remarks on the extensive environmental assessment of the Project.

(a) Large team of independent consultants

The VFPA's assessment of the potential environmental impacts of the Project went above and beyond the requirements of such an assessment. Leading scientists from a wide range of disciplines have provided their expertise to the VFPA to determine how the Project may interact with the physical, biophysical, and human environment. Throughout the assessment, the VFPA has not only brought this expertise to bear on the Project, the VFPA has also supported, funded, and facilitated a number of studies that have advanced the scientific understanding of a wide range of topics.

Prior to submitting the Project Description for the Project, the VFPA established a technical advisory group (**TAG**) process to engage and consult with leading technical experts and federal and provincial regulators and agencies with respect to four key issues: coastal geomorphology, productive capacity, biofilm and shorebirds, and southern resident killer whales (**SRKW**). The TAGs provided recommendations for the assessment of these key issues, including identifying appropriate valued components, intermediate components, sub-components, and indicator species as well as recommending environmental assessment methodologies. The TAGs also recommended key environmental models to assist in the prediction of potential environmental effects. This included, for example, the recommendation to use the Ecopath with Ecosim and Ecospace model, a locally developed and world leading productivity modelling tool capable of considering an ecosystem in its entirety, including individual species, their food web linkages, net changes in productivity, and their habitat and environmental preferences, to build a site specific Roberts Bank productivity model.

(b) Extensive and detailed scientific studies

Building on decades of environmental study of Roberts Bank, in 2011 the VFPA commenced a program that included 77 individual studies, resulting in over 35,000 hours of fieldwork with contributions from Indigenous groups, regulators, and over 100 professional scientists. In doing so, the VFPA has not only applied the best available science to the assessment of

Project-related effects, the VFPA has also advanced the science in a number of significant areas.

Of note, a substantial part of this work has focused on developing a greater understanding of biofilm, an important food source for shorebirds that use Roberts Bank during migration. Building on comments, input and feedback received through the TAG process, the VFPA has conducted over twenty biofilm studies. This includes three years of annual biofilm surveys between 2015 and 2018 to determine, among other things, how biofilm production reacts to natural variations in salinity. Through this work, the VFPA is further advancing the scientific understanding of biofilm as a component of the Roberts Bank ecosystem.

The results of these studies and others has strengthened the conclusions of the VFPA's environmental assessment.

(c) Multiple lines of evidence

The VFPA's independent environmental consultants relied on multiple lines of evidence and applied their expertise to integrating those lines of evidence to ensure a robust and comprehensive assessment. Lines of evidence included field studies, literature review, modelling, the results of other environmental assessments, the incorporation of ITK, past VFPA experience at Roberts Bank, and professional judgment.

(d) Conservative assessment

The VFPA adopted a conservative and precautionary approach throughout the assessment, in acknowledgement of the predictive nature of environmental assessment, and the associated uncertainty that is inherent. The assessment is based on the most stringent applicable standards for intermediate and valued components. Where the VFPA has applied modelling to its assessment, it has incorporated a number of conservative assumptions and estimates into that modelling, ensuring that modelled outcomes are more conservative than measured and observed results are likely to be. Where possible, the VFPA has confirmed this conservative modelling through actual observation and measured data.

As an example of a conservative approach applied in the assessment, the VFPA's approach to assessing Project effects on juvenile Chinook and chum salmon was precautionary in nature. The ecosystem model forecasted a minor increase in juvenile salmon productivity, with the Project. However, to account for potential effects on juvenile salmon that may result from Project construction and operation that were not captured by the ecosystem model, the VFPA integrated other lines of evidence into a qualitative assessment of juvenile Chinook and chum salmon. As other lines of evidence suggest that potential Project-related effects on juvenile salmon would be negative, the VFPA determined that prior to mitigation, the Project may result in a minor loss in juvenile salmon productivity.

(e) Additional work in response to concerns

Throughout the environmental assessment, including the public hearing, the VFPA heard concerns from the public, regulators, Indigenous groups, and stakeholders and aimed to address these concerns where feasible. This includes further investigation into concerns through meetings, conducting additional studies, providing additional analysis through IR responses, developing mitigation measures, and Follow-up Program commitments.

For example, the VFPA undertook over a year of technical work in response to concerns raised by Indigenous groups about the effects of an intermediate transfer pit on Dungeness crabs, crab health, and the exercise of Aboriginal and treaty harvesting rights and access within the Project area. As a result of additional technical work performed in response to this feedback, the VFPA determined that an intermediate transfer pit would no longer be required as a temporary storage location during Project construction. Eliminating this feature made it possible to avoid the anticipated temporary effects on the crab population, and addressed the concerns of Indigenous harvesters.

(f) Overall conclusions respecting environmental effects

Following the application of the proposed mitigation measures, the VFPA is confident that the Project will not result in any significant adverse environmental or socio-economic effects. However, the VFPA has predicted the Project would result in a minor but measurable adverse residual effect for acoustic disturbance and behavioural effects to SRKW resulting from underwater noise at the Project site (corresponding to a predicted increase in disturbance of 0.016%, or 1.4 hours per whale per year, based on the potential for SRKW to be present at the same time as the incremental underwater noise being generated by the Project). This residual effect of the Project alone will not significantly affect the SRKW population, and will not jeopardize the survival or recovery of SRKW. Past activities, such as hunting and capture, have caused the SRKW's endangered status, so the VFPA took the conservative approach of assuming that SRKW have already been significantly adversely affected under existing conditions due to other physical activities that have been carried out. Although the VFPA assessed the Project contribution to acoustic disturbance and behavioural effects due to underwater noise to be not significant, when examined in combination with the effects of other past and current activities, the VFPA acknowledges the cumulative residual effect will still be significant. That is, the cumulative effect currently experienced by SRKW under existing conditions will remain significant, but will not meaningfully worsen, with the Project.

4. Detailed commitments for mitigation, including offsetting, and Follow-up Program

The VFPA has committed to adopting all technically and economically feasible mitigation measures within the VFPA's care and control to reduce the environmental effects of the Project. The VFPA has made extensive commitments to address potential effects of the

Project, including commitments for environmental management plans, specific mitigation measures, offsetting, and 24 Follow-up Program elements.

In selecting mitigation measures for the Project, the VFPA adopted a hierarchy. First, the VFPA considered measures that would avoid potential adverse effects. Second, the VFPA considered measures that would reduce and control potential adverse effects. Third, the VFPA considered measures that would offset potential adverse effects.

The measures to avoid and reduce the effects of the Project include Project design elements, and the development of comprehensive environmental management plans and sub-plans for both the construction and operation phases of the Project. The purpose of these environmental management plans is to ensure that proper measures and controls are in place to prevent or reduce adverse environmental effects and to provide clearly defined action plans and emergency response procedures to protect the environment as well as human health and safety. Upon Project approval, the VFPA will develop these environmental management plans and sub-plans in collaboration with relevant regulatory agencies and organizations, Tsawwassen First Nation, Musqueam First Nation and other Indigenous groups, and regional stakeholders such as the City of Delta, to ensure the plans address regulatory requirements and standards. The development of the environmental management plans will incorporate VFPA commitments to mitigation measures, as presented in the Updated Project Commitments. The VFPA will provide drafts for review to the parties it has consulted a minimum of 90 days prior to the start of construction, and the final environmental management plans will be made public on the VFPA website.

Offsetting is a key component of the VFPA's efforts to mitigate the effects of the Project. The VFPA has a proven track record of successfully creating and maintaining offsetting projects. The VFPA has proposed onsite offsetting across five habitat types to create and enhance biophysical habitats that support species of the Roberts Bank ecosystem. Based on feedback received from Indigenous groups through the Indigenous Advisory Forums, the VFPA will enhance the proposed offsetting, including prioritizing habitats that support species of special concern to Indigenous groups, including juvenile salmon and crab.

The VFPA has also committed to a Follow-up Program to address any uncertainty in either the effects predictions or the effectiveness of mitigation. The Follow-up Program will provide greater confidence in environmental management and also ensure that unexpected environmental consequences that may result from uncertainty are corrected in a timely fashion. If the Follow-up Program results indicate an adverse effect, and if evaluation has confirmed that the cause for the detected adverse effect is Project-related, the VFPA will initiate adaptive management. The Follow-up Program development will include consultation with Indigenous groups, and the Follow-up Program Advisory Committee governance will include two Indigenous group nominees; representatives from Tsawwassen First Nation and Musqueam First Nation. Indigenous perspectives, knowledge, and priorities will enhance the evaluation of monitoring data and input into any required adaptive management recommendations.

With respect to marine shipping associated with the Project, the VFPA has not committed to mitigation measures beyond the boundaries of its jurisdiction and control. However, the VFPA supports a number of regional initiatives, such as the federal government's Oceans Protection Plan and the port authority-led Enhancing Cetacean Habitat and Observation (ECHO) Program, which aims to mitigate the overall regional effects of marine shipping. The VFPA has committed to continue to collaborate with agencies leading regional initiatives, when requested, and will actively participate as a key stakeholder in the Oceans Protection Plan Working Group as well as the ECHO Program. The VFPA will also continue its own consultation with Indigenous groups on Project-associated marine shipping, in alignment and collaboration as appropriate with regional initiatives.

5. Substantial socio-economic benefits

The Project will generate socio-economic benefits for all Canadians, but particularly for local communities and municipalities through payments of taxes, payments in lieu of taxes, local employment, and contributions to economic development.

During construction, the Project will generate an estimated \$174 million in provincial and local government taxes and fees, as well as \$127 million in federal tax revenues. During operation, on-terminal activities will generate \$19.7 million in provincial and local government revenues annually.

The Project will generate an estimated 12,700 person-years of direct, indirect, and induced employment for British Columbians during construction, including 4,150 person-years of direct employment from on-terminal construction activities. These jobs will generate \$1 billion in labour income, and an estimated \$1.3 billion in revenues for BC businesses supplying materials and goods and services for construction activities, of which \$837 million is expected to accrue to supplier industries for Metro Vancouver.

During operation, on-terminal activities related to the Project will generate an estimated 1,550 person-years of direct, indirect, and induced employment each year, including 928 person-years of direct employment, a majority of which is expected to be unionized and accruing within Metro Vancouver. This will generate \$186 million in labour income annually, as well as \$33 million in revenues for BC suppliers and services.

The VFPA is also committed to developing an Indigenous Training, Employment, and Procurement Plan for the Project to ensure that socio-economic benefits from the Project flow to Indigenous groups. The VFPA will develop this plan in collaboration with Indigenous groups and through the Indigenous Advisory Committee prior to commencing Project construction.

6. Justification

Upon receipt of the Review Panel's report, the Minister of Environment and Climate Change must decide if, taking into account the implementation of any mitigation measures the Minister considers appropriate, the Project is likely or is not likely to cause significant

adverse environmental effects. If the Minister decides the Project is likely to cause significant adverse environmental effects, the Minister must then refer to the Governor in Council the matter of whether those effects are justified in the circumstances.

The VFPA's assessment has shown that with mitigation, the Project, when examined alone, will not result in significant adverse environmental effects. However, the VFPA has predicted the Project to result in an adverse residual effect for acoustic disturbance and behavioural effects to SRKW resulting from underwater noise. This residual effect alone is not expected to significantly affect the SRKW population, and will not jeopardize the survival or recovery of SRKW. Further, due to past activities resulting in SRKW's endangered status, the VFPA took the conservative approach of assuming that SRKW were already experiencing significant cumulative adverse effects under existing conditions.

The predicted minor contribution to the already significant cumulative existing conditions of SRKW can be justified in the circumstances, given the benefits to both the local economy and Canada as a whole.

The VFPA has a mandate to facilitate Canada's trade and protect the environment, and it has designed the Project to minimize, mitigate, and offset the environmental effects to the greatest extent possible, while taking into account and addressing concerns of Indigenous groups.

7. Conclusions

The VFPA has conducted a thorough and comprehensive environmental assessment of RBT2. In conducting the environmental assessment, the VFPA has consulted extensively with Indigenous groups and the public, and engaged with regulatory agencies through TAGs and through ongoing communications and responses to submissions and IRs.

Throughout the environmental assessment process, including the public hearing, the VFPA has listened carefully to all points of view and has responded to questions and concerns in a responsible and respectful manner.

The VFPA is confident in its conclusion that the Project will not result in any significant adverse effects on any of the valued environmental or socio-economic components, after taking into account design measures to avoid potential effects, mitigation measures to reduce potential effects, and offsetting measures.

The VFPA requests that the Review Panel, in its report to the Minister, make a recommendation that RBT2 be approved. The VFPA acknowledges DFO's position that a *SARA* permit or a *SARA*-compliant *Fisheries Act Authorization* would be required, and is committed to working with DFO in this permitting process. The VFPA is confident that the requirements of *SARA* can be met.

LIST OF ACRONYMS

Acronym	Definition
2004 MOA	Memorandum of agreement between the VFPA and Tsawwassen First Nation. Posted as CEAR Doc 1995.
2018 Mercator Report	Mercator International (2018), <i>Roberts Bank Terminal 2 Container Vessel Call Forecast Study</i> . Provided in CEAR Doc 1362.
AICFA	Area I Crab Fisherman Association
AIEIS	Additional Information to the Environmental Impact Statement – <i>WSÁNEĆ</i> Nation. Posted as CEAR Doc 930.
AIMSA	Additional Information to the Marine Shipping Addendum – Musqueam First Nation and Tsleil-Waututh Nation. Posted as CEAR Doc 572.
AIS	Automatic Identification System
AQ Study	RBT2 Air Quality Study. Provided in CEAR Doc 181, EIS, Volume 2, as Appendix 9.2-A.
AQSS	Air Quality Scoping Study
Area I	Crab Management Area I
ARM	Ambient Ratio Method
CAAQS	Canadian Ambient Air Quality Standards
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CD	Chart datum
CEA Agency	Canadian Environmental Assessment Agency
<i>CEAA 2012</i>	<i>Canadian Environmental Assessment Act, 2012</i>
CEAR	Canadian Environmental Assessment Registry
Conservation Agreement	Conservation Agreement signed on May 10, 2019 pursuant to section 11 of the <i>Species at Risk Act</i> to support southern resident killer whale recovery. Provided in CEAR Doc 1785.
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPUE	Catch per unit effort
CSAP System	Collaborative Situational Awareness Portal
CSAS	Canadian Science Advisory Secretariat
Current Use	Current use of lands and resources for traditional purposes
CWCS	Canadian Wetland Classification System
CWS	Canadian Wildlife Service
Delta Police	Delta Police Department
DFO	Fisheries and Oceans Canada
DP3 Project	Deltaport Third Berth Project
DP4 project	Deltaport Fourth Berth project

Acronym	Definition
DP4 PPE	Preliminary Project Enquiry for the DP4 project submitted by GCT to the VFPA
EAO	British Columbia Environmental Assessment Office
ECCC	Environment and Climate Change Canada
ECHO Program	Enhancing Cetacean Habitat and Observation Program
EIS	Environmental Impact Statement. Posted as CEAR Doc 181.
EIS Guidelines	<i>Guidelines for the Preparation of an Environmental Impact Statement for the Roberts Bank Terminal 2 Project.</i> Unless otherwise specified, all references to the EIS Guidelines in this submission should be read as references to CEAR Doc 1680, the Updated EIS Guidelines dated April 24, 2019.
EWE	Ecopath with Ecosim and Ecospace
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
FREMP	Fraser River Estuary Management Program
FSC	Food, social, and ceremonial
GCT	Global Container Terminals Canada
GMT	George Massey Tunnel
GPS	Global positioning system
HHRA	Human health risk assessment
HIA	Health impact assessment
IMO	International Maritime Organization
IR	Information request
ITK	Indigenous traditional knowledge
ITP	Intermediate transfer pit
ITT	Issue-tracking table
IY	Intermodal yard
LFN	Low frequency noise
L_{max}	Maximum sound level
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973
MCTS	Marine Communication Traffic Services
MNBC	Métis Nation BC
MSA	Marine Shipping Addendum. Posted as CEAR Doc 316.
NCA	Navigational closure area
NOAA	National Oceanic and Atmospheric Administration
NRCan	Natural Resources Canada
NWPCAS	Northwest Ports Clean Air Strategy

Acronym	Definition
OLM	Ozone Limiting Method
Operational Policy Statement	The Canadian Environmental Assessment Agency's Operational Policy Statement: Addressing "Purpose of" and "Alternative Means" under the <i>Canadian Environmental Assessment Act, 2012</i>
OPP	Oceans Protection Plan
OSC	Ocean Shipping Consultants
PCB	Polychlorinated biphenyl
PCoD	Population Consequence of Disturbance
PCU	Project Construction Update. Posted as CEAR Doc 1210.
Project	Roberts Bank Terminal 2 Project (see also RBT2)
PUFA	Polyunsaturated fatty acids
PVA	Population viability analysis
RBT2	Roberts Bank Terminal 2 Project (see also Project)
Review Panel	Independent federally appointed review panel for the Roberts Bank Terminal 2 Project
SARA	<i>Species at Risk Act</i>
Schnurr Paper	Schnurr et al (2019), <i>Seasonal changes in fatty acid composition of estuarine intertidal biofilm: Implications for western sandpiper migration</i> . Provided in CEAR Doc 1775.
Schwenk Paper	Schwenk et al. (2013), <i>Lipid content in 19 brackish and marine microalgae: influence of growth phase, salinity and temperature</i> . Provided in CEAR Doc 1841.
Seaport Report	Seaport Consultants Canada Inc. (2014), <i>Update of Projections of Container Ship Characteristics for Roberts Bank Terminal 2</i> . Provided in CEAR Doc 667, at Appendix A.
SFOM	Shorebird Foraging Opportunity Model
SLR	Sea level rise
SOPF	Ship-source Oil Pollution Fund
SRKW	Southern resident killer whale
TAG	Technical advisory group
TEU	Twenty-foot equivalent unit
TFN	Tsawwassen First Nation
TSS	Total suspended solids
VFPA	Vancouver Fraser Port Authority
VFPA Navigational Jurisdiction Area	The VFPA's geographic area of jurisdiction, depicted in Figure 1-1 of the MSA
VPA	Vancouver Port Authority, now referred to as the VFPA
WCMRC	Western Canada Marine Response Corporation

Acronym	Definition
WESA	Western sandpiper
WFA	Wetlands functions assessment
WorleyParsons Report	WorleyParsons Canada (2011), <i>Projections of Vessel Calls and Movements at the Roberts Bank Marine Terminals</i> . Provided in CEAR Doc 667, at Appendix A.

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CHAPTER I. INTRODUCTION

These Closing Remarks are comprised of 21 chapters that describe the position of the VFPA with regard to the topics presented at the public hearing for the Roberts Bank Terminal 2 Project (**RBT2** or the **Project**), and throughout the environmental assessment process. As specified in the Public Hearing Procedures issued by the Review Panel, these Closing Remarks are based on the extensive public record. These Closing Remarks provide a summary of the evidence submitted by the Vancouver Fraser Port Authority (**VFPA**) as the proponent of the Project, beginning with the Project Description filed in September 2013, the environmental impact statement (**EIS**) filed in March 2015, the Marine Shipping Addendum (**MSA**) submitted in October 2015, responses to information requests (**IRs**) of the Canadian Environmental Assessment Agency (**CEA Agency**), responses to IRs of the Review Panel, supplementary documents and information, and presentations during the public hearing commencing on May 14, 2019 and ending on June 24, 2019.

The Closing Remarks begin with chapters on the following:

- Chapter II. The Environmental Assessment Process and the Review Panel's Mandate;
- Chapter III. Project Proponent and Rationale, Project Design, and Alternative Means;
- Chapter IV. Marine Shipping and Accidents or Malfunctions;
- Chapter V. Regulatory Engagement and Public Consultation; and
- Chapter VI. Indigenous Consultation and Engagement.

The Closing Remarks then include chapters on each of the topics addressed in the topic-specific sessions of the public hearing. These chapters generally follow the same order as the topic-specific sessions, and are listed below:

- Chapter VII. Effects Assessment Methodology;
- Chapter VIII. Environmental Modelling – Roberts Bank Ecosystem Model;
- Chapter IX. Offsetting;
- Chapter X. Marine Fish;
- Chapter XI. Marine Invertebrates;
- Chapter XII. Marine Commercial Use;
- Chapter XIII. Marine Mammals and Underwater Noise;
- Chapter XIV. Marine Vegetation and Wetlands;
- Chapter XV. Shorebirds and Biofilm;
- Chapter XVI. Coastal Birds;
- Chapter XVII. Air Quality;
- Chapter XVIII. Noise and Vibration;
- Chapter XIX. Human Health; and
- Chapter XX. Socio-economics.

The Closing Remarks conclude with the following:

- Chapter XXI. Justification and Conclusions; and

- Appendix A. Summary of Recommended Mitigation Measures.

Appendix A provides a summary of each mitigation or commitment recommended by regulatory agencies, along with a description of the VFPA commitments that align with the recommendation or, as applicable, a rationale for why the VFPA does not support the recommendation.

Within each of the chapters on specific topics, the Closing Remarks include sections as follows:

- A. VFPA evidence;
- B. Overview;
- C. Key issues raised and VFPA response; and
- D. Conclusion.

In the section on key issues raised and VFPA response, the Closing Remarks identify a number of key issues, particularly those brought forward during the public hearing. It should be noted that these Closing Remarks do not attempt to address each and every issue, concern, or recommendation raised by participants. The VFPA has considered all issues, concerns, and recommendations raised by participants, but it is not practical to address each of these in the Closing Remarks. The fact that the Closing Remarks do not address any particular issue, concern, or recommendation should not be taken as indicating acceptance of that issue, concern, or recommendations. The VFPA is committed to following up directly with participants on issues, concerns, and recommendations raised as appropriate, through the avenues described in Chapters V and VI of these Closing Remarks.

CHAPTER II. THE ENVIRONMENTAL ASSESSMENT PROCESS AND THE REVIEW PANEL'S MANDATE

1. Overview

The VFPA proposes to construct a new three-berth marine container terminal adjacent to the existing terminals at Roberts Bank. The new terminal will provide additional capacity for 2.4 million twenty-foot equivalent units (**TEUs**) and is necessary to meet expanding container demand on Canada's west coast. The Project is also expected to provide approximately 1,500 full-time, on-terminal jobs during operation, as well as close to 11,000 full-time jobs generated by off-terminal activities such as trucking and warehousing.

In addition to the construction of the new terminal, the VFPA proposes to expand the existing causeway connecting the Roberts Bank terminals to the mainland and the existing tug basin. Both expansions will facilitate the efficient operation of the existing terminals as well as the operations at the new marine terminal.

The Project is a designated project for the purposes of the *Canadian Environmental Assessment Act, 2012*¹ (**CEAA 2012**), and is therefore subject to environmental assessment. On January 7, 2014, the Minister of the Environment referred the Project to an independent review panel.² The Minister of Environment and Climate Change subsequently established the Review Panel on May 31, 2016.³

The purpose of the environmental assessment is to ensure that decision makers for the Project identify and consider the environmental effects of the Project along with the Project's benefits before the Project is allowed to proceed. The Supreme Court of Canada has confirmed that environmental assessment is a planning tool to assist in the decision-making process for designated projects:

Environmental impact assessment is, in its simplest form, a planning tool that is now generally regarded as an integral component of sound decision-making. Its fundamental purpose is summarized by R. Cotton and D. P. Emond in "Environmental Impact Assessment", in J. Swaigen, ed., *Environmental Rights in Canada* (1981), 245, at p. 247:

The basic concepts behind environmental assessment are simply stated: (1) early identification and evaluation of all potential environmental consequences of a proposed undertaking; (2) decision making that both guarantees the adequacy of this process and

¹ SC 2012, c 19, s 52.

² CEAR Doc 10, Notice of Referral to a Review Panel.

³ CEAR Doc 408, News Release: Establishment of Review Panel.

reconciles, to the greatest extent possible, the proponent's development desires with environmental protection and preservation.

As a planning tool it has both an information-gathering and a decision-making component which provide the decision maker with an objective basis for granting or denying approval for a proposed development; see M.I. Jeffery, *Environmental Approvals in Canada* (1989), at p. 1.2 {SS} 1.4; D.P. Emond, *Environmental Assessment Law in Canada* (1978), at p.5. In short, environmental impact assessment is simply descriptive of a process of decision-making.⁴

The environmental assessment must balance the Project against the unique ecological circumstances of the area in question so as to promote sustainable development in a coordinated manner.⁵

The environmental assessment of the Project has involved a thorough, six-year process in which the VFPA's evidence has been rigorously tested. The process has allowed for extensive participation by Indigenous groups, the public, regulators, and stakeholders. The VFPA has demonstrated that the Project meets all applicable standards and regulatory requirements. The VFPA has demonstrated that the Project will have no significant adverse environmental effects or cumulative effects. With respect to southern resident killer whales (**SRKW**), the VFPA conservatively assumed that SRKW have already been significantly adversely affected due to other physical activities that have been carried out. Although the VFPA assessed the Project contribution to acoustic disturbance and behaviour effects on SRKW due to underwater noise to be not significant, the VFPA acknowledges the cumulative residual effect is significant. That is to say, the cumulative effect currently experienced by SRKW under existing conditions will remain significant, but will not measurably worsen with the Project.

As discussed in Chapter III of these Closing Remarks, the VFPA began planning for the development of a second container terminal at Roberts Bank in the late 1990s. The VFPA subsequently decided to advance RBT2 in 2011. Building on decades of available environmental study at Roberts Bank, the VFPA commissioned an additional 77 studies, resulting in over 35,000 hours of field work with contributions by Indigenous groups, regulators, and over 100 professional scientists. The VFPA has made the terms of reference for those studies and all available prior study reports available on the Project's website, and continues to provide regular notifications to inform local governments, Indigenous groups, and the public about ongoing environmental studies.⁶

⁴ *Friends of the Oldman River Society v Canada (Minister of Transport)*, [1992] 1 SCR 3 at para 103.

⁵ *Bow Valley Naturalists Society v Canada (minister of Canadian Heritage)*, [1999] FCJ No 1422 (TD) at para 25; aff'd [2001] 2 FC 461 (CA).

⁶ CEAR Doc 1341, Project Overview and Rationale, at p. 30.

In 2012 and 2013, the VFPA established four Technical Advisory Groups (**TAGs**) to improve the relevance, quality, rigour, and completeness of studies and information submitted as part of the Project. These groups, comprised of local and international scientific and technical experts, have provided the VFPA with expert advice regarding four key environmental aspects of the Roberts Bank ecosystem:

- Biofilm and shorebirds;
- Coastal geomorphology;
- Productive capacity; and
- SRKW.

The VFPA has incorporated the information from these TAGs into its submissions in the environmental assessment, and continues to rely on the information and advice received during the TAG process to improve the Project.

The VFPA submitted its project description for the Project on September 23, 2013, following more than a decade of analysis to determine how best to address the looming shortfall in marine terminal container capacity. This work includes consideration of the most efficient and least disruptive design for the Project, extensive stakeholder engagement with industry, local communities, and Indigenous groups, and efforts to build and improve on existing VFPA facilities.

On January 7, 2014, the Minister issued *Guidelines for the Preparation of an Environmental Impact Statement for the Roberts Bank Terminal 2 Project (EIS Guidelines)*, which specified the nature, scope, and extent of the information required for the environmental assessment of the Project, including a description of the project, existing environment, predicted environmental effects, and proposed measures to mitigate any adverse environmental effects.⁷ As discussed in Section 7, below, the Minister subsequently issued Final EIS Guidelines on April 24, 2019 to include Project-related marine shipping and socio-economic effects.⁸

In accordance with the EIS Guidelines and with the CEA Agency's Policy and Guidance, the VFPA submitted its EIS on March 27, 2015, following over a year of further environmental and technical studies, and stakeholder consultation. The EIS consists of five volumes:

- Volume 1: Introduction and Project Information;
- Volume 2: Effects Assessment Methods and Physical Setting;
- Volume 3: Biophysical Effects Assessments;
- Volume 4: Socio-Economic Effects Assessments; and
- Volume 5: Environmental Management, Aboriginal Rights and Interests, Conclusions and Summaries.

⁷ CEAR Doc 12, EIS Guidelines.

⁸ CEAR Doc 1680, EIS Guidelines.

In total, the EIS contains over 7,600 pages of detailed information, studies, figures, and analysis of the potential impacts of the Project on the environment. The information presented is comprehensive and responsive to both the EIS Guidelines and the requirements of *CEAA 2012*.

In October 2015, the VFPA also submitted the MSA, totalling more than 1,400 pages, based on additional environmental analysis and consultation with Indigenous groups and stakeholders.⁹

The EIS and the MSA, as clarified and amended by the VFPA's subsequent filings and responses to over 350 IRs, constitutes a rigorous assessment of the effects of the Project, including cumulative effects, and satisfies all legal requirements. Furthermore, in response to these IRs, the VFPA has clarified existing information, conducted additional research and stakeholder consultation, and provided supplemental information with respect to project design, construction activities and schedules, operation, environmental effects, and socio-economic effects. The VFPA has also amended the construction methods based on the additional information in the IR responses.

Over the course of the environmental assessment of the Project, the CEA Agency and the Review Panel (in the sufficiency phase) have provided opportunities for stakeholder engagement through public comment periods. To date, there have been eight public comment periods, addressing each of the following steps in the environmental assessment process:

Step in the Environmental Assessment Process	Public Comment Period
Summary of the Project Description ¹⁰	September 23, 2013 to October 15, 2013
Draft Environmental Impact Statement Guidelines ¹¹	November 8, 2013 to December 8, 2013
Draft Terms of Reference for Review Panel ¹²	August 22, 2014 to September 22, 2014
Environmental Impact Statement ¹³	April 30, 2015 to June 15, 2015
Addendum to the Environmental Impact Statement (Marine Shipping Addendum) ¹⁴	November 12, 2015 to December 16, 2015
Sufficiency and Technical Merit of Information Submitted (EIS) ¹⁵	June 16, 2016 to October 14, 2016 – subsequently extended to October 28, 2016 ¹⁶
Sufficiency of Information (Information Requests Part 1) and Draft Hearing Procedures ¹⁷	July 6, 2018 to October 5, 2018

⁹ CEAR Doc 316, MSA.

¹⁰ CEAR Doc 3, Public Notice: Public Comments Invited on a Summary of the Project Description.

¹¹ CEAR Doc 8, Public Notice: Public Comments Invited on the Draft EIS Guidelines.

¹² CEAR Doc 62, Public Notice: RBT2 Project - Public Comment Invited on Draft Terms of Reference.

¹³ CEAR Doc 184, Public Notice: RBT2 Project - Public Comment Period on EIS.

¹⁴ CEAR Doc 319, Public Notice: RBT2 Project - Public Comment Invited on the Addendum to the EIS.

¹⁵ CEAR Doc 441, Public Notice - RBT2 Project - Comment Period and Orientation Session.

¹⁶ CEAR Doc 550, Public Notice - RBT2 Project - Change in Comment Period Deadline.

¹⁷ CEAR Doc 1219, Public Notice - RBT2 Project - Review Panel Invites Public Comments on Sufficiency of Information and Draft Public Hearing Procedures.

Step in the Environmental Assessment Process	Public Comment Period
Sufficiency of Information (Information Requests Part 2) ¹⁸	December 4, 2018 to February 8, 2019

On March 1, 2019, the Review Panel confirmed that the information provided by the VFPA was sufficient to proceed to the public hearing phase, announced the date for commencement of the public hearing on May 14, 2019 and issued its Public Hearing Procedures (dated February 2019 and later updated May 2019), which provided information to all participants as to when and how to file their evidence and how to participate in the public hearing.

From May 14, 2019 to June 24, 2019, the Review Panel held the public hearing for the Project. The hearing comprised of three types of sessions:

- General sessions, which allowed local residents to provide information to the Review Panel and the VFPA with respect to potential effects of the Project and marine shipping associated with the Project;
- Community sessions, held in Indigenous communities, which allowed Indigenous groups to present information to the Review Panel and the VFPA;
- Topic-specific sessions, which allowed for scrutiny of technical aspects of the Project and associated marine shipping, including presentations by experts who possess specialized knowledge or expertise on the results of their technical review of the potential environmental effects of the Project and marine shipping associated with the Project.

Since the VFPA submitted its application for the Project, the CEA Agency has maintained an online public registry of all the information, data, environmental studies, participant submissions, and correspondence associated with the Project. As of June 28, 2019 (the day the public registry closed but for the submission of Closing Remarks), this registry consisted of 2,000 entries.

It is clear that the environmental assessment process for the Project has been thorough and complete. All stakeholders have had multiple opportunities to make submissions on all stages of the environmental assessment. All parties have had an opportunity to become familiar with the Project, understand the evidence and have their voices heard. The process has clearly been fair, reasonable, open, and transparent. It has met the natural justice requirements for notice, an opportunity to know the case to be met, and to be heard throughout.

2. Requirements of CEAA 2012

The Project is a designated project for the purposes of CEAA 2012.¹⁹ It is therefore subject to environmental assessment under that Act. The purpose of an environmental assessment

¹⁸ CEAR Doc 1366, Public Notice - RBT2 Project - Review Panel Invites Public Comments on Sufficiency of Information.

under *CEAA 2012* is to determine whether a designated Project is likely to cause significant adverse environmental effects after taking into account mitigation measures. If significant adverse environmental effects cannot be avoided, the Governor in Council will determine whether those effects are justified in the circumstances before the Project may proceed.

The environmental assessment of the Project has been conducted in accordance with the purposes of *CEAA 2012*, which are set out in section 4 of that Act.

In conducting the environmental assessment of the Project, the Review Panel must take into account the factors listed in subsections 19(1) and 19(3) of *CEAA 2012*, which include the following:

- The environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other physical activities that have been or will be carried out;
- The significance of the effects referred to in the preceding paragraph;
- Comments from the public that are received in accordance with *CEAA 2012*;
- Mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;
- The requirements of the follow-up program in respect of the project;
- The purpose of the project;
- Alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- Any change to the project that may be caused by the environment; and
- Community knowledge and Aboriginal traditional knowledge.

The Minister of Environment determines the scope of factors for the purposes of subsection 19(1) of *CEAA 2012*.²⁰ The Minister of Environment determined that the scope of the Project includes the construction, operation, and, where relevant, the decommissioning of the project components and physical activities of the Project, as set out at section 7.1 and 7.2 of the EIS Guidelines, respectively.²¹

The Minister determined the scope of the assessment includes the effects of Project components and activities on the environment, including those that may extend beyond the scope of the Project itself.²² The Minister also provided guidance for determining the scope of factors to be considered in the assessment, and the spatial and temporal boundaries of the assessment.²³

¹⁹ Construction of new marine terminals are designated projects, pursuant to s. 1(g) of the Schedule in the *Regulations Designating Physical Activities*, SOR/2012-147.

²⁰ *CEAA 2012*, at s. 19(2).

²¹ CEAR Doc 176, Terms of Reference, at s. 2.5.

²² CEAR Doc 1680, EIS Guidelines, at s. 3.2.

²³ CEAR Doc 1680, EIS Guidelines, at s. 3.3.

An environmental effect is defined in *CEAA 2012* as follows:

- 5 (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are
- (a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:
 - (i) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act,
 - (ii) aquatic species as defined in subsection 2(1) of the Species at Risk Act,
 - (iii) migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and
 - (iv) any other component of the environment that is set out in Schedule 2;
 - (b) a change that may be caused to the environment that would occur
 - (i) on federal lands,
 - (ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or
 - (iii) outside Canada; and
 - (c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on
 - (i) health and socio-economic conditions,
 - (ii) physical and cultural heritage,
 - (iii) the current use of lands and resources for traditional purposes, or
 - (iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Cumulative environmental effects are assessed in relation to other factors listed in subsection 19(1) of *CEAA 2012*, based on an examination of physical activities that have been carried out and that are reasonably foreseeable within the spatial and temporal boundaries of the Project. The VFPA's methodology for assessing cumulative effects, set out in Chapter VII of these Closing Remarks, complies with the requirements of *CEAA 2012* and the guidance from the CEA Agency and the Minister of Environment.

The approach and level of effort applied to assessing cumulative environmental effects in a project environmental assessment is established on a case-by-case basis. The CEA Agency

requires that environmental assessment documentation clearly explain and justify the methodology that has been used to assess cumulative effects.²⁴

(a) Distinction between conditions and recommendations

At the end of the environmental assessment, the Review Panel will issue a report to the Minister including the Review Panel's rationale, conclusions, and recommendations, including any mitigation measures and follow-up programs.²⁵ The Minister will then be required to issue a decision under subsection 52(1) of *CEAA 2012*, after taking into account the Review Panel's report.²⁶

The Minister must decide if, taking into account the implementation of any mitigation measures that the decision maker considers appropriate, the designated project is likely to cause significant adverse environmental effects.²⁷ If the Minister decides the Project is not likely to cause significant adverse effects, the Minister may issue the decision statement for the Project. If the Minister decides the Project is likely to cause significant adverse environmental effects, the Minister must refer the Project to the Governor in Council for a decision.²⁸

In either case, the Minister or the Governor in Council must establish the conditions in relation to the environmental effects with which the proponent of the designated project must comply.²⁹ These conditions must include the implementation of the mitigation measures that were taken into account by the Minister in making the decision as to whether the designated project is likely to result in significant adverse environmental effects, as well as the implementation of a follow-up program.³⁰

As discussed below in Section 7, below, the Minister has included marine shipping related to the Project as part of the Project for the purposes of the environmental assessment. As set out in the Updated Project Commitments, the VFPA has committed to a number of Project-related mitigation measures. The VFPA has been careful not to commit to mitigation measures related to marine shipping beyond the boundaries of its jurisdiction and control. However, the VFPA supports a number of regional initiatives, such as the Oceans Protection Plan (the **OPP**) and the Enhancing Cetacean Habitat and Observation Program (the **ECHO Program**), which addresses marine shipping issues that are beyond its jurisdiction and control that mitigate the effects of marine shipping, both Project-associated and other. These regional initiatives should not be considered mitigation measures for the Project itself. It is open to the Review Panel to address the continued implementation of these initiatives in its report as recommendations rather than as conditions.

²⁴ *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act*.

²⁵ *CEAA 2012*, at s. 43(d).

²⁶ *CEAA 2012*, at s. 47.

²⁷ *CEAA 2012*, at s. 52.

²⁸ *CEAA 2012*, at s. 51, 54.

²⁹ *CEAA 2012*, at s. 53(1), 53(2).

³⁰ *CEAA 2012*, at s. 53(4).

In its report, the Review Panel may recommend the following to the Minister:

- Conditions applicable to the VFPA that should be imposed on Project approval; and
- Recommendations for actions or measures to reduce the effects of marine shipping in general, such as the OPP and ECHO Program.

The Review Panel—and the Minister—need not wait until such regional initiatives are completed prior to recommending Project approval. The initiatives described herein are appropriately focused on all marine shipping in the Salish Sea, of which the Project-associated shipping will represent a small portion, and on multi-stakeholder approaches to reducing the effects on SRKW. In the event that additional mitigation measures are identified through these regional initiatives in the future, regardless of whether they are Project-related mitigation measures, the Review Panel and the Minister can reasonably expect that additional measures adopted will also apply to Project-related activities. The courts have held that it is both appropriate and efficient from a policy perspective for one regulator to rely on another's ongoing oversight in the assessment of a project.³¹

Finally, to the extent the Review Panel determines that there are technically and economically feasible measures within the jurisdiction of other federal authorities to reduce the effects of marine shipping, the Review Panel may recommend to the Minister that those federal authorities implement those measures for all vessel traffic in the marine shipping area.

3. Requirements of the *Species at Risk Act*

The environmental assessment of the Project must also comply with the requirements of the *Species at Risk Act* (**SARA**).³² That Act requires the VFPA and the Review Panel to ensure that the assessment of the Project is conducted to achieve the following:

- Promptly notify the competent minister or ministers if the project is likely to affect a listed wildlife species or its critical habitat;³³
- Identify the adverse effects of the project on the listed wildlife species and its critical habitat;³⁴ and
- If the project is carried out, ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures taken must be taken in a way that is consistent with any applicable recovery strategy and action plan.³⁵

The Minister of Environment and Climate Change has incorporated the requirement to address SARA into the EIS Guidelines for the Project.³⁶ The assessment of the Project has met these requirements. The competent ministers (Fisheries and Oceans Canada (**DFO**) and

³¹ *Prairie Acid Rain Coalition v Canada (Minister of Fisheries and Oceans)*, 2006 FCA 31 at para 47.

³² SC 2002, c 29.

³³ SARA, at s. 79(1).

³⁴ SARA, at s. 79(2).

³⁵ SARA, at s. 79(2).

³⁶ CEAR Doc 1680, EIS Guidelines, at s. 3.2.

Environment and Climate Change Canada (**ECCC**) have been notified and have participated fully in the review. The potential effects of the Project on listed species and critical habitat have been fully addressed. Measures have been identified to avoid and monitor these effects. These effects have been discussed in the appropriate chapters of these Closing Remarks.

In particular, it is important to understand that the reference to 'measures' in subsection 79(2) of *SARA* does not refer to 'mitigation measures' as that term is defined in *CEAA 2012*. Instead, the definition of 'measures' in subsection 79(2) of *SARA* is not defined, and has its plain and ordinary meaning, which means "a suitable action to achieve some end."³⁷ Measures, in the context of subsection 79(2), can therefore include a variety of means, including recovery strategies, government programs, or other means to lessen effects on a particular species at risk.

4. Integration of Indigenous traditional knowledge

Indigenous traditional knowledge (**ITK**) is an important part of project planning, resource management and environmental assessment. Subsection 19(3) of *CEAA 2012* gives responsible authorities the direction to consider ITK in any environmental assessment: "The environmental assessment of a designated project may take into account community knowledge and Aboriginal traditional knowledge."

The EIS Guidelines specifically requires the integration of ITK, in particular in the following sections:

- Section 3.3.2, Spatial Boundaries;
- Section 3.3.3, Temporal Boundaries;
- Section 4.2, Study Strategy and Methodology;
- Section 4.4.2, Community Knowledge and Aboriginal Traditional Knowledge;
- Section 9.1.1, Methodology;
- Section 10.2, Adverse Impacts on Aboriginal and Treaty Rights and Related Interests;
- Section 11.2, Measures to Address Impacts on Aboriginal and Treaty Rights; and
- Section 17, Marine Shipping.

The VFPA worked with Indigenous communities to gather ITK to support the assessment. The VFPA's efforts to collect ITK are described in Section 7.2 of the EIS,³⁸ and included literature reviews, ITK meetings and workshops, questions and interviews, and sponsorship of additional studies.

³⁷ *The Canadian Oxford Dictionary*, sub verbo "measure".

³⁸ CEAR Doc 181, EIS, Volume 1, at s. 7.2.1.7.

The VFPA integrated the ITK that was shared by Indigenous groups throughout the environmental assessment, as described in the IR #8³⁹ for the EIS, and MSA IR #4⁴⁰ for the MSA. Examples include the following:

- In the assessment of marine fish, field surveys did not indicate a presence of eulachon in the study area. However, Indigenous groups shared traditional knowledge with the VFPA that eulachon were present at the Roberts Bank area, transiting through the local assessment area on their way to up-river spawning grounds. Based on this information, eulachon were assumed to be present and included in the assessment;^{41,42} and
- In the assessment of marine invertebrates, ITK informed the description of Dungeness crab population characteristics in terms of historical abundance and observed declines. ITK also informed the description of key habitat features of Dungeness crabs, in terms of location, abundance, and seasonality.⁴³

ITK was integrated into the VFPA's assessment of the Project effects, and will continue to form an important part of the ongoing monitoring and follow-up through the Indigenous Advisory Committee, should the Project be approved.

5. Application of the precautionary principle

The EIS Guidelines require the application of the precautionary principle.

The EIS Guidelines list the 'precautionary approach' as one of the guiding principles of the environmental assessment process. Section 2.4 of the EIS Guidelines, entitled 'Application of the Precautionary Approach,' states the following:

"In documenting the analyses included in the EIS, the proponent will demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner in order to *ensure that it would not cause serious or irreversible damage to the environment, especially with respect to environmental functions and integrity, system tolerance and resilience, and the human health of current or future generations*. The proponent will also ensure that in designing and operating the project, priority has been and would be given to strategies that avoid adverse effects." (emphasis added)

Section 10.1 of the EIS Guidelines, under the sub-heading 'Application of the Precautionary Approach', states the following with respect to the precautionary principle:

³⁹ CEAR Doc 314, VFPA response to IR #8.

⁴⁰ CEAR Doc 391, VFPA response to MSA IR #4.

⁴¹ CEAR Doc 181, EIS, Volume 3, at s. 13.2.1.

⁴² CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 51.

⁴³ CEAR Doc 314, VFPA response to IR #8.

"In documenting the analyses included in the EIS, the proponent will:

- demonstrate that all aspects of the project have been examined and planned in a careful and *precautionary manner in order to ensure that they would not cause serious or irreversible damage to the environment, especially with respect to environmental functions and integrity, system tolerance and resilience, and the human health of current or future generations;*
- outline and justify the assumptions made about the effects of all aspects of the project and the approaches to minimize these effects;
- ensure that in designing and operating the project, priority has been and would be given to strategies that avoid the creation of adverse effects;
- develop contingency plans that explicitly address accidents and malfunctions; and
- identify any proposed follow-up and monitoring activities, particularly in areas where scientific uncertainty exists in the prediction of effects."
(emphasis added)

The VFPA's environmental assessment meets these requirements and is consistent with the precautionary principle and is consistent with the Government of Canada's framework for the application of the precautionary principle. In particular, the Government of Canada's framework recognizes that the absence of full scientific certainty should not be used as a reason for postponing decisions where there is a risk of serious or irreversible harm. The framework presents three basic tenets for the application of the precautionary principle to science-based decision making: the need for a decision, the risk of serious or irreversible harm, a lack of full scientific certainty.⁴⁴

The VFPA's assessment is consistent with the precautionary principle and the guidance set out in the framework. As discussed throughout these Closing Remarks, the VFPA has taken a conservative approach to the assessment of the Project. The VFPA has based its assessment on the most stringent applicable standards for all of the valued components. The VFPA has also incorporated a number of conservative assumptions and estimates into its modelling for the Project, ensuring that the modelled outcomes are more conservative than measured and observed results are likely to be. Where possible, the VFPA has confirmed this conservative modelling through actual observation and measured data. As a result, the VFPA is confident that its effects assessment conclusions support a positive recommendation from the Review Panel.

⁴⁴ Government of Canada, 2003, "A framework for the application of precaution in science based-decision making about risk."

6. Relationship between the environmental assessment process and the permitting or regulatory process

As noted above, the environmental assessment process is a planning process involving information gathering, assessment, and decision-making with respect to whether or not a proposed project should be approved and the terms and conditions that should apply.

If the Project is approved, under *CEAA 2012*, it will still require a number of regulatory permits and authorizations. This relationship between the environmental assessment process and the permitting process is summarized in Section 6 of Volume 1 of the EIS. Table 6-1 of that section lists the federal regulatory approvals potentially required for RBT2. As indicated in Chapter III of these Closing Remarks, a disposal at sea permit is not expected to be required based on modifications to the project construction outlined in the Project Construction Update (PCU).

Regulatory approvals that are expected to be required are listed below:

- A *Fisheries Act*, section 35 Authorization respecting construction of in water works;
- An agreement or permit under section 74 of *SARA* in conjunction with the *Fisheries Act*, section 35 Authorization;
- A VFPA project permit pursuant to section 27 of the *Port Authorities Operations Regulations* under the *Canada Marine Act*.

Under section 7 of *CEAA 2012*, the federal authorities exercising these permitting or regulatory functions are precluded from exercising those functions unless and until the project receives approval under *CEAA 2012*.

In undertaking its environmental assessment and review of the Project, the Review Panel can take into account the measures that will be considered and implemented through these regulatory processes, particularly with respect to fish habitat and SRKW. It is submitted that the Review Panel should be careful not to issue recommendations with respect to terms and conditions that may limit the discretion of regulatory authorities.

7. Environmental Impact Statement Guidelines

On January 7, 2014 the Minister of the Environment issued the EIS Guidelines,⁴⁵ which identify the minimum information requirements for the VFPA in developing the EIS. The EIS Guidelines specifies the nature, scope, and extent of the information required, including a description of the Project, existing environment, predicted environmental effects, and proposed measures to mitigate any adverse environmental effects.

On April 17, 2015, the Minister of the Environment issued Updated EIS Guidelines that directed the VFPA to collect information to address two additional topics: marine shipping

⁴⁵ As described below, the Minister subsequently updated the EIS Guidelines on April 17, 2015 and again on April 24, 2019. Unless otherwise specified, all references to the EIS Guidelines in this submission should be read as references to CEAR Doc 1680, the Updated EIS Guidelines dated April 24, 2019.

associated with the Project and the Project's socio-economic effects.⁴⁶ At the same time, the Minister revised the Terms of Reference for the Review Panel to clarify that the Minister considers these components relevant to the environmental assessment of the Project.⁴⁷ The Minister subsequently finalized these revisions on April 24, 2019.⁴⁸

On April 24, 2019 the Minister of Environment and Climate Change amended the Terms of Reference to include marine shipping associated with the Project as part of the definition of the designated project under *CEAA 2012*. The letter from the Minister to the Review Panel, as well as the final amendments to the Review Panel Terms of Reference and the EIS Guidelines can be found on the CEA Agency registry at CEAR Doc 1680.

The EIS Guidelines are guided by four main principles:

- Environmental assessment as a planning tool;
- Public participation;
- Aboriginal engagement; and
- The application of the precautionary approach.⁴⁹

Throughout the environmental assessment, the VFPA has applied these guiding principles. In the preparation of its EIS, the VFPA reached out to a wide range of public and Indigenous groups to better understand the potential environmental impacts of the Project. The VFPA has ensured that all stakeholders have had timely access to relevant information to enable project understanding and to facilitate the determination of potential Project-related effects on Indigenous and other local communities' activities and other interests. The VFPA is committed to maintaining that engagement throughout the life of the Project.

The VFPA has taken a careful and precautionary approach to the environmental assessment and is committed to designing, constructing, and operating the Project in a manner that gives priority to the avoidance and mitigation of adverse effects. The VFPA Environmental Policy includes commitment to the safe, efficient, and environmentally responsible movement of goods and passengers through the port, as well as sustainability, avoidance and reduction of environmental impacts, minimization of environmental risk of port operations, and promotion of continual environmental improvement. The VFPA has applied that Environmental Policy throughout the environmental process.⁵⁰

The EIS Guidelines also provide direction to the VFPA with respect to the scope of the environmental assessment, including the scope of the project, the assessment, and the factors to be considered in the assessment. These factors include valued components—attributes of the physical, biophysical, and human environment that may be affected by the Project that have been identified to be of concern by the VFPA, government agencies,

⁴⁶ CEAR Doc 177, Updated EIS Guidelines.

⁴⁷ CEAR Doc 1680, Terms of Reference, at s. 2.4.

⁴⁸ CEAR Doc 1680, Final Amendments to the EIS Guidelines and Terms of Reference.

⁴⁹ CEAR Doc 1680, EIS Guidelines, at s. 2.

⁵⁰ CEAR Doc 181, EIS, Volume 1, at s. 1.1.1, 1.3.3.2.

Indigenous groups, and the public. The factors also include spatial and temporal boundaries for the assessment of the Project.

As set out further below, the VFPA prepared its EIS and all supplemental submissions pursuant to the EIS Guidelines.

The revision to the EIS Guidelines and Terms of Reference to include marine shipping allows the Minister to fully consider the Panel's conclusions and recommendations with respect to marine shipping associated with the Project in her environmental assessment decision under section 52 of *CEAA 2012*. As the Review Panel confirmed, the revisions to the EIS Guidelines and Terms of Reference did not affect the environmental assessment process:

"This change does not affect the review panel process or the information the Panel is considering in its review. From the beginning of its mandate, the Panel has considered the environmental effects of marine shipping associated with the Project as part of its assessment. The Panel has reviewed the Marine Shipping Addendum and has asked a number of information requests pertaining to marine shipping associated with the Project. The Panel will continue to collect evidence about the potential environmental effects of marine shipping associated with the Project at the public hearing."⁵¹

In response to the requirement to address the marine shipping associated with the Project, the VFPA prepared and submitted the MSA as an addendum to the EIS.⁵² The MSA provides a complete and thorough assessment of marine shipping associated with the Project beyond the VFPA's care and control and extending to the 12 nautical mile limit of Canada's territorial sea.

The regulation of marine shipping associated with the Project falls mostly outside of the VFPA's control. The VFPA is committed to working with industry and government to advance a number of regional initiatives to mitigate any adverse effects of marine shipping, and to better understand the overall environment at Roberts Bank and in the wider Salish Sea. These initiatives include, among other things, the OPP, the ECHO Program, and the Action Plan for Northern and Southern Resident Killer Whales. As indicated above, a distinction should be made between conditions imposed on the VFPA within its jurisdiction and control, and recommendations on matters beyond the VFPA's jurisdiction and control.

The VFPA's commitments to these industry and government initiatives will have both short- and long-term mitigating effects. The information obtained through these programs will assist the VFPA in meeting any conditions, and will also assist other regulators in addressing

⁵¹ CEAR Doc 1682, From the Review Panel Secretariat to the distribution list for the environmental assessment re: Notification of Final Amendments to Review Panel Terms of Reference and Environmental Impact Statement Guidelines.

⁵² CEAR Doc 316, MSA.

environmental issues. It may not be possible to describe all of the mitigation measures that will be implemented over the life of the Project, as the process of assessment is dynamic and ongoing.⁵³ The VFPA is nevertheless committed to identifying and considering all technically and economically feasible mitigation measures to reduce the effects of all Project components and marine shipping associated with the Project.

Such mitigation measures will likely include recommendations to other regulators, such as Transport Canada and DFO. These recommendations should not be addressed to the VFPA through conditions attached to the Project Certificate because the measures are beyond the care and control of the VFPA.

8. The Review Panel's mandate and Terms of Reference

The Review Panel's mandate is defined by the Terms of Reference issued by the Minister of Environment and Climate Change Canada on April 17, 2015, as amended April 2019.⁵⁴

The mandate of the Review Panel is to conduct an assessment of the Project. This is specifically reflected in the Review Panel's Terms of Reference and in the EIS Guidelines. As referenced above, the Review Panel must take into account a number of factors listed in subsections 19(1) and 19(3) of *CEAA 2012*, including alternative means of carrying out the project (RBT2) that are technically and economically feasible, and the environmental effects of such alternative means. Alternative means of carrying out RBT2 are discussed in Chapter III of these Closing Remarks. The Review Panel does not have any mandate to review any other projects brought forward by third parties, including the Deltaport Fourth Berth proposal brought forward to the VFPA in February 2019. That proposal is not an alternative means of carrying out RBT2. It is a separate proposal brought forward by a third party which would require an entirely separate process of environmental assessment and review.

As set out above, on April 24, 2019 the Minister amended the Review Panel Terms of Reference to include marine shipping associated with the Project as part of the definition of the designated project under *CEAA 2012*, for the purposes of the assessment. The change allows the Minister to fully consider the Review Panel's conclusions and recommendations with respect to marine shipping associated with the Project in her environmental assessment decision under section 52 of *CEAA 2012*. Updated EIS Guidelines were also issued on that date.

The Review Panel's mandate is to conduct an assessment of the environmental effects of the Project in a manner consistent with the requirements of *CEAA 2012* and the Terms of

⁵³ *Pembina Institute for Appropriate Development v Canada (Attorney General)*, 2008 FC 302 at para 24.

⁵⁴ All references to the Terms of Reference in these Closing Remarks, unless otherwise specified, refer to the finalized Terms of Reference issued by the Minister of Environment and Climate Change Canada on April 24, 2019. See CEAR Doc 1680.

Reference.⁵⁵ In addition to the requirements of *CEAA 2012*, discussed above, the Terms of Reference include the following specific requirements of the Review Panel:

- Ensure that the information that it uses when conducting the environmental assessment is made available to the public;
- Hold hearings in a manner that offers any interested party an opportunity to participate in the environmental assessment;
- Prepare a report with respect to the environmental assessment that sets out:
 - The rationale, conclusions and recommendations of the Review Panel, including any mitigation measures and follow-up program; and
 - A summary of any comments received from the public, including interested parties;
- Submit the report with respect to the environmental assessment to the Minister; and
- On the request of the Minister, clarify any of the conclusions and recommendations set out in its report with respect to the environmental assessment.⁵⁶

The Review Panel may also receive and take into account information with respect to whether any significant adverse environmental effects may be justified in the circumstances. Should the Minister determine that the Project is likely to cause significant adverse environmental effects, the Minister will refer the matter to the Governor in Council. It is the Governor in Council who will ultimately determine whether those environmental effects are justified in the circumstances.

To fulfill its mandate, the Minister has imbued the Review Panel with all the powers and duties of a panel described in section 45 of *CEAA 2012*, which include the following:

- Powers to summon witnesses and order the witnesses to give evidence, including the same powers to compel the attendance of witnesses as is vested in a court; and
- The authority to hear and accept evidence in confidence, if necessary.

The Minister has provided particular direction to the Review Panel under subsection 19(1)(j) of *CEAA 2012*. Specifically, the Terms of Reference require the Review Panel to take the following into account in the environmental assessment of the Project:

- The potential economic, social, heritage and health effects of the project, including cumulative effects, that may not be encompassed by the definition of environmental effects under *CEAA 2012*, and practicable means to mitigate such potential adverse effects.⁵⁷

As discussed further in Chapter XX of these Closing Remarks, the socio-economic assessment issue is included to facilitate the provincial environmental assessment of the Project.

⁵⁵ CEAR Doc 1680, Terms of Reference, at s. 3.1.

⁵⁶ CEAR Doc 1680, Terms of Reference, at s. 3.2.

⁵⁷ CEAR Doc 1680, Terms of Reference, at s. 2.3.

With respect to consultation with Indigenous groups, the Minister has also mandated the Review Panel to collect information on behalf of the Crown, but has clarified that the federal government maintains the duty to consult throughout the environmental assessment process.⁵⁸ As such, the Review Panel will not make any conclusions or recommendations as to the following:

- The validity of potential or established Aboriginal or treaty rights asserted by an Indigenous group or the strength of such claims;
- The scope of the Crown's duty to consult an Indigenous group;
- Whether the Crown has met its respective duty to consult or accommodate in respect of rights recognized and affirmed by section 35 of the *Constitution Act, 1982*;
- Whether the Project would be an infringement of potential or established Aboriginal or treaty rights; and
- Any matter of treaty interpretation (historic or modern).⁵⁹

Although the Review Panel is not authorized to make any conclusions with respect to Aboriginal rights or title, the Review Panel may use the information received through the Review Panel process to make recommendations, which, if implemented, would avoid or mitigate the environmental effects of the Project, including those environmental effects that might adversely impact potential or established Aboriginal or treaty rights.⁶⁰

The Review Panel is required to complete its mandate and submit its report to the Minister within 430 days of the date of establishment of the Review Panel. This period does not include the time periods between when the Review Panel requests information from the VFPA and when the VFPA submits responses to the IRs.⁶¹

The Review Panel process is divided into three stages: sufficiency review, public hearing, and review panel report.

- In the first stage, the CEA Agency provides the EIS to the Review Panel. The Review Panel then initiates a public comment period to determine whether the information is sufficient. If the information is not sufficient, the Review Panel may request additional information from the VFPA. The Review Panel must allow for review of and comment on additional information it receives. The sufficiency stage continues until the Review Panel determines it has sufficient information to proceed to a public hearing.⁶² The Review Panel determined it had sufficient information to proceed to the hearing on March 1, 2019.
- At the second stage, the Review Panel must hold the public hearing in a manner that offers all interested parties, including Indigenous groups, government bodies, and the public an opportunity to participate in the public hearing process. The Terms of Reference direct the Review Panel to, where practicable, hold the public hearing in

⁵⁸ CEAR Doc 1680, Terms of Reference, at s. 3.7.

⁵⁹ CEAR Doc 1680, Terms of Reference, at s. 3.8.

⁶⁰ CEAR Doc 1680, Terms of Reference, at s. 3.11.

⁶¹ CEAR Doc 1680, Terms of Reference, at s. 4.14.

⁶² CEAR Doc 1680, Terms of Reference, at s. 4.15-4.22.

closest proximity to the project, including Indigenous communities, and to take into account the timing of traditional activities in Indigenous and local communities when setting the time and location of the public hearing.⁶³ The Review Panel held the public hearing between May 14, 2019 and June 24, 2019.

- During the third stage, the Review Panel will close the record for the environmental assessment and prepare and submit its report to the Minister.

The Review Panel's report must include the following:

- The rationale, conclusions, and recommendations of the Review Panel on the environmental assessment of the Project, including any mitigation measures and follow-up program;
- A summary of the report;
- A summary of any comments received, including those from Indigenous groups, government bodies, the public, and other interested parties;
- Identification of those conclusions that relate to the environmental effects of the project defined in section 5 of *CEAA 2012*;
- Identification of recommended mitigation measures and follow-up programs that relate to the environmental effects of the Project defined in section 5 of *CEAA 2012*, including, as appropriate, any commitments identified by the VFPA in the EIS or during the Review Panel process; and
- A summary of information received by participants with respect to potential or established Aboriginal or treaty rights and interests.⁶⁴

In the event that the Review Panel concludes that the Project is likely to cause significant adverse environmental effects, the Review Panel may include in its report information that it has received with respect to whether those significant adverse environmental effects are justified in the circumstances.⁶⁵

9. British Columbia *Environmental Assessment Act* process

In December 2014, the Provincial Minister of Environment issued a Section 14 Order pursuant to the BC *Environmental Assessment Act* with respect to the Project on the basis that it is a reviewable Project.⁶⁶ In the schedule to the Section 14 Order, the Province has indicated that it will rely primarily on the federal review process, to be supplemented as necessary with further information requests to the VFPA, further consultation with Indigenous groups, and information from the Gateway Transportation Collaboration Forum. The BC Environmental Assessment Office (EAO) has indicated that it will review the

⁶³ CEAR Doc 1680, Terms of Reference, at s. 4.223-4.26.

⁶⁴ CEAR Doc 1680, Terms of Reference, at s. 4.27-4.28.

⁶⁵ CEAR Doc 1680, Terms of Reference, at s. 4.29.

⁶⁶ There are potential constitutional limitations regarding the applicability of provincial legislation to federal projects.

information contained in the Review Panel report. The BC EAO recently confirmed this approach in letters it sent to Indigenous groups involved in the assessment of the Project.⁶⁷

The CEA Agency and the BC EAO have agreed to coordinate the environmental assessment process to the extent possible, pursuant to a 2013 Memorandum of Understanding between the two offices.⁶⁸ Accordingly, it was on this basis that the federal Minister of Environment updated the EIS Guidelines and Terms of Reference to incorporate provincial requirements for a socio-economic assessment into the federal Review Panel process. The VFPA notes that as a federal authority proposing a port project within the exclusive jurisdiction of the federal government, there are potential legal limits to the jurisdiction of the provincial environmental assessment process.

The VFPA is confident that the information it has submitted is sufficient to meet the requirements of a provincial environmental assessment. The Province has confirmed that the information presented in the EIS is complete with respect to provincial factors.⁶⁹ More recently, a number of provincial authorities confirmed that the information submitted by the VFPA is sufficient for the purposes of a provincial environmental assessment.⁷⁰

Finally, the VFPA notes that the Terms of Reference are clear that matters under provincial jurisdiction are not environmental effects for the purposes of the project and will not be subject to conditions in the Minister's decision statement:

"2.4. For greater certainty, the potential economic, social, heritage and health effects of the project, including cumulative effects, that are not encompassed by the definition of environmental effects under *CEAA 2012* are not environmental effects of the project for the purposes of the Minister's decision on whether the project is likely to cause significant adverse environmental effects and will not be subject to conditions to the proponent in any decision statement issued by the Minister under *CEAA 2012*."⁷¹

10. Conclusion

RBT2 is a proposed three-berth marine container terminal to provide additional capacity to meet container demand on Canada's west coast. The VFPA has provided a thorough and robust environmental assessment of the Project in accordance with *CEAA 2012* and the EIS Guidelines. As discussed in the chapters that follow, the VFPA's assessment relies on the best available science, ITK, and a conservative and precautionary approach. The assessment has been rigorously tested by the Review Panel, Indigenous groups, the public, regulators, and stakeholders through a six-year process.

⁶⁷ CEAR Doc 1196, BC EAO letters to Indigenous groups.

⁶⁸ 2013 Memorandum of Understanding between BC EAO and the CEA Agency.

⁶⁹ CEAR Doc 238, BC EAO letter to the CEA Agency.

⁷⁰ CEAR Doc 1280, Ministry of Labour letter to Review Panel dated September 26, 2018.

⁷¹ CEAR Doc 1680, Terms of Reference, at s. 2.4.

The VFPA is confident that the assessment of the Project meets the requirements of *CEAA 2012*. If the Project is approved pursuant to *CEAA 2012*, the VFPA will still require a number of regulatory permits and authorizations, including permits and authorizations pursuant to the *Fisheries Act* and *SARA*. The VFPA will work with the appropriate regulatory agencies at the permitting stage to ensure the Project meets the requirements for those permits and authorizations.

CHAPTER III. PROJECT PROPONENT AND RATIONALE, PROJECT DESIGN, AND ALTERNATIVE MEANS

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10. Exhibit 5 – Port of Vancouver Container Ship Calls and Throughput (1995-2018)	1735

2. Overview

The role of the VFPA is to ensure the port is ready for Canada’s trading future. The VFPA is required to plan and carefully consider how to provide the necessary capacity at port facilities to help goods flow throughout the region. The VFPA has made significant investments in increasing the size and improving the efficiency of its terminals, and improvements have also been made at other terminals on the west coast, such as Prince Rupert. However, these investments are not sufficient to accommodate the anticipated

shortfall in container terminal capacity. For this reason, the VFPA undertook extensive planning, environmental study, and engagement with regulators, Indigenous groups, and communities to plan for additional container capacity, and determined that the preferred project is RBT2 at Roberts Bank.

The proposed Project contains three main components: a new three-berth marine container terminal, a widened causeway, and an expanded tug basin. The marine terminal would sit on newly created industrial land mostly in deep, subtidal waters located immediately west of the existing Roberts Bank terminals, about 5.5 km from the mainland end of the causeway. The terminal would provide berths for up to three container ships on the south side, container storage in the centre, and rail intermodal yards on the north side. The Roberts Bank causeway would be widened to link existing road and rail networks to the marine terminal and to provide additional road and rail infrastructure. An expansion of the existing tug basin would include sufficient moorage for two tug operators, which is necessary to efficiently and safely assist in the arrival and departure of ships calling at RBT2.

The VFPA has continuously evaluated its preferred means of carrying out the Project to identify efficiencies and alternative construction methods that will avoid or reduce potential adverse environmental effects while increasing the Project benefits. In doing so, the VFPA has and continues to work closely with environmental and engineering consultants, Indigenous groups, local communities, public stakeholders, and government authorities. Based on the current project schedule, subject to regulatory approvals and a final investment decision, the Project could be operational by the late-2020s, in time to meet forecasted growth in demand.

In this chapter, the VFPA outlines or clarifies the following:

- The VFPA's role as Project proponent and the purpose of the Project (Section 3);
- Its approach to the design and execution of the Project, highlighting the specific measures taken to avoid or reduce potential adverse effects (Section 4); and
- The assessment of alternatives to the Project and alternative means of carrying out the Project (Section 5).

3. Project proponent and rationale

(a) The VFPA's Role in the Pacific Gateway

The VFPA is a federal agency under Transport Canada. The VFPA's mandate under the *Canada Marine Act* is to plan and provide port infrastructure to help meet Canada's trade objectives, ensuring safety, environmental protection, and consideration for local communities. The VFPA is also responsible for ensuring terminal capacity is provided to customers at a reasonable cost and in a timely manner, which requires fair and appropriate competition between terminal operators within the port.

The VFPA operates as a non-shareholder, financially self-sufficient corporation responsible for the stewardship of federal port lands in and around the Port of Vancouver. The VFPA

does not operate terminals, but is responsible for making available federal port lands for lease to the goods movement industry and fulfilling its mandate in the interests of all Canadians. The VFPA helps Canadian businesses deliver their goods and products to markets around the world and provides an entry point to the Canadian market for construction and manufacturing inputs and many consumer goods. In addition, the VFPA supports Canadian trade by facilitating and in some cases leading the development of port-related infrastructure necessary to connect Canada's markets to trading economies around the world, particularly those in the Asia-Pacific region.

The VFPA is a Canada Port Authority incorporated by letters patent issued by the Minister of Transport pursuant to the *Canada Marine Act*. Pursuant to the *Canada Marine Act*, the federal government has delegated certain port-related aspects of its constitutional authority with respect to navigation and shipping and the management of federal lands to port authorities. The letters patent issued for the VFPA⁷² describe the geographic boundaries of the navigation jurisdiction of the VFPA, the federal real property that it manages, and the lands other than federal real property, namely lands that the VFPA holds in its own name. For the purposes of engaging in activities related to shipping, navigation, transportation of passengers and goods, handling of goods, and storage of goods within its jurisdiction, the VFPA is an agent of the federal Crown.

Besides the authority the VFPA has within its jurisdiction, shipping activities are governed by Canada's marine safety and security regime. Transport Canada is the federal lead in regulating shipping activities, with support from the Canadian Coast Guard (CCG), the Canadian Hydrographic Service, ECCC, DFO, and Natural Resources Canada (NRCan). Relevant federal legislation pertaining to marine shipping activities includes the *Canada Shipping Act, 2001* and the *Pilotage Act*. Regulatory authority with respect to federal railway companies operating within the Port of Vancouver rests with Transport Canada, pursuant to the *Canada Transportation Act* and the federal *Railway Safety Act*.

In pursuing its mandate within its jurisdiction, the VFPA has adopted a vision to be the world's most sustainable port. The VFPA defines a sustainable port as one that delivers economic prosperity through trade, maintains a healthy environment, and enables thriving communities through collective accountability, meaningful dialogue, and shared aspirations. To this end, the VFPA leads a range of regional programs and initiatives that inform or enhance the sustainability and environmental performance of port operations and port-related activities, including, but not limited, to the following:⁷³

- Habitat Enhancement Program to proactively develop habitat to offset effects to fish and fish habitat that may be required as part of port development through its habitat banking arrangement with DFO, the first established habitat bank in Canada;

⁷² *Certificate of amalgamation of port authorities*, P.C. 2007-1885 December 6, 2007, C. Gaz. 2007, Vol. 141, No. 51.

⁷³ CEAR Doc 1831, VFPA response to Undertaking #1.

- Fraser River Improvement Initiative to clean up neglected vessels and structures on the Fraser River that can pose a risk to wildlife, natural habitats, or public safety. The program addressed 151 sites and was completed in 2019;
- Site Remediation and Land Renewal Strategy to treat port lands contaminated from past activities;
- Truck Licencing System to reduce emissions from container trucks that access the port through environmental requirements for engine age, emission controls, and idle reduction;
- ECHO Program to better understand and manage the impact of shipping activities on whales along the southern coast of British Columbia (BC);
- EcoAction Program to reduce marine emissions and underwater noise by offering discounts on harbour dues for vessels meeting environmental best practices;
- Non-Road Diesel Emissions Program to accelerate the changeover of older diesel equipment through a combination of fees and rebates;
- Energy Action to help port tenants access financial incentives to advance energy conservation measures and to study electrification potential of diesel-powered equipment in partnership with BC Hydro;
- Noise Monitoring Program to better understand the source and intensity of port-related noises via 11 long-term noise monitoring stations in locations across Metro Vancouver, and help respond to community concerns regarding noise;
- Shore Power at Canada Place cruise terminal, and the Centerm (Berth 5) and Deltaport (Third Berth) container terminals, to reduce air pollutants and greenhouse gases by allowing ships to connect to the hydroelectric grid while at berth;
- Air Quality Monitoring, including funding the operation and maintenance of air quality monitoring Station T39 in Tsawwassen. Station T39 was established to assess air quality near Deltaport, marine activities, and other sources, and to help fill a gap in Metro Vancouver's monitoring network in the southwest part of the region;⁷⁴ and
- Conservation Agreement, pursuant to section 11 of *SARA*, entered into by the Government of Canada, the Pacific Pilotage Authority, industry partners, and the VFPA, with the purpose of reducing the acoustic and physical disturbance to SRKW by commercial vessels in Pacific Canadian waters.

(b) Project rationale

The purpose of the Project is to meet increasing demand for containerized trade on the west coast of Canada and to continue to maximize the potential economic and competitive benefits of the port.⁷⁵ The updated Project Overview and Rationale⁷⁶ presents a discussion of project purpose, objectives, and rationale, as well as projected trends in the containerized sector.

⁷⁴ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3311.

⁷⁵ CEAR Doc 1413, Transcript, January 30, 2019 Information Session, at pp. 31, 34, 42; CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3735.

⁷⁶ CEAR Doc 1341, Project Overview and Rationale.

The VFPA routinely commissions an expert third-party to provide container traffic forecasts that consider long-term trends in global markets and trade.⁷⁷ The most recent forecast report prepared by Ocean Shipping Consultants (**OSC**) in 2016 projects sustained growth in container traffic through the west coast of Canada to 2040 and beyond. The report also concludes that the Port of Vancouver remains a highly competitive option for import and export containers.⁷⁸ As discussed in the VFPA's presentation during the January 30, 2019 information session,⁷⁹ expert forecasts have proven very accurate. Since 2001, ports on the west coast of Canada have on average handled more than eight percent growth annually in the container sector, a trend that was predicted by earlier forecasts, including one by OSC.

Subsequent to this report, the VFPA commissioned InterVISTAS Consulting in 2018, to evaluate the 2016 OSC forecast and offer expert opinion as to whether the forecast methodology and projections of the analysis were reasonable. InterVISTAS confirmed that "the [OSC] forecast meets the standard of a good forecasting methodology and provides a reasonable result."⁸⁰ Further, InterVISTAS augmented the analysis conducted by OSC with a stochastic analysis, which considered a greater range of risk factors that could influence the expected forecast. This stochastic analysis resulted in InterVISTAS concluding that the OSC high case and low case fall within the 10th to the 90th percentile of likely outcomes. This means that there is only a 10% risk that Port of Vancouver traffic will be less than the low forecast of OSC.⁸¹ The most likely outcome is that the Port of Vancouver will serve just over 4.86 million TEUs in 2025, and there is a 50% probability that it will serve between 4.52 and 5.23 million TEUs.⁸²

Since 2005, the VFPA has led and supported improvements to the Port of Vancouver's existing container terminals, including Vanterm and Centerm in Vancouver's inner harbour, and Deltaport at Roberts Bank.⁸³ The completion of the Deltaport Third Berth (the **DP3 Project**) expansion in 2010 added 600,000 TEUs. As part of the Deltaport Terminal, Road and Rail Improvement Project, the port authority, along with Global Container Terminals Canada (**GCT**) and the Province of British Columbia, completed improvements in and around Deltaport in 2018 that added an additional 600,000 TEUs of capacity.

Container capacity growth is also expected at the Port of Prince Rupert. The Port of Prince Rupert had previously planned an expansion of 900,000 TEUs at its Fairview Terminal; however, that expansion plan has now been cancelled and the Port of Prince Rupert has instead announced a plan for a new container terminal project of 5 million TEUs on South Kaien Island. The Port of Prince Rupert has suggested the new terminal could be operational in the mid to late 2020s; however, the experience of the environmental assessment of RBT2

⁷⁷ CEAR Doc 1341, Project Overview and Rationale, at p. 15.

⁷⁸ CEAR Doc 934, VFPA response to IR1-03, at Appendix IR1-03-A.

⁷⁹ CEAR Doc 1413, Transcript, January 30, 2019 Information Session.

⁸⁰ CEAR Doc 1364, InterVISTAS Report (2018), at p. iv.

⁸¹ CEAR Doc 1364, InterVISTAS Report (2018), at pp. v-vi.

⁸² CEAR Doc 1364, InterVISTAS Report (2018), at p. 19.

⁸³ CEAR Doc 1341, Project Overview and Rationale, at p. 19.

suggests that this is an overly optimistic timeline for completion of environmental assessment, permitting, and construction.⁸⁴

It is important to note that the Port of Prince Rupert has not yet developed a project description for any new container terminal projects. Under the new federal *Impact Assessment Act*, the Port of Prince Rupert would be required to conduct consultation with the public and with Indigenous groups prior to submitting a project description, and the project would then be subject to a lengthy and detailed environmental assessment and review, potentially by a review panel. Accordingly, at this time, the potential for such a new terminal, and its operating date, can only be regarded as speculative.

It was anticipated that the planned and completed improvements in the Port of Vancouver and the expansion of Fairview in the Port of Prince Rupert would be sufficient to handle increased container volumes in the short term. Mr. Cliff Stewart of the VFPA reiterated at the public hearing that “With the cancellation of the Fairview Terminal expansion of 900,000 TEUs, capacity will become more constrained.”⁸⁵ Under the low, base, or high case scenarios set out in the OSC report, capacity shortfalls for growth through to 2030 are projected. As a result, by 2030, practical capacity would be exceeded by the low and base case forecasts, and the high case forecast would exceed even the maximum capacity of the Canadian west coast.⁸⁶

(c) Key issues raised and VFPA response

(i) VFPA as proponent vs. VFPA as regulator

Some participants at the public hearing expressed a perceived conflict in the VFPA’s role as both a project proponent and a regulator.⁸⁷ During the public hearing, the VFPA reiterated that RBT2 is undergoing a thorough and robust federal environmental assessment under *CEAA 2012* by an independent review panel and requires other permits and authorizations from relevant agencies before it can proceed. The Review Panel will issue a report to the Minister of Environment and Climate Change Canada. The Minister or the Governor in Council will then decide whether to approve the Project.

With respect to designated projects under *CEAA 2012*, the VFPA has a role in issuing permits. Under section 27 of the *Port Authorities Operations Regulations*, the Project will require a VFPA authorization to conduct certain prescribed activities associated with the Project. Under the VFPA’s Project Environmental Review Guidelines and the VFPA’s Guidelines for Designated Projects, the VFPA’s Project Environmental Review group will consider the environmental assessment undertaken by the Review Panel and the Decision Statement of the Minister or Governor in Council in this permitting process.

⁸⁴ CEAR Doc 1755, Transcript, Volume 3, May 16, 2019, at p. 460; CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3851; see also CEAR Doc 1341, Project Overview and Rationale.

⁸⁵ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3851.

⁸⁶ CEAR Doc 934, VFPA response to IR1-03.

⁸⁷ For example, CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3815-3816.

As further clarification, the VFPA differs from a private proponent in several ways. Unlike a private proponent, the VFPA does not answer to private shareholders. Instead, the VFPA answers to the Minister of Transport and is responsive to the public interest. Unlike private proponents, the VFPA must consider the broader Canadian interest in future capacity planning. The VFPA must ensure that its decision making is consistent with its mandate and the three pillars of its sustainability vision.

Generally, the VFPA, and its predecessor port authorities, have been the proponent for all land reclamation and marine structures at Roberts Bank.⁸⁸ As the VFPA explained during the topic-specific session on alternative means, the VFPA initiated a public procurement process and identified a potential private proponent for the Container Terminal 2 Project in 2008.⁸⁹ Early in the planning process, the VFPA received feedback from the Government of Canada that the Government would prefer that the VFPA be the proponent for the environmental assessment and permitting of Container Terminal 2, rather than a private proponent. According to the Government, the VFPA would be a more reliable proponent with respect to adhering to any project permit conditions as a result of its long-term responsibility for stewardship of the Port of Vancouver and the environment.⁹⁰

(ii) Challenges to independent container demand forecasts

Several participants during the public hearing challenged historical container throughput data⁹¹ and demand forecasts, further asserting that there is no need for the Project.

As outlined above, forecasts prepared in 2016, and verified in 2018 by independent third-party consultants, project that the west coast of Canada is expected to reach marine container terminal capacity as early as the mid-2020s. The VFPA is confident in the forecasting that has been conducted, based on comparisons of early forecasts to actual throughput.⁹²

Terminal capacity shortfalls would likely create significant negative implications for port users and local communities as a result of terminal congestion, including local truck and train backups, vessel scheduling challenges, cargo redirection and delays, increased truck traffic to and from the USA due to cargo redirection to other ports, increased transportation costs for Canadian goods due to redirection, and the potential loss of business for importers and exporters. Based on years of analyses and studies, the VFPA is confident that RBT2 represents the best option to minimize adverse effects and accommodate projected growth in the containerized sector.⁹³

⁸⁸ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3742, lines 10-14.

⁸⁹ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3750, lines 4-9.

⁹⁰ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3750, lines 4-21.

⁹¹ See for example CEAR Doc 1703, David Jones (Fraser Voices) oral presentation, and CEAR Doc 1834, VFPA response to Undertaking #5.

⁹² CEAR Doc 1735, Exhibit 5, document presented by the VFPA on May 15, 2019.

⁹³ CEAR Doc 1413, Transcript, January 30, 2019 Information Session, at pp. 28-31.

(iii) Use of public monies in RBT2 construction

Some participants at the public hearing expressed concern about the Project being constructed with public monies, thus forcing the Canadian taxpayer to bear financial risk.⁹⁴

As discussed in Undertaking #6,⁹⁵ RBT2 is a large infrastructure project that will likely involve multiple partners to design, build, finance, operate, and maintain. At the current stage of the Project, the commercial structure of the Project has not been finalized. However, in terms of how the financing of the Project will be undertaken, the VFPA will likely use its cash balance and/or borrow funds from a lending institution to finance the Project. The Project would not be financed through government grants or 'tax payer dollars' as was suggested. The manner in which the VFPA will finance the Project is the same as how a private proponent would finance a project—through a combination of cash and/or debt. These borrowed funds will ultimately be repaid through funds received by terminal users in the form of user fees.

(iv) VFPA accountability for mitigation and commitments

Some participants at the public hearing expressed concern about the VFPA's accountability for proposed mitigation measures and commitments. As discussed in IR1-01, should the government approve the Project, the VFPA will be responsible for fulfilling conditions required by the Government of Canada.⁹⁶ Contractual arrangements between the VFPA and the infrastructure developer and terminal operator will require those parties to abide by conditions applicable to these entities.⁹⁷

(v) Need for competition at the VFPA's marine container terminals

GCT challenged the VFPA's assertions relating to the benefits of competition between terminal operators.⁹⁸ Since the VFPA began contemplating a second container terminal at Roberts Bank, the VFPA has emphasized the need for a new terminal operator to ensure intra-port competition.⁹⁹ Healthy competition is necessary to ensure users continue to pay reasonable rates for reliable service—a key purpose of the *Canada Marine Act*.¹⁰⁰ As Dr. Mike Tretheway of InterVISTAS explained during the public hearing:

"Fundamentally, competition drives good affordable prices for consumers, and where competition is reduced, prices generally

⁹⁴ For example, CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3812, lines p. 9-13.

⁹⁵ CEAR Doc 1835, VFPA response to Undertaking #6.

⁹⁶ CEAR Doc 934, VFPA response to IR1-01.

⁹⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #1; CEAR Doc 1413, Transcript, January 30, 2019 Information Session, at pp. 50-51.

⁹⁸ CEAR Doc 1808, GCT oral presentation, May 30, 2019.

⁹⁹ CEAR Doc 1838, supporting documents for the VFPA's oral presentation on May 31, 2019, at p. 32.

¹⁰⁰ *Canada Marine Act*, at s. 4(c).

almost inevitably will rise, and that will be to [the] detriment of consumers."¹⁰¹

The issue of intra-port competition goes beyond just the number of terminal operators within the Port of Vancouver. It extends to the facilities available to each of those operators. If the VFPA were to pursue an expansion of Deltaport Terminal as opposed to a new container terminal, one terminal operator would control not just a significant majority of the market for container terminal services, but also 100% of container capacity at Roberts Bank. With the trend toward larger container ships,¹⁰² the inner harbour terminals will be increasingly constrained by the height of the Lions Gate Bridge. It is therefore essential to ensure that two terminal operators are able to provide service for larger vessels at Roberts Bank.¹⁰³

4. Project components and design considerations

(a) Overview

This section summarizes the components and sub-components proposed for the Project, the mitigation measures incorporated into Project design and execution, and the key issues raised during the public hearing related to Project design and execution.

(b) Components and sub-components

The physical components of the Project include the construction of a new three-berth marine container terminal with design capacity for 2.4 million TEUs annually, widening of the existing causeway between the mainland and the Roberts Bank terminals, and expansion of the existing tug basin. The Project components are described in the EIS,¹⁰⁴ and updates were provided in the PCU, and the VFPA's responses to IRs.

The marine terminal will be generally rectangular in shape with a rounding of the northwest corner, approximately 1,700 m long and 700 m wide, with a footprint of 130 hectares, including 108 hectares of useable land. The four sub-components of the marine terminal are as follows:

1. The wharf structure and berth pocket on the south side of the terminal permits safe berthing and mooring of vessels calling at the terminal to allow ship-to-shore gantry cranes to move containers on and off vessels. The wharf structure is approximately 1,300 m long and provides a minimum water depth of -18.3 m chart datum (**CD**). Both the ship-to-shore gantry cranes (in terms of height and reach) and the berth pocket depth are sufficient to accommodate the largest vessels projected to call at

¹⁰¹ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3851-3852.

¹⁰² CEAR Doc 1473, VFPA response to Undertaking #2 from the January 30, 2019 Information Session.

¹⁰³ CEAR Doc 1821, Transcript, Volume 12, May 28, 2018, at pp. 3098-3100.

¹⁰⁴ CEAR Doc 181, EIS, Volume 1, at s. 4.

RBT2.¹⁰⁵ The wharf will be constructed using prefabricated caissons tied together at the wharf face with a concrete cope wall and include provisions for shore power.

2. The container storage yard located in the centre of the terminal is where containers are temporarily stored after being unloaded from, or before being loaded to, trucks, trains, and container vessels. Electric stacking cranes in the container storage yard transfer and sort containers.
3. The rail intermodal yards (**IYs**) located at the north side of the terminal include electric rail-mounted gantry cranes to transfer containers between rail cars and the container storage yard.
4. Infrastructure ancillary systems, and support facilities will be located on the east side of the terminal, and includes truck gate facilities, buildings, and security facilities.

The widened causeway will have a 49.4-hectare footprint, including 36 hectares of useable land. The existing 5.5 km-long causeway will be widened to provide additional road, rail, and utility infrastructure. Railway infrastructure on the widened causeway includes two new rail yards and lead tracks between the existing upland rail network and the Project's IYs. Road infrastructure includes the RBT2 overpass, the access road between the RBT2 overpass and the terminal, and an emergency two-lane gravel road along the entire causeway length. The VFPA has also incorporated a vehicle access and control system into the design of the widened causeway for security purposes.

The expanded tug basin, occupying a footprint of 3.1 hectares, provides additional tug capacity for a second tug operator to facilitate the safe passage of container vessels approaching, mooring at, and departing the marine terminal.

(c) Design, construction, and operation mitigation measures

The following section summarizes several key mitigation measures incorporated into Project design, construction, and operation to avoid or reduce potential adverse effects. The complete list of Project-related mitigation measures is set out in the Updated Project Commitments.¹⁰⁶

The VFPA will ensure that the final detailed design and construction approach are aligned with the Updated Project Commitments¹⁰⁷ and conditions outlined in the Decision Statement and by regulators during the permitting processes, and will meet all applicable regulatory codes/standards and guidelines in place at the time of detailed design.¹⁰⁸

(i) Design mitigation measures

Key measures related to the design of the Project to avoid, reduce, or offset potential effects from the Project are as follows:

¹⁰⁵ CEAR Doc 1473, VFPA response to Undertaking #2 from the January 30, 2019 Information Session.

¹⁰⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Table A1.

¹⁰⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #1.

¹⁰⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #1.

- Marine terminal in subtidal water – based on engagement with regulatory authorities early in the planning process,¹⁰⁹ the VFPA chose to locate the proposed marine terminal in subtidal waters at the west end of the Roberts Bank causeway to minimize direct loss of valued intertidal habitat, and to reduce the potential for dendritic channel formation, the amount of dredging required, and the potential noise effects to communities. Additional details on the location alternatives examined at Roberts Bank are provided in Subsection 5 below.
- Marine terminal footprint optimization – the VFPA has committed to incorporating a rounded design for the northwest corner of the terminal.¹¹⁰ Based on results of project-optimizing coastal geomorphology studies, this layout would most decrease the areal extent of scour induced by flow acceleration around the west side of the terminal.¹¹¹
- Marine terminal perimeter – the marine terminal perimeter incorporates rocky shoreline to increase habitat for marine species.¹¹² This is a proven approach in aquatic environments to increase the complexity of structural features, especially when compared to vertical wall perimeters. The VFPA has previously applied this approach successfully in the DP3 Project.
- Widened causeway footprint optimization – causeway widening has been minimized to the greatest extent practicable to reduce effects in the intertidal zone, while ensuring there is adequate area for the road and rail infrastructure to support terminal operations.¹¹³
- Expanded tug basin footprint optimization – the orientation and layout of the tug basin expansion has been optimized to reduce the area of disturbance to marine habitat in the inter-causeway area.¹¹⁴
- Expanded tug basin crest protection – tug basin expansion includes the installation of crest protection rip-rap around the exposed perimeter of the basin to protect the existing mudflats from scouring forces during tidal exchanges, thus mitigating the potential for formation of dendritic channels.¹¹⁵

In addition to the incorporation of these mitigation measures, the VFPA considered a number of potential effects of the environment on the Project, including seismic risks, climate change and related sea level rise, extreme weather, landslides, tsunamis, and land settlement. The VFPA determined that none of these potential hazards represent a unique risk to the Project and can be fully mitigated through relatively minor design modifications and management practices.

¹⁰⁹ CEAR Doc 934, VFPA response to IR1-06, at Appendix IR1-06-A; CEAR Doc 1866, Exhibit 42, document presented by the VFPA on May 31, 2019; CEAR Doc 1341, Letter from Minister of Fisheries and Oceans to the VPA dated July 29, 2003.

¹¹⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #6.

¹¹¹ CEAR Doc 181, EIS, Volume 1, at s. 5.4.1.3.

¹¹² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #7.

¹¹³ CEAR Doc 181, EIS, Volume 1, at s. 4.2.2; CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #4.

¹¹⁴ CEAR Doc 181, EIS, Volume 1, at s. 5.4.4.

¹¹⁵ CEAR Doc 181, EIS, Volume 1, at s. 4.4.1.18.

The VFPA continues to further refine the design of the Project and identify other mitigation measures to minimize risk. In doing so, the VFPA is working closely with environmental and engineering consultants, Indigenous groups, local communities, public stakeholders, and government authorities.¹¹⁶ The VFPA commits to ensuring that the final design is within the footprint defined in the PCU.¹¹⁷

(ii) Construction mitigation measures

Measures specifically related to construction of the Project that are key to avoiding, reducing, or offsetting potential effects from the Project are as follows:

- Construction scheduling – construction activities have been scheduled to avoid fisheries-sensitive windows for Dungeness crabs and juvenile salmon. The specific periods when work is restricted¹¹⁸ is outlined in the PCU¹¹⁹ and the Updated Project Commitments.¹²⁰
- Construction sequence – based on consultation with Indigenous groups and the availability in the region of dredging equipment with pump-ashore capability, the VFPA eliminated the need for the intermediate transfer pit (**ITP**) and revised the Project construction sequence accordingly, as described in the PCU. The VFPA will no longer need to temporarily store Fraser River sand underwater, nor recover stored Fraser River sand by dredging at the ITP.¹²¹
- Use of all dredgeate and no disposal at sea activities – all material dredged from the dredge basin and tug basin can be used in terminal or causeway land development.¹²² Based on the results of a Supplemental Geotechnical Investigation Program in 2016, it was determined that material to be dredged from the dredge basin is of better quality than previously assumed in the EIS.¹²³ This led to the elimination of all marine-based vibro-replacement activities (and associated silty material that would be generated).¹²⁴ In addition, it was determined that tug basin dredgeate could be used as fill.¹²⁵ These updates to Project construction activities mean that disposal at sea activities are no longer part of the Project.

The VFPA continues to review its proposed construction plan to adopt the most efficient and effective construction methods and reduce potential adverse environmental and socio-economic effects. The VFPA has committed to a construction Compliance Management

¹¹⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #2.

¹¹⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3.

¹¹⁸ For crab from October 15 through to March 31 annually for work activities on and in the seabed below -5.0 m CD and for juvenile salmon from March 1 through to August 15 annually for work activities within the water column above -5.0 m CD.

¹¹⁹ CEAR Doc 1210, PCU, at Attachment B2.

¹²⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitments #49, 53.

¹²¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #10.

¹²² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #30.

¹²³ CEAR Doc 1210, PCU, at s. 2.3.1.

¹²⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #11.

¹²⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #12.

Plan,¹²⁶ which will describe the monitoring and reporting framework to verify compliance with regulatory requirements, the Construction Environmental Management Plan, and sub-plans. The Compliance Management Plan will describe the roles and responsibilities of the four-party compliance management team¹²⁷ with regards to planning, implementing measures, monitoring compliance, and implementing corrective actions, if required.

The VFPA will develop the Construction Environmental Management Plan and associated sub-plans prior to the start of construction to the satisfaction of qualified professionals¹²⁸ and will ensure that the plans are executed by the infrastructure developer to the satisfaction of the VFPA.¹²⁹ As an example of reduction measures, the VFPA is committed to ensuring that a no-idling policy is developed for implementation during construction activities,¹³⁰ and ensuring that all equipment and vehicles are maintained, inspected, and operated according to manufacturer specifications.¹³¹ As another example, the VFPA has committed to employing specific dredging practices to handle the upper 0.5 m of the existing tug basin and tug basin expansion area to avoid discharge of fines in supernatant and reduce the potential for increasing polychlorinated biphenyl (**PCB**) concentrations in the receiving environment to the satisfaction of a qualified professional(s).¹³²

(iii) Operation mitigation measures

The VFPA will develop an Operation Environmental Management Plan and associated sub-plans prior to the start of operation to the satisfaction of qualified professionals¹³³ and will ensure that the plans are executed by the terminal operator to the satisfaction of the VFPA.¹³⁴

There are several mitigation measures that will reduce air and noise emissions during Project operation. For example, as part of the RBT2 operation Air Quality Emissions Management Plan, the VFPA has committed to measures for reducing air emissions from the Project, including all cargo-handling equipment meeting or exceeding applicable emission standards at time of introduction in 2029 (i.e., Tier IV compliant engines or better).¹³⁵ It is anticipated that electrified mobile equipment will be used at some point in the operational life of the Project.

¹²⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #18.

¹²⁷ As outlined in CEAR Doc 2001, Updated Project Commitments, at Appendix D, Table D1, the four-party approach is the collaboration between the VFPA, the contractor, the Indigenous Monitors, and the Independent Environmental Monitor for jointly providing environmental oversight of the Project during construction and providing assurance that the Project is being built in compliance with regulatory requirements, the Construction Environmental Management Plan, sub-plans, and Contractor's Environmental Protection Plans (Commitments #14, 18). This includes ensuring the appropriately qualified and skilled individuals are completing the work.

¹²⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #14.

¹²⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #15.

¹³⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #57.

¹³¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #58.

¹³² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #47.

¹³³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #16.

¹³⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #17.

¹³⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

From the beginning of preliminary engineering for the Project, the VFPA planned for terminal operation support equipment to be electrified to the extent technically possible. The marine terminal design includes the use of electric ship-to-shore cranes, container yard automatic stacking cranes, intermodal yard rail mounted gantry cranes, and reefer plug-in points. In addition, the wharf is designed with shore power connections at all three berths to allow ships to plug into land-based electrical power and minimize use of diesel-powered generators.

(d) Key issues raised and VFPA response

(i) Accounting for sea level rise

During the IR and public hearing processes, the VFPA was asked to explain how it had accounted for sea level rise (**SLR**) in the Project design and how it had incorporated land settlement in its assessment of SLR.¹³⁶ With respect to the latter, in response to NRCan,¹³⁷ the VFPA clarified that its assessment of SLR took into account an approximate total expected long-term settlement of 0.5 m by 2100, from land subsidence, post-construction settlement, tectonic contributions, and glacial isostatic adjustments.¹³⁸

The VFPA further clarified that its most recent assessment is based on the Intergovernmental Panel on Climate Change (2013) Representative Concentration Pathways 8.5 worst-case scenario, which is also consistent with the latest BC Ministry of Environment Climate Change Adaptation Guidelines.¹³⁹ The VFPA adopted a probabilistic approach accounting for up to 1.86 m relative SLR, including the approximately 0.5 m of total settlement mentioned above. This probabilistic approach is more appropriate than a deterministic approach because it is in-depth, site-specific, statistically sound, and captures the many possible future outcomes of SLR and the simultaneous occurrence of tides, storm surges, and waves.¹⁴⁰

NRCan confirmed that the VFPA's assessment is satisfactory.¹⁴¹

The VFPA also provided an updated 'EIS Figure 4-5 (modified)' in Undertaking #11,¹⁴² which illustrates both the potential SLR relative to the terminal wharf face and the installation of a bull rail as an adaptive management measure to minimize wave inundation. As discussed during the public hearing and in Undertaking #11, the mitigation measures that may be installed in the future are not anticipated to affect the findings of the VFPA's environmental

¹³⁶ CEAR Doc 1228, IR Package 13, at IR13-28; CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1253, 1305.

¹³⁷ CEAR Doc 1444, NRCan comments on the sufficiency of information.

¹³⁸ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1250.

¹³⁹ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1250.

¹⁴⁰ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1250-1251, 1253-1254, 1306, 1325.

¹⁴¹ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1325.

¹⁴² CEAR Doc 1837, VFPA response to Undertaking #11.

assessment because none of the proposed SLR mitigation measures would increase the Project footprint or adversely affect the marine environment.¹⁴³

In response to IR13-28 from the Review Panel, the VFPA noted that the 2018 updated Flood Hazard Area Land Use Management guidelines are not directly applicable to the Project, as those guidelines are intended to help local governments, land-use managers, and approving officers involved in land use planning where more site-specific studies or information is not available. This is consistent with information provided by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (**FLNRORD**) in Undertaking #21.¹⁴⁴

(ii) Storm frequency sensitivity analysis

The Ministry of Environment and Climate Change Strategy recommended that the VFPA conduct a sensitivity analysis to better understand what would occur if storm frequency increased.¹⁴⁵ The VFPA assessed two potential effects relevant to the Project, including (a) increased wind speeds and (b) increased precipitation, using an increase factor of 15%.

In terms of increased wind speeds, and associated wind-generated waves, the VFPA assessed the effect of increased wave overtopping in the probabilistic SLR model and found that the proposed future mitigation measures, such as a raised bull rail along the wharf face and the installation of the wave walls around other areas of the Project, would still be adequate but could be needed sooner.¹⁴⁶

Should precipitation during storm events increase by 15% in terms of intensity, an increase in ponding at the IYs is expected on the marine terminal and north end of S-bend on the widened causeway. This ponding could be up to several inches deep and last for several minutes to several hours. The implications of this would be a minor operational inconvenience. The VFPA is confident that, if necessary, this effect can be fully mitigated by increasing the Project's drainage system capacity.¹⁴⁷ It should be noted the VFPA's current terminal drainage system is designed to withstand a one in 10-year storm event.¹⁴⁸ Final sizing and capacity of the drainage system will be determined during detailed design.

(iii) Seismic design

As discussed during the public hearing, the VFPA's primary approach to mitigating seismic risk is through Project design. All relevant seismic and engineering standards as well as industry best practices will be factored into the detailed design.

NRCan confirmed that the VFPA has conducted an appropriate assessment of the seismic risk for the Project:

¹⁴³ CEAR Doc 1837, VFPA response to Undertaking #11.

¹⁴⁴ CEAR Doc 1968, FLNRORD response to Undertaking #21.

¹⁴⁵ CEAR Doc 1669, Ministry of Environment and Climate Change Strategy written submission.

¹⁴⁶ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1249, 1266-1267.

¹⁴⁷ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1247-1248.

¹⁴⁸ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1257-1258.

“And in conclusions then, the proponent has adequately characterized the earthquake hazards in this region. The proponent has confirmed that the project will comply with relevant [statutes], regulations, policies, and other laws, including building codes that are applicable at the time of construction.

The proponent has indicated that it will conduct a non-linear response analysis as part of the detailed design. And finally, NRCan is satisfied with the information provided by the proponent and proposals for future work during the detailed design stage.”¹⁴⁹

As a point of clarity, the VFPA notes that the Project will comply with the 2015 National Building Code of Canada, or the latest version at the time of *detailed design*, and not at the time of construction, as NRCan stated.¹⁵⁰

(iv) Causeway breach

Several participants at the public hearing discussed the possibility of breaching the causeway, including installing culverts to allow water to flow between the north and south sides of the causeway, to address a variety of perceived environmental concerns.¹⁵¹ As discussed in the VFPA’s response to IR1-13, during the DP3 Project, the VFPA, regulators, and Indigenous groups discussed the potential for putting an opening through the causeway by installing a culvert to permit flow exchange (i.e., to measurably change the salinity or delivery of sediment) to the inter-causeway area.¹⁵² Ultimately, technical investigations determined that a culvert would not pass sufficient Fraser River flow to measurably change the salinity or delivery of sediment to the inter-causeway area.¹⁵³ Moreover, it was determined that a culvert installation could introduce substantial risk of morphological changes on the tidal flats that may adversely affect existing habitat on both sides of the causeway.

The VFPA conducted additional studies of the intertidal area during adaptive management for the DP3 Project. Those studies, based on eight years of detailed monitoring and analysis, determined that the inter-causeway area has flourished, most notably in the expansion of eelgrass beds.¹⁵⁴

¹⁴⁹ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1283-1284.

¹⁵⁰ CEAR Doc 934, VFPA response to IR2-20, as clarified by Mr. Stewart during the public hearing: CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1289-1290.

¹⁵¹ See examples CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1633; CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 2039; CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2271.

¹⁵² CEAR Doc 934, VFPA response to IR1-13.

¹⁵³ CEAR Doc 539, Summary Report – Terminal 2 (T2) Trade-off Process and Outputs CCIP, February 2012.

¹⁵⁴ CEAR Doc 934, VFPA response to IR1-13.

During the public hearing,¹⁵⁵ and as discussed further in Chapter X of these Closing Remarks, the VFPA also noted that it is unlikely that juvenile salmon would swim through a dark culvert the width of the causeway. The VFPA's literature review indicates that juvenile salmon avoid structural shading and tend to move along the light side of a shadow's edge.

The VFPA further notes the majority of the existing causeway is provincial land¹⁵⁶ and, therefore, is outside of the VFPA's care and control.

The VFPA has demonstrated that the current design for the causeway remains the optimal design.

(v) Scour protection at rounded northwest corner of the terminal

Participants and panel member Dr. Douw Steyn asked at the public hearing how the rounded northwest corner would be protected to prevent scour and undermining.

To prevent undermining of this rounded corner, rock armour protection sized to withstand the design scour, wave, and current forces will be installed along the perimeter. Furthermore, a small bench at the toe of the scour protection slope, referred to as a Dutch toe, will be provided to allow some adjustment of the rock slope above. Any adjustments in the slope would cause rock to fall onto that bench, thereby self-armouring the toe, without extending the toe beyond the original footprint.¹⁵⁷

As outlined during the public hearing, bathymetric surveys in the immediate construction and post-construction period will be conducted to monitor for scour.¹⁵⁸ Specifically, the Coastal Geomorphic Process Follow-up Program element will verify effect predictions from Project-related changes to geomorphic features and sediment erosion and deposition, by conducting bathymetric surveys in the immediate construction and post-construction period to monitor for scour.¹⁵⁹

(vi) Monitoring of supernatant discharge

At the public hearing, the Review Panel raised questions concerning whether real-time monitoring of total suspended solids (**TSS**) will occur and what stop work orders would be carried out in the event of exceedances.¹⁶⁰

The level of TSS in the supernatant discharge that will be pumped out via the pipelines is a function of the fines content of the fill material and the amount of settling time the fines have before being discharged from the containment dykes. To ensure established TSS thresholds are not exceeded, the VFPA intends to monitor turbidity in real time, such that

¹⁵⁵ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 2039-2043.

¹⁵⁶ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 2043.

¹⁵⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3; CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1334.

¹⁵⁸ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1327-1334.

¹⁵⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #30.

¹⁶⁰ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at pp. 2334-2336.

the infrastructure developer can revise its dredging activities to ensure the TSS levels are within the threshold limits. If TSS levels exceed targets, the infrastructure developer may, for example, elect to either slow down the rate of dredging (especially in pockets/areas of higher fines content) or increase the retention time.¹⁶¹

Further details pertaining to the management of sediment and water will be addressed during the development of the Dredging and Sediment Discharge Plan in consultation with ECCC and DFO prior to the start of construction activities.¹⁶² The Dredging and Sediment Discharge Plan will specify thresholds, criteria for the location of real-time monitoring of TSS, and criteria, protocol, and procedures to stop construction activities to address non-compliances, as originally intended.¹⁶³

(vii) Sand and aggregate supply

Several participants at the public hearing raised questions concerning the annual rate of fill requirements for the Project from the Fraser River and local quarries, which is documented in the PCU.¹⁶⁴

In response to a request for information issued by the VFPA to the market in 2017, existing quarries have confirmed that they have sufficient capacity to meet the Project's needs. As a result, it will not be necessary to commission a new quarry to support Project construction.

As described in the PCU, the development of land for the marine terminal would use material from dredging activities in the Project footprint, existing quarries, and sand from the annual Fraser River Maintenance Dredging Program.¹⁶⁵ As this is an existing non-Project-related program carried out to maintain Fraser River navigation channels, the annual volume of materials dredged from the Fraser River is unrelated to RBT2.

5. Alternative means of carrying out the Project

(a) Overview

In accordance with the requirements of section 19(1)(g) of *CEAA 2012*, the CEA Agency's Operational Policy Statement Addressing "Purpose of" and "Alternative Means" under *CEAA 2012* (the **Operational Policy Statement**), and section 8 of the EIS Guidelines,¹⁶⁶ the VFPA accounted for alternative means in the assessment of the Project by first identifying the alternative means to carry out the Project, then identifying the effects of each technically and economically feasible alternative means, and lastly identifying the preferred means of carrying out the project. Ultimately, the VFPA selected the proposed location,

¹⁶¹ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at pp. 2334-2336.

¹⁶² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #30.

¹⁶³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #30.

¹⁶⁴ CEAR Doc 1210, PCU, at Attachment A, Figure 4-9.

¹⁶⁵ CEAR Doc 1210, PCU, at s. 2.3.

¹⁶⁶ CEAR Doc 1680, EIS Guidelines, at s.8.

orientation, and design as its preferred means to meet the Project purpose, as it would best serve growing capacity demand while minimizing environmental effects.

During the public hearing, in response to a motion brought by GCT, the Review Panel scheduled an additional topic-specific session on alternative means of carrying out the Project. Issues or concerns raised by GCT and other participants are discussed below. The VFPA is confident that RBT2—the only project that is before the Review Panel—is the best option for meeting the Project purpose. As emphasized in Chapter II of these Closing Remarks, the mandate of the Review Panel, as defined by the Terms of Reference, is to conduct an assessment of the environmental effects of RBT2.

(b) Assessment approach

Although under *CEAA 2012* an assessment of alternatives to the Project is not required, section 19(1)(g) of *CEAA 2012* provides that alternative means of carrying out the Project that are technically and economically feasible are “factors to be considered in the environmental assessment.” The EIS Guidelines required the VFPA to consider alternative means of carrying out the Project as well as alternatives to the Project at other potential locations within BC.¹⁶⁷

The EIS presents the alternative means assessment for alternatives to the Project at other potential locations within BC. and at Roberts Bank, as well as the alternative means of carrying out the Project.¹⁶⁸ The VFPA identified alternative means based on the Project team’s professional judgment, historical information, advice from consultants and industry representatives, technical, engineering and environmental reports, and feedback from public and Indigenous group consultation activities.¹⁶⁹ The responses to IR1-06 through IR1-12, as well as IR3-37 and IR3-38 provide updated and additional information for the assessments of alternatives, based on construction-related changes described in the PCU and based on requested information from the Review Panel.¹⁷⁰

The VFPA’s presentation at the May 31, 2019 topic-specific session provided a further summary of the alternative means considerations.¹⁷¹

The VFPA identified its preferred means by first evaluating the technical and economic feasibility of each alternative, and subsequently, for the technically and economically feasible alternative means, evaluating adverse effects on the basis of having more or less of an effect for select valued components compared to the other options being evaluated.¹⁷² The VFPA described the approach and technical, economic, and environmental criteria used to determine the preferred means of carrying out the Project in responses to IRs.¹⁷³ The

¹⁶⁷ CEAR Doc 1680, EIS Guidelines, at s. 8.

¹⁶⁸ CEAR Doc 181, EIS, Volume 1, at s. 5.

¹⁶⁹ CEAR Doc 181, EIS, Volume 1, at s. 5.2.

¹⁷⁰ CEAR Doc 934, VFPA responses to IR1-06 to IR1-12, IR3-37, IR3-38.

¹⁷¹ CEAR Doc 1838, VFPA oral presentation, May 31, 2019; CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3734 and following.

¹⁷² CEAR Doc 934, VFPA response to IR1-07.

¹⁷³ CEAR Doc 934, VFPA responses to IR1-06, IR1-07.

VFPA did not weigh technical information against information available from environmental reports—rather, information sources were generally considered to be of equal importance during the analysis of alternative means, except for the following:

- Regulator input on preferred location was considered at the beginning of the process of determining alternative means. Preliminary planning for a new three-berth container terminal at Roberts Bank was undertaken in the early 2000s¹⁷⁴ (as described in the EIS¹⁷⁵) and regulators provided guidance during that time pertaining to the preferred location for another terminal at Roberts Bank; and
- Input during all rounds of consultation was considered iteratively during Project planning: feedback on the design and location of the alternative means from consultation with Indigenous groups and the public, including communities, local and regional government, stakeholders, community groups, and residents, was initiated in 2012 on Project concepts. An example of feedback from consultation dictating Project changes is illustrated by the changes documented in the PCU, as described above for the elimination of ITP use.¹⁷⁶

During its submissions on May 31, 2019, GCT suggested that the VFPA's analysis of alternative means was flawed in that it failed to carry out a comprehensive environmental assessment of both the Project and expansion on the east side of the causeway, that is, the Deltaport Fourth Berth (**DP4**) project.¹⁷⁷

The DP4 project is not an alternative means of carrying out the Project. There are two reasons for this. First, they are different projects with different proponents and different intended outcomes. Second, the VFPA does not consider construction of additional capacity in the intertidal area to be technically feasible.

With respect to the first reason, the VFPA submitted its Project Description to the CEA Agency in September 2013. That Project Description refers to "a new three-berth marine container terminal located at Roberts Bank, Delta, BC, approximately 35 kilometres (km) south of Vancouver." It is that Project—and only that Project—that has been under assessment by the CEA Agency and the Review Panel since 2013 and 2016, respectively. The Review Panel's mandate is clear that the Review Panel is to review the VFPA's RBT2 Project.

In contrast, GCT submitted its Preliminary Project Enquiry for the DP4 project (the **DP4 PPE**) to the VFPA's environmental permitting department in February 2019, five and a half years after the VFPA submitted its Project Description.¹⁷⁸ The DP4 PPE makes comparisons

¹⁷⁴ In 2002, RBT2 (then referred to as Container Terminal 2) was proposed together with the DP3 Project. Based on regulator input, the VFPA chose not to advance Container Terminal 2 in order to provide more time to complete environmental and engineering studies to explore the best location and design for a new terminal; DP3 proceeded through the regulatory process as a separate project.

¹⁷⁵ CEAR Doc 181, EIS, Volume 1, at s. 2.3.1.

¹⁷⁶ CEAR Doc 934, VFPA response to IR1-08.

¹⁷⁷ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3810-3811.

¹⁷⁸ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3816, lines 13-15.

between the two projects as separate projects.¹⁷⁹ The DP4 PPE also acknowledges that the DP4 project would require a separate and lengthy process, independent from the RBT2 process.¹⁸⁰ In GCT's submissions to the Review Panel on February 8, 2019, GCT acknowledged that under its own container demand forecasting, either one or both of the 'projects' may be required in the medium and high trade growth scenarios.¹⁸¹ GCT's presentation to the Review Panel on May 31, 2019 acknowledged that the DP4 project will be subject to review under the *Impact Assessment Act*.¹⁸² Finally, GCT acknowledges that the DP4 project is a separate project and not an alternative means to carrying out the Project. As counsel for GCT stated during the public hearing:

"So although we really appreciate the comments that were made, I think the focus of today, as the Panel had clearly articulated in its order, was alternatives to, and the focus is on that project, namely the Roberts Bank Terminal 2 Project, and not Deltaport 4."¹⁸³

Second, the VFPA does not consider the DP4 project to be technically feasible given the regulatory risk associated with development in the intertidal area, identified previously as Option E1. As early as 2002, the Vancouver Port Authority (**VPA**, now referred to as the VFPA) engaged with federal and provincial regulators to explore two distinct potential container expansion projects: a third berth at the existing Deltaport facility (the DP3 Project) and a second container terminal at Roberts Bank (referred to at the time as the Container Terminal 2 Project). Specifically, in spring 2003, the VFPA met with representatives from DFO, Environment Canada, Canadian Wildlife Service (**CWS**), and the BC EAO to discuss the two projects. The VFPA's plans at the time included four potential locations for the Container Terminal 2 Project: two options in intertidal areas along the causeway, identified as E1 and W3, and two options in deeper waters on the west side of the Deltaport and Westshore terminals, identified as W1 and W2. At the meetings, the regulators expressed concerns with development in intertidal areas. Subsequently, in correspondence between the VPA and regulators,¹⁸⁴ DFO and Environment Canada gave the VPA the following direction:

- DFO Pacific Region stated that during previous meetings "DFO clearly stated our concern over any proposal to develop additional container storage and dock facilities on the east side of the existing causeway. In each of those meetings DFO advised the VPA that, because of the critical value of the fish habitat in the area of the

¹⁷⁹ CEAR Doc 1862, Exhibit 38, document presented by GCT on May 31, 2019.

¹⁸⁰ CEAR Doc 1862, Exhibit 38, document presented by GCT on May 31, 2019.

¹⁸¹ CEAR Doc 1445, GCT comments on sufficiency of information.

¹⁸² CEAR Doc 1839, GCT oral presentation, May 31, 2019.

¹⁸³ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3833.

¹⁸⁴ CEAR Doc 934, VFPA response to IR1-06, Appendix IR1-06-A; CEAR Doc 1866, Exhibit 42, document presented by the VFPA on May 31, 2019; CEAR Doc 1341, Letter from Minister of Fisheries and Oceans to the VPA dated July 29, 2003.

proposed expansion, DFO would not be able to issue a *Fisheries Act* Sec. 35(2) authorization for the destruction of that habitat.”¹⁸⁵

- DFO Pacific repeated their concerns in their letter, stating that “the option designated E1 in the current Terminal 2 proposal results in destruction of critical fish habitat on the east side of the causeway that DFO could not authorize. Option W3 also impacts valuable fish habitat and would result in many of the same impacts to fish habitat as Option E1.”¹⁸⁶
- Environment Canada stated that they “understand that the Vancouver Port Authority is confining its current activities to studying the project area in order to provide a comprehensive, scientific basis for evaluating the various facility options in terms of their environmental and social sustainability as well as their operational viability” and supported the approach being taken.¹⁸⁷
- The Minister of Fisheries and Oceans provided clear direction to the VFPA that DFO “will not consider issuing a *Fisheries Act* Section 35(2) authorization for the destruction of this critical fish habitat.” In addition, the Minister of Fisheries and Oceans suggested that the VFPA “focus its efforts on options that have a lesser likelihood of damaging critical fish habitat... [options] in deeper water, where construction would likely have less impact on the Estuary’s fish habitat.”¹⁸⁸

As a result of this clear regulatory direction, the VFPA did not consider the intertidal marine terminal locations E1 and W3 to be technically feasible means of carrying out the Project. As pointed out in the EIS¹⁸⁹ and response to IR1-06,¹⁹⁰ regulatory risk was identified as a technical criterion for the evaluation of location, orientation, layout, and configuration alternatives. Therefore, the VFPA considered only the W1 and W2 location options as technically feasible, and undertook further evaluation on these options.

Based on a comparative analysis of potential environmental effects to key valued components, the VFPA determined that the proposed location and configuration would have the least environmental effects due to its location in subtidal waters and because it had the smallest marine footprint (including requiring the smallest dredging footprint).¹⁹¹ While this option was neither the technically simplest nor least expensive option, the VFPA selected it as the preferred means because of its environmental advantages.¹⁹² DFO confirmed that the VFPA’s “decision to propose the terminal on a deeper, sub-tidal location instead of on intertidal areas closer to shore is the key mitigation measure in reducing the significance of adverse effect on fish habitats. A more shore-ward terminal location would have affected larger areas of more productive fish habitats.”¹⁹³

¹⁸⁵ CEAR Doc 934, VFPA response to IR1-06, Appendix IR1-06-B.

¹⁸⁶ CEAR Doc 934, VFPA response to IR1-06, Appendix IR1-06-B.

¹⁸⁷ CEAR Doc 1866, Exhibit 42, document presented by the VFPA on May 31, 2019.

¹⁸⁸ CEAR Doc 1341, Letter from Minister of Fisheries and Oceans to the VPA dated July 29, 2003.

¹⁸⁹ CEAR Doc 181, EIS, Volume 1, at s. 5.3.1.1, 5.4.1.1.

¹⁹⁰ CEAR Doc 934, VFPA response to IR1-06.

¹⁹¹ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3752-3753.

¹⁹² CEAR Doc 539, Summary Report – Terminal 2 (T2) Trade-off Process and Outputs CCIP, February 2012.

¹⁹³ CEAR Doc 1630, DFO written submission, at p. 22.

GCT claimed several times that the DP3 Project was constructed in the E1 area.¹⁹⁴ This is not true. As shown in EIS Figure 5-2,¹⁹⁵ and as discussed in the VFPA's presentation on alternative means,¹⁹⁶ the DP3 Project and the E1 option are adjacent to each other but distinctly different footprints. Following direction from regulators during the DP3 regulatory review process, the VFPA significantly reduced the area of the DP3 Project and did not construct any terminal infrastructure in the E1 area. In fact, the VFPA constructed significant compensatory habitat in the E1 area as part of the DP3 Project.¹⁹⁷ Further terminal development in the E1 area would likely result in the destruction of that compensatory habitat.

GCT also referred to several environmental and economic reports it had commissioned with respect to the DP4 project.¹⁹⁸ The VFPA has responded to these reports in its response to Undertaking #51.¹⁹⁹ These reports are preliminary and have no bearing on the assessment of the Project. In the case of the "Summary of Review of Regulatory Considerations; East Causeway Development" prepared by Hemmera, the report proposes a roadmap for potential development shoreward of the existing terminal, and contemplates such development as being a subsequent project to RBT2, and not an alternative means.²⁰⁰ With respect to the "Preliminary Environmental Impacts Comparison" report prepared by PGL Environmental Consultants, the VFPA notes that the report provides a limited analysis and is only meant to provide "high-level comparison... without detailed quantitative data and is intended to provide an initial indication, based on overall project design."²⁰¹ It is notable that no authors of these reports and no expert testimony were brought forward by GCT during the public hearing.

The DP4 PPE submission to the VFPA and these preliminary reports clearly relate to a separate project, and not an alternative means of carrying out the Project. The Review Panel's Terms of Reference are clear that its mandate is to assess RBT2, including an assessment of alternative means, not alternative projects. For the reasons set out above, the VFPA does not consider expansion in the intertidal area to be technically feasible. As a result, the Review Panel should place no weight on GCT's submissions with respect to the DP4 project and need not consider the DP4 project further.

As this Review Panel is aware, under *CEAA 2012*, the Review Panel is not required to evaluate alternatives **to** the Project, but is only required to evaluate alternative means of carrying out the preferred project, that is, RBT2.²⁰² The Review Panel is not required to consider the DP4 project, which is not an alternative means of carrying out that project.

The following is a summary response to GCT submissions:

¹⁹⁴ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3804, 3808, 3809.

¹⁹⁵ CEAR Doc 181, EIS, Volume 1, at Figure 5-2.

¹⁹⁶ CEAR Doc 1838, VFPA oral presentation, May 31, 2019.

¹⁹⁷ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3838.

¹⁹⁸ CEAR Doc 1839, GCT oral presentation, May 31, 2019.

¹⁹⁹ CEAR Doc 1932, VFPA response to Undertaking #51.

²⁰⁰ CEAR Doc 1932, VFPA response to Undertaking #51.

²⁰¹ CEAR Doc 1865, Exhibit 41, document presented by GCT on May 31, 2019.

²⁰² CEAR Doc 1728, Transcript, Volume 1, May 14, 2019, at pp. 31-32.

1. The VFPA conducted an alternative means consideration in accordance with the Operational Policy Statement early in the planning of the Project starting in 2003 when a number of alternative locations in Roberts Bank were brought forward.²⁰³ These included locations E1 and W3 on intertidal habitat.
2. Both DFO department officials and the Minister of Fisheries and Oceans made it absolutely clear that they would not issue authorizations for this Project if the proposal was to locate it on intertidal habitat since it was of critical importance. These regulatory directions were in specific response to RBT2. As a result of this clear direction from DFO and the Minister, location options E1 and W3 were eliminated as technically feasible options for a second terminal at Roberts Bank. Since 2003, the VFPA has held dozens of meetings with DFO in respect of RBT2 and they have never indicated that their direction had changed, nor did they do so during the public hearing.²⁰⁴
3. The DP3 expansion (adding a third berth to GCT's Deltaport Terminal) was also brought forward in 2003 as a separate project. This was a much smaller expansion than the proposed Terminal 2 at E1. In consultation with DFO, Environment Canada, Indigenous groups, and the public (and GCT), the VFPA reduced the DP3 footprint from 32 hectares to less than 21 hectares to reduce effects to intertidal habitat and to avoid effects to an existing Dungeness crab nursery area and a productive eelgrass bed. In the comprehensive study report on DP3, jointly conducted by DFO and Environment Canada, the regulators acknowledged that the reduced terminal footprint was "done primarily to minimize potential effects to existing fish and wildlife habitats." The DP3 Project with the reduced footprint received Ministerial approval in November 2006 and was constructed between 2006 and 2009.²⁰⁵
4. It is disingenuous for GCT to suggest that approval of the DP3 Project indicates that DFO and the Minister changed their direction against protecting intertidal habitat. In fact, the record is that construction of Terminal 2 in the E1 area, and expansion of DP3 beyond 21 hectares was clearly rejected. The DP4 proposal of GCT would propose destruction of fish and marine habitat rejected by DFO and the Minister—both in the expansion of DP3 and in the E1 area rejected for Terminal 2. In fact, as stated by the VFPA in reviewing alternative locations for Terminal 2 in 2010:

"Lessons from the recent DP3 environmental assessment process had reinforced the 2003 guidance that the project would not be permitted within the former E1 and W3 locations."²⁰⁶
5. The VFPA undertook consideration of alternative terminal locations in subtidal waters to avoid the intertidal areas. These alternatives are illustrated in the VFPA's

²⁰³ CEAR Doc 1838, VFPA oral presentation, May 31, 2019.

²⁰⁴ CEAR Doc 1838, VFPA oral presentation, May 31, 2019; CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3747.

²⁰⁵ CEAR Doc 1838, VFPA oral presentation, May 31, 2019, at slides 12 to 17; CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3747-3749.

²⁰⁶ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3751.

presentation on May 31, 2019, slides 17 and 18. The VFPA invested over \$3 million in geotechnical field drilling and engineering analysis to determine if the W1 and W2 options could be built in deeper waters. A comprehensive trade-off study was undertaken to assess each of the six potential orientations of the terminal against financial, economic, environmental, and social considerations. While all six orientations were considered technically and economically feasible, the study identified the W1 orientation with zero metre setback as the preferred means based on a comparison of environmental and social considerations.²⁰⁷

6. As stated on behalf of the VFPA:

“Although this orientation was the most expensive option, it was preferred because it had the least environmental impact due to its location, primarily in the subtidal zone, and having the smallest marine footprint and least dredging.”²⁰⁸

7. The location also minimized the potential for noise and air quality concerns to residents of local communities as it was furthest from shore.²⁰⁹

8. The VFPA also considered alternatives of location and design relating to the causeway, including road and rail options, the tug basin, and the intermodal yard.²¹⁰

9. Following these considerations, W1 became the ‘preferred means’ among the alternatives. As stated in the Operational Policy Statement:

“Based on information gathered in Step 1 and Step 2, proponents are encouraged to identify a preferred means of carrying out the designated project. The preferred means then becomes the focus of the project EA, and no further analysis is generally required on other alternative means considered in Step 1 or 2.”

10. Throughout the environmental review of RBT2, the VFPA has continued to consider alternative means of carrying out RBT2, including using a dredge with pump-ashore capability to eliminate the need for the ITP during construction.²¹¹

11. The RBT2 Project Description was submitted in September 2013. The *Fisheries Act* had not changed. Amendments were made to the *Fisheries Act* effective in November 2013. In June of this year, Parliament modernized the *Fisheries Act* “to restore protection for fish and fish habitat.” Protections for fish habitat under the 2012 version of the *Fisheries Act* still included a requirement for a section 35 authorization for a permanent impact on fish habitat. There is no evidence that, in respect of RBT2, the Minister changed the clear direction given in 2003 that a section 35 authorization would not be granted to build a new three-berth terminal footprint in

²⁰⁷ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3751-3752.

²⁰⁸ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3752-3753.

²⁰⁹ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3753.

²¹⁰ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3752; CEAR Doc 181, EIS, Volume 1, at Table 5-2.

²¹¹ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3753-3756.

the intertidal habitat. In fact, the evidence from GCT is that there were many delays in implementing any new policy, that DFO actually maintained the existing policy on habitat protection, and that the recent amendments to the *Fisheries Act* restore the protection on fish habitat to the pre-2012 position.²¹²

12. In summary, the VFPA has been diligent, thorough, and responsible in reviewing alternative means, and in designing the Project to avoid impacts on intertidal habitat. The VFPA has met the requirements of *CEAA 2012*, the EIS Guidelines, and the Operational Policy Statement.
13. GCT's DP4 proposal, only brought forward in February of this year, is clearly not an alternative means of carrying out RBT2. The Project is a new three-berth terminal at Roberts Bank with a different operator to provide both increased capacity and competition in container services. Location of this new three-berth terminal in the intertidal area either on the west side (W3) or the east side (E1) was categorically rejected by DFO and the Minister in 2003. The DP4 proposal for a single new berth operated by GCT is not an alternative means of carrying out a project for a new three-berth terminal with a new operator. Nothing in the submissions of GCT provides any foundation for the assertion that the alternative means consideration for RBT2 was not adequate.
14. The location of the terminal in subtidal waters is also incorporated into the memorandum of agreement the port authority reached with Tsawwassen First Nation (TFN) in December 2004 (the **2004 MOA**).²¹³ The MOA was entered into in 2004 as part of a settlement agreement relating to developments at Roberts Bank. The 2004 MOA addresses proposals for the 'Roberts Bank Port Facility Expansion', which was defined to include the DP3 Project and "the creation of a new three-berth container terminal called "Terminal 2"".

The Roberts Bank Port Facility Expansion is conceptually shown on a schedule to the 2004 MOA. The plan in the schedule shows the proposed DP3 location on the east side of the terminal facilities and shows the Terminal 2 proposal on the west side and out at the edge of the subtidal area. The plan also shows the outline of water lots on the west and east side of the causeway in the intertidal area and marked as "VPA to TFN". These water lots are also shown in the hatched areas on slide 15 of the VFPA presentation for May 31, 2019.²¹⁴ As stated by the VFPA at the topic-specific session:

"Slide 15. I would like to pause here to address the Port Authority's consultation with the Tsawwassen First Nation in the early 2000s.

²¹² Note that in the GCT document (CEAR Doc 1864, pp. 9-14), the joint report to the VFPA and GCT indicates that while the Act was changed from 2013 to 2019, the DFO department approach to protecting fish habitat was never modified (Hemmera Report).

²¹³ CEAR Doc 1995, TFN and VPA Roberts Bank Development Memorandum of Agreement.

²¹⁴ CEAR Doc 1838, VFPA oral presentation, May 31, 2019.

The Port Authority sought agreement with the TFN with respect to its plans for container terminal expansion at Roberts Bank and to settle certain outstanding claims the TFN had against the Port Authority.

Following the elimination of E1 and W3 as technically feasible options for the location of a new terminal at Roberts Bank, we determined that we would not require certain water lots along the terminal causeway for Port expansion as shown in the hatched area on the screen.

As part of the agreement the Port Authority reached with the TFN in December 2004, the Port Authority agreed to transfer those water lots to the TFN upon approval of container terminal 2 if the water lots were not required for Port expansion.

If either the E1 or W3 options were pursued, we would not be able to transfer those lots to the TFN."²¹⁵

The transfer of the water lots is addressed in section 6 of chapter 9 of the 2004 MOA. Consultation on the Roberts Bank Port Facility Expansion is addressed in section 2 of chapter 2 of the 2004 MOA. The importance of the water lots to TFN is confirmed in the exchange of letters between the BC Ministry of Water, Land and Air Protection (October 28, 2004), and Chief Baird of TFN (November 1, 2004) attached as schedule B to the 2004 MOA. Note that section 10 of chapter 9 of the 2004 MOA recognizes the potential for designated 'habitat compensation areas' within the water lots as a result of directives from environmental assessment, subject to consultation with TFN.

Location of the Project (a new three-berth terminal with a new operator) within the intertidal area on the east side of the causeway (the E1 area rejected by the Minister in 2003) would be inconsistent with the 2004 MOA.

(i) Intermodal yard location

At the public hearing, participants, including TFN and the Review Panel, raised questions about the preferred location for the rail IY. The questions were centred around the feasibility of a land-based IY instead of an on-terminal IY location and related to the potential to reduce effects in the marine environment (i.e., with a smaller terminal footprint).

During the assessment of alternative means, the VFPA rejected both an on-causeway IY and a land-based IY for the reasons described in the EIS²¹⁶ and responses to IR #15²¹⁷ and

²¹⁵ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3748-3749.

²¹⁶ CEAR Doc 181, EIS, Volume 1, at s. 4.

²¹⁷ CEAR Doc 314, VFPA response to IR #15.

IR1-06²¹⁸ (i.e., outside of the VFPA's jurisdiction, third party proponent, and public preference to avoid impacts on the agricultural land reserve). As further clarification, the EIS stated that the "land-based IY option is a technically and economically feasible option; however, it is located outside of [the VFPA's] jurisdiction and would require a third-party proponent."²¹⁹ It was outlined in IR #15 that the EIS "should have stated that a land-based IY option may be technically and economically feasible for a third party, but is not a technically feasible option for [the VFPA]."²²⁰ Further, the response to IR1-06 stated that third party consideration of a land-based IY continued in the ensuing years and the implementation of a land-based facility would have needed to be a cost-efficient business proposition for the operating railways and the marine terminal operator, with the cost-savings of such a facility outweighing the extra handling and drayage costs required for its operation.²²¹ The VFPA clarified during the public hearing that the upland intermodal location may be economically feasible but is unlikely to be commercially feasible.²²²

At the public hearing, the VFPA described having discussions with the Tsawwassen Economic Development Group, who at the time were controlling the Tsawwassen industrial lands. The group considered whether or not they would allow an upland IY on their land, and they determined that it was not consistent with the type of development that they were seeking.²²³

Given that the existing Deltaport terminal has an on-terminal IY and the other reasons previously described, the Project requires similar terminal facilities to be commercially competitive. For these reasons, the land-based IY option was not investigated further, and the only feasible means, the on-terminal IY location, was fully assessed in the EIS.

6. Conclusion

Despite significant investments in increasing the efficiency of its terminals, and taking into account all planned expansions to container capacity on the west coast, these anticipated improvements will not be enough to manage Canada's future trade demand, and by the mid-2020s, it is anticipated there will be a shortfall in container capacity. After years of planning, consultation with Indigenous groups and local communities, and extensive engineering and environmental studies, including careful consideration of alternative means of delivering this additional capacity, the VFPA determined that the best project to address this need is RBT2.

Intensive engagement with regulators in the early 2000s concerning the potential location of the Project resulted in clear direction that the terminal would not be acceptable in either the E1 or W3 locations. This was reinforced by the VFPA's experience in permitting the DP3 Project. As a result, those options were not determined to be technically feasible, and at no

²¹⁸ CEAR Doc 934, VFPA response to IR1-06.

²¹⁹ CEAR Doc 181, EIS, Volume 1, at s. 5.4.3.1.

²²⁰ CEAR Doc 314, VFPA response to IR #15.

²²¹ CEAR Doc 934, VFPA response to IR1-06.

²²² CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at p. 3781.

²²³ CEAR Doc 1859, Transcript, Volume 15, May 31, 2019, at pp. 3779-3780.

time since that decision was made, throughout the extensive regulatory engagement the VFPA has undertaken, did ECCC or DFO provide any indication their opinion had changed that these locations were unacceptable. The VFPA fully and properly considered the alternative means of delivering this preferred project, including design and construction options. GCT's DP4 project is not an alternative means of delivering the Project.

The Project's design has been refined over time, to ensure the Project is delivered in the least environmentally impactful way. The VFPA has carefully considered feedback from regulators, Indigenous groups, and members of the public, and incorporated it wherever possible (such as the elimination of the use of the ITP and use of all dredgeate) to optimize the Project's design. If the Project is approved and proceeds through the detailed design phase, the VFPA will continue to refine the Project based on further consultation and engagement.

CHAPTER IV. MARINE SHIPPING AND ACCIDENTS OR MALFUNCTIONS

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
MSA Sections	
1. Marine Shipping Addendum	316
Updated and Supporting Documents	
1. Mercator International (2018) Roberts Bank Terminal 2 Container Vessel Call Forecast Study (2018 Mercator Report)	1362
2. Roberts Bank Terminal 2 Project Ship Traffic Information Sheet	1362
3. Ocean Shipping Consultants (2016): Container Traffic Forecast Study – Port of Vancouver, 2016 (Appendix IR1-03-A)	934
CEA Agency IRs and Response	
1. MSA IR #2 – Rationale for Effects Characterization	391
2. MSA IR #3 – Effects of the Environment on Marine Shipping Associated with the Project	391
3. MSA IR #6 – Additional Projects to be Considered	391
4. MSA IR #7 – Reasonably Foreseeable Projects and Activities	391
Panel IRs and Responses	
1. IR1-05 – Project Operation – Marine Shipping	934
2. IR2-06 – Coastal Geomorphology – Morphodynamics: Wave Effects	934
3. IR4-01 – Marine Shipping – Vessel Size	934
4. IR4-02 – Vessel Traffic Projections – Vessel Size	934
5. IR4-03 – Vessel Traffic Projections – Vessel Size and Movements	934
6. IR4-04 – Vessel Traffic Projections – Vessel Movements: Segment G	934
7. IR4-05 – Vessel Traffic Projections – Small Vessels	934
8. IR4-06 – Vessel Traffic Projections – Small Vessels	934
9. IR4-07 – Vessel Traffic Projections: Peak and Non-peak Ship Traffic Movements	934
10. IR4-08 – Vessel Traffic Projections: Tug Escort, Ferries	934
11. IR4-09 – Vessel Traffic Projections: Excluded Projects Reconciliation	934
12. IR4-10 – Underwater Noise – ECHO Program	934
13. IR4-11 – Underwater Noise – Vessel Source Levels: Triple-E Class Ships	934
14. IR4-12 – Underwater Noise – Methodology Verification	934
15. IR4-13 – Underwater Noise – Vessel Source Levels: Adjustments	934
16. IR4-14 – Underwater Noise – Vessel Source Levels: Contribution of Small Vessels	934
17. IR5-01 – Marine Shipping – Anchorages	934
18. IR5-01a – Marine Shipping – Anchorages (Clarification)	934
19. IR6-03 – Light – Methodology (Use of Representative Vessel)	934
20. IR7-02 – Atmospheric Noise – Transient Vessels	934
21. Preamble for IR7-13 to IR7-23 Wave Environment Information Requests	934
22. IR7-13 – Wave Environment – Numerical Wave Model	934
23. IR7-14 – Wave Environment – Wind Model Information Source(s)	934
24. IR7-15 – Wave Environment – Baseline, Wind-driven Wave Climate	934

Documents Relevant to Topic	CEAR Doc #
25. IR7-16 – Wave Environment – Baseline, Wind-driven and Wake-driven Wave Climate	934
26. IR7-17 – Wave Environment – Numerical Modelling of Vessel Wake-driven Waves: Vessel Wake Study	934
27. IR7-18 – Wave Environment – Numerical Modelling of Vessel Wake-driven Waves: Additional Details	934
28. IR7-19 – Wave Environment – Wake Waves by Vessel Type Information Source(s)	934
29. IR7-20 – Wave Environment – Modelling Ship Wake Waves	934
30. IR7-21 – Wave Environment – Calm Conditions	934
31. IR7-22 – Wave Environment – Open Water	934
32. IR7-23 – Wave Environment – Interaction of Vessel Waves	934
33. IR9-02 – Coastal Birds or Marine Birds – Artificial Light	934
34. IR11-01 – Accidents and Malfunctions – Methodology, Incidence Probabilities	934
35. IR11-02 – Accidents and Malfunctions – Methodology, Quantitative Risk Assessment	934
36. IR11-03 – Accidents and Malfunctions – Effects Assessment, Potential Contaminant Release	934
37. IR11-04 – Accidents and Malfunctions – Effects Assessment, Potential Effects of Spill of Light Fuel Oil	934
38. IR11-05 – Accidents and Malfunctions – Effects Assessment, Ultra Large Container Ship Scenario	934
39. IR11-06 – Accidents and Malfunctions – Effects Assessment, Discharge at Sea	934
40. IR11-07 – Accidents and Malfunctions – Environmental Management	934
41. IR11-08 – Accidents and Malfunctions – Effects Assessment, Other Vessels Scenario	934
42. IR11-09 – Accidents and Malfunctions – Effects Assessment, Structural Failure Scenario	934
43. IR11-10 – Accidents and Malfunctions – Effects Assessment, Temporal and Spatial Aspects	934
44. IR11-11 – Accidents and Malfunctions – Effects Assessment, Marine Birds	934
45. IR11-12 – Accidents and Malfunctions – Pre-SCAT survey and mapping information	934
46. IR12-03 – Human Health – Indigenous Health, Accidents and Malfunctions, and Contaminants in marine traditional resources	934
47. IR12-08 – Wave Environment – Baseline, Wind-driven Wave Climate	934
48. IR13-19 – Cultural and Physical Heritage Resources – Wave Environment, Cumulative Effects Assessment	934
49. IR13-26 – Accidents and Malfunctions: Fate of Oil Spills	934
50. IR13-27 – Accidents and Malfunctions – Concept of Resilience, Marine Commercial Use and Current Use of Lands and Resources for Traditional Purposes	934
51. IR13-30 – Compilation of Environmental Management Plans, Mitigation Measures, and Follow-Up Programs	934
52. IR14-01 – Wave Environment – Current Use of Lands and Resources for Traditional Purposes – Access to Preferred Locations	934
53. Additional Information Request February 22, 2019: 3. Ship Traffic	1547
54. Updated Project Commitments	2001
Public Hearing Documents	
1. Panel Orientation Session #2 (September 16, 2016), Undertaking #1 Estimate of the number of ultra-large ships that would call on Roberts Bank Terminal 2	667
2. Panel Information Session (January 30, 2019), Undertaking #2	1473
3. Undertaking #20 Underwater Noise Documents	1800
4. Undertaking #35 Ship Percentage in the Marine Shipping Area (Segments B and D)	1899

Documents Relevant to Topic	CEAR Doc #
5. Undertaking #36 Vessel Class Descriptions	1900
6. Undertaking #37 Vessel Participation in VFPA Air Quality Incentive Programs	1901
7. Undertaking #40 Current Use Mitigation: Marine Shipping Activities Communication Plan	1902
8. Undertaking #63 Wave Periodicity as Part of Wave Structure	1987
9. Exhibit 5 – Port of Vancouver – Container Ship Calls and Throughput (1995-2018)	1735
10. Exhibit 30 – NOx Tiers of Containerships That will Call Vancouver (Mercator 2019)	1846

2. Overview

This chapter summarizes key topics involving the regulatory regime governing marine shipping, as well as marine shipping related issues discussed during the May 28, 2019 topic-specific session and subsequent general sessions. The VFPA provides clarifying or supporting information on the following topics:

- The regulatory regime applicable to marine shipping;
- Marine shipping activities associated with the Project outside of the VFPA's navigational jurisdiction, including updated vessel traffic and size projections outlined in the 2018 Mercator Report; and
- Potential project and marine shipping accidents or malfunctions, including mitigation measures to reduce risks.

3. Marine shipping

(a) Overview

On April 17, 2015, the CEA Agency revised the EIS Guidelines to include consideration of environmental effects of marine shipping associated with the Project beyond the care and control of the VFPA and extending to the 12 nautical mile limit of Canada's territorial sea. In accordance with this requirement, the VFPA submitted the MSA,²²⁴ which described potential changes to the physical, biophysical, and human environments resulting from marine shipping associated with the Project in the marine shipping area. Since submission of the MSA, the VFPA has responded to numerous IRs both from the CEA Agency and the Review Panel (see Section 1 above).

On April 24, 2019, the Minister of Environment and Climate Change made final amendments to the Review Panel's Terms of Reference and the EIS Guidelines, stating that it is "reasonable to establish the spatial extent of Project-related marine shipping that would be included as part of the designated project at the 12 nautical mile limit of Canada's territorial sea."²²⁵

²²⁴ CEAR Doc 316, MSA.

²²⁵ CEAR Doc 1680, Letter from the Minister of Environment and Climate Change to the Review Panel.

While marine shipping associated with the Project is being assessed as part of the Project and, therefore, a factor to be considered in the Minister's decision, marine shipping activity is outside the care and control of the VFPA. The VFPA, like all participants, is constrained by its jurisdiction and any conditions placed on project approval must be in accordance with that jurisdiction. As discussed in Chapter II of these Closing Remarks, the VFPA has appropriately not committed to mitigation measures related to marine shipping beyond the boundaries of its jurisdiction and control. However, the VFPA supports a number of regional initiatives that address marine shipping issues that are beyond the VFPA's jurisdiction and control that mitigate the effects of marine shipping, both Project-associated and other. These regional initiatives should not be considered mitigation measures for the Project itself. It is open to the Review Panel to address the continued implementation of these initiatives in its report as recommendations, rather than as conditions.

The Updated Project Commitments outline many of the regional initiatives and programs that have the potential to reduce adverse effects of marine shipping in the marine shipping area in general, and also the federal recommendations and accommodations that form part of the federal approval of the Trans Mountain Expansion Project.²²⁶ The VFPA is committed to actively participating in these initiatives and programs. The VFPA is also committed to consulting and collaborating with Indigenous groups, other regulatory agencies, and stakeholders. For example, the VFPA initiated the development and implementation of the ECHO Program, which is focused on regional measures to improve conditions for SRKW. As outlined in the ECHO Program presentation, given how vessel noise contributions to the soundscape vary throughout the region, underwater noise reduction measures would be most effectively managed on a subregional scale.²²⁷

(b) Geographic setting of the Marine Shipping Area

The MSA outlines the geographic setting of the marine shipping area.²²⁸ In brief, marine shipping activity associated with the Project occurs within the Salish Sea in established, designated shipping lanes. The boundaries of the Salish Sea are depicted in Figure 2-1 of the MSA. The international shipping lanes are depicted in Figure 4-1 of the MSA.

(c) Regulatory context

The federal government has exclusive legislative jurisdiction over navigation and shipping, and marine shipping associated with the Project is governed by Canada's marine safety and security regime. In addition to federal legislation, there is an international context to marine shipping as the federal government has entered into international agreements with respect to marine traffic management. Each of these aspects is discussed in further detail below.

²²⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix B, Table B2.

²²⁷ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 2976-2977.

²²⁸ CEAR Doc 316, MSA, at s. 2.

(i) VFPA jurisdiction over navigation

The VFPA does not have jurisdiction over any marine shipping activities outside of its geographic area of jurisdiction. Within the VFPA's geographic area of jurisdiction (the **VFPA Navigational Jurisdiction Area**), which is depicted in Figure 1-1 of the MSA, the VFPA has legislative authority over navigation, as established under the *Canada Marine Act, 2001*, and associated regulations, including the *Port Authorities Operations Regulations*.²²⁹ The VFPA does not have jurisdiction over marine shipping activities beyond the VFPA Navigational Jurisdiction Area. This is reflected in the EIS Guidelines, which required assessment of the environmental effects of marine shipping associated with the Project "which is beyond the care and control of the VFPA" and within the 12 nautical mile limit of Canada's territorial sea.²³⁰

Further, it should be noted that the VFPA's jurisdiction within the VFPA Navigational Jurisdictional Area does not extend to all aspects of marine shipping, and is limited to control over navigation within designated port limits.²³¹

(ii) Federal Authorities with jurisdiction over aspects of marine shipping

The federal agencies with authority in relation to marine shipping relevant to the Project include Transport Canada, CCG, and the Pacific Pilotage Authority. Details regarding the jurisdiction of these departments and agencies are provided below.

A. Transport Canada generally

Transport Canada is the lead department responsible for marine safety and security.²³² Marine shipping associated with the Project is governed by Canada's marine safety and security regime.²³³ Transport Canada's 2018 document entitled *Canada's Marine Safety and Security System* provides a general overview of this regime, including an overview of topics relevant to the Project assessment, such as safe navigation standards, oversight and enforcement, preparedness and response, and liability and compensation.²³⁴

It is important to recognize that while Transport Canada develops regulations and standards to govern shipping operations, container shipping is international in nature, and domestic legislation reflects not only domestic needs, but also international conventions to which Canada is a signatory.

With respect to the international jurisdiction over matters relating to marine shipping, most relevant to the assessment of marine shipping associated with the Project are the conventions of the International Maritime Organization (**IMO**). The IMO is a specialized

²²⁹ SOR/2000-55

²³⁰ CEAR Doc 1680, EIS Guidelines, at s. 17.1.2.

²³¹ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, pp. 13-14.

²³² CEAR Doc 459, Transport Canada presentation at June 28, 2016 Orientation Session; CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B.

²³³ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B.

²³⁴ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, p. 12.

agency of the United Nations, of which Canada is a member, and has responsibility for the safety and security of shipping, and the prevention of atmospheric pollution by ships. When IMO agreements become binding, member countries must give effect to the provisions of the agreement and take all other steps necessary to give the agreement effect.²³⁵

There are a number of IMO conventions relevant to marine shipping associated with the Project, including the following:

- The International Convention for the Safety of Life at Sea, 1974, and the Protocol of 1988 relating to the Convention specify minimum standards for the construction, equipment and operation of ships, compatible with their safety;
- The International Convention for the Prevention of Pollution from Ships, 1973 (**MARPOL**) covers the prevention of pollution of the marine environment by vessels from operational or accidental causes. MARPOL includes regulations aimed at preventing and minimizing pollution from vessels—both accidental pollution and that from routine operations—and currently includes six technical Annexes with respect to:
 - Carriage and handling of oil;
 - Carriage and handling of noxious liquid substances in bulk;
 - Carriage of packaged dangerous goods; and
 - Managing vessel sewage discharges, garbage, and air emissions.
- The International Convention on Oil Pollution Preparedness, Response and Co-operation (1990) provides a global framework for international cooperation in combating major incidents or threats of marine pollution. Parties to this convention must establish measures for dealing with pollution incidents, including oil pollution, either nationally or in cooperation with other countries.

In addition, as outlined by Transport Canada, proposed changes to traffic separation schemes (i.e., shipping lanes) cannot be changed at the domestic level, and are required to be submitted to the IMO, where they are reviewed by the IMO's Marine Safety Committee. If a proposed change is found to improve safety, it may be adopted by the IMO and the international community.²³⁶

B. Transport Canada – navigation

For the purpose of providing safe and efficient navigation, the federal government, under the *Canada Shipping Act*, has established the *Vessel Traffic Zones Regulations*.²³⁷ These establish vessel traffic service zones along the west coast out the limit of Canada's territorial sea. Shipping in this zone is monitored by CCG's Marine Communication Traffic Services (**MCTS**). Vessels of a certain size, including container vessels, must report to an MCTS officer 24 hours before entering the vessel traffic service zone and report prescribed information about the vessel and her intended route, including any pollutant cargoes and

²³⁵ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, p. 2.

²³⁶ CEAR Doc 1996, Transport Canada response to Undertaking #66.

²³⁷ SOR/89-98.

defects.²³⁸ The Vancouver vessel traffic service zone includes the entirety of the marine shipping area.²³⁹

Vessels of 300 gross tonnes or more (other than fishing vessels) engaged in international voyage, including all container vessels, must be fitted with an Automatic Identification System (**AIS**). AIS automatically provides information, including the vessel's identity, type, position, course, speed, navigational status, and other safety-related information to AIS-equipped shore stations, satellites, other vessels, and aircraft. Ships can automatically receive information from other vessels fitted with AIS. All MCTS centres regulating vessel traffic are equipped with AIS infrastructure.²⁴⁰

On June 15, 2019, the Government of Canada, on the recommendation of the Minister of Transport, amended the *Navigation Safety Regulations (Automatic Identification Systems)*, to expand the mandatory requirement to a wider category of vessels that must carry AIS. The purpose of this expansion is to strengthen the surveillance and enforcement of current and future requirements respecting the disturbance of SRKWs by small vessels. In addition, it is designed to enhance the safety of passengers on board vessels by reducing the risk of collisions on water and improving the ability to respond to events and locate vessels in distress.²⁴¹

An additional measure ensuring safe and efficient navigation are routing measures, including traffic separation schemes (commonly known as shipping lanes) and precautionary areas, among others.

Transport Canada also administers the *Collision Regulations*,²⁴² which provide uniform measures regarding the safe conduct of vessels. The regulations establish rules of general conduct specific to the navigation, including rules as to how to safely operate a vessel in the vicinity of other vessels. These rules apply to every type of vessel, from small fishing craft to container vessels. The rules cover navigational, steering and safety, safe speeds, minimizing risks of collision, and the interaction of fishing vessels in shipping lanes. All vessels must comply with the *Collision Regulations*.

C. Transport Canada – oversight and enforcement of vessels

Transport Canada's mandate also includes oversight and enforcement of vessels, including foreign-flagged vessels as well as Canadian-flagged vessels. Port State Control is Transport Canada's primary means for ensuring compliance with the *Canada Shipping Act, 2001*, the *Marine Transportation and Security Act*, and applicable international conventions that have been implemented into Canadian legislation.

²³⁸ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, p. 12.

²³⁹ See *Vessel Traffic Services Zones Regulations*, SOR/89-98 at Schedule 4, Item 9.

²⁴⁰ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, at p. 12.

²⁴¹ *Regulations Amending the Navigation Safety Regulations, (Automatic Identification Systems)*, SOR/2019-100.

²⁴² CRC, c 1416.

Port State Control is a vessel inspection program established under the IMO, whereby countries sharing common waters agree to share inspection responsibilities and information. Canada is a Port State for foreign vessels that enter into Canadian waters, and Canada inspects those foreign vessels according to international agreements.

As described by Transport Canada at the public hearing, under the Port State Control vessel inspection program, inspectors examine a number of aspects, including the following:

- Vessel security and control;
- Vessel certificates and documents (crew training, log books, ballast water reports, etc.);
- The overall condition and hygiene of vessels;
- Whether any deficiencies found by a Port state authority at a previous inspection have been corrected;
- Cargo transfer operations;
- External hull condition, load lines, and draft marks;
- Suitability of moorings; and
- Means of access.²⁴³

D. Transport Canada – incident preparedness and response

Transport Canada is the lead regulatory agency that provides regulatory oversight for Canada's Marine Oil Spill Preparedness and Response Regime.²⁴⁴ As described in Transport Canada's document entitled *Canada's Marine Safety and Security System* (August 2018 Revision), Transport Canada undertakes the following with respect to preparedness and response for marine incidents:

- Provides regime management and oversight;
- Develops regulations and standards;
- Applies and enforces regulations relating to Response Organizations (such as Western Canada Marine Response Corporation (**WCMRC**));
- Applies and enforces regulations relating to oil handling facilities;
- Oversees an appropriate level of national preparedness;
- Monitors marine activity levels and makes adjustments to the regime, as needed;
- Monitors marine oil spills through the National Aerial Surveillance Program and vessel inspection program; and
- Approves and facilitates the work of the Regional Advisory Councils.

The *Canada Shipping Act, 2001* requires Response Organizations to be certified to respond to marine oil pollution incidents in Canada. On the west coast of Canada, the applicable Response Organization is WCMRC.

²⁴³ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, pp. 17-18. See also CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 3162, 3182, 3267.

²⁴⁴ CEAR Doc 1780, CCG and Transport Canada joint oral presentation, May 28, 2019, at p. 5.

As described at the public hearing, the responsibility for developing spill response plans lies primarily with CCG and WCMRC. WCMRC's mandate is to ensure that, as mandated by Transport Canada, there is an appropriate state of preparedness on BC's waters and coastline.²⁴⁵ In accordance with section 167 of the *Canada Shipping Act, 2001* and the *Environmental Response Arrangements Regulations*,²⁴⁶ all container ships entering Canadian waters must have an agreement in place with WCMRC to ensure the provision of spill response in the event of an incident.

Transport Canada certifies and oversees WCMRC and other Response Organizations to ensure they comply with all statutory and regulatory requirements, and that they are adequately equipped to respond to marine oil spills of up to 10,000 tonnes within specified time standards.

With respect to these mandatory response times, the evidence of CCG was that the regulated response times under Transport Canada's Response Organizations Standards (TP12401), are currently under review as part of the OPP. However, it was noted that where spills have occurred, WCMRC response times are typically faster than CCG, and that WCMRC is efficient in deploying its resources.²⁴⁷

In addition to CCG and WCMRC, vessels are also required to have capacity to respond to minor spills. The *Vessel Pollution and Dangerous Chemicals Regulations*²⁴⁸ establish when and how vessel masters or owners must report discharges or anticipated discharges of pollutants.

E. Canadian Coast Guard – marine pollution response planning and incident command

While Transport Canada is the lead department that provides legislative and regulatory oversight for spill prevention, preparedness, and response, CCG is the lead federal agency responsible for ensuring appropriate response to marine pollution incidents, and is the lead agency for any release of pollutants in Canadian waters.²⁴⁹ Through its Environmental Response program, it provides a leadership role in ensuring appropriate responses to various types of spills, including ship-source spills, mystery-source spills, and spills from any source originating in foreign waters that impact Canadian waters.²⁵⁰

Environmental response planning in southern BC is currently ongoing as part of regular CCG spill response preparedness activities. CCG is currently working with Indigenous groups in the south coast to develop geographically specific response plans for this area. CCG has

²⁴⁵ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 2895; CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, pp. 22-23.

²⁴⁶ SOR/2008-275.

²⁴⁷ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3210-3212.

²⁴⁸ SOR/2012-69.

²⁴⁹ CEAR Doc 558, Orientation Session Transcript, September 16, 2016 at p. 19.

²⁵⁰ CEAR Doc 1780, CCG and Transport Canada joint oral presentation, May 28, 2019, at p. 6.

indicated that this process is ongoing, and as plans are developed, they will be jointly exercised, updated, and collaboratively maintained going forward.²⁵¹

In addition to response planning, CCG has implemented an Incident Command System, which is described as a “standardized, on scene, all-hazards management methodology designed to ensure the effective command, control and coordination of response efforts to all-hazard maritime incidents.”²⁵² The Incident Command system allows the CCG to effectively manage emergency response incidents like oil spill response.²⁵³ CCG has indicated that it has invested in training and exercising to ensure operational readiness, including an exercise in the Salish Sea in 2017. In addition, through an initiative linked to the OPP, CCG is providing Indigenous communities on the west coast with introductory level training in the Incident Command System. CCG has initiated a new exercise and team training regime that will better measure the performance of the OPP initiatives.²⁵⁴

While the VFPA does not have jurisdiction with respect to spill response, the Port of Vancouver’s 24-hour Operations Centre allows it to provide operational assistance in the event of an emergency within its jurisdiction, facilitating a collaborative, effective, and unified response.²⁵⁵

F. Transport Canada – liability and compensation

In Canada, the *Marine Liability Act*²⁵⁶ addresses shipowner liability, including liability for spills. The *Marine Liability Act* is based on the polluter-pays principle. There are various regimes for paying clean-up and compensation costs, such as shipowners’ liability, and domestic and international funds. A single pollution incident may draw compensation from one or more of these funds.²⁵⁷

This liability and compensation framework is outlined in Transport Canada’s document entitled *Canada’s Marine Safety and Security System* (August 2018 Revision), and is reproduced here for reference:²⁵⁸

²⁵¹ CEAR Doc 1615, CCG written submission, at p. 7.

²⁵² CEAR Doc 1615, CCG written submission, at p. 7.

²⁵³ CEAR Doc 558, Orientation Session Transcript, September 16, 2016 at p. 19.

²⁵⁴ CEAR Doc 1615, CCG written submission, at p. 7.

²⁵⁵ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 2896.

²⁵⁶ SC 2001, c 6.

²⁵⁷ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, pp. 29-30.

²⁵⁸ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, p. 27.

Tier	Persistent Oil Spill (crude oil, fuel oil, etc. carried in tankers)	Bunker Oil Spill (fuel used to propel / operate non-tankers)	Non-Persistent Oil Spill (refined oil, etc.)
Tier 1 – Shipowner’s Liability	Shipowner strictly liable under the 1992 <i>Civil Liability Convention</i> Compulsory insurance certified by states Separate and higher limits of liability	Shipowner strictly liable under the 2001 <i>Bunkers Convention</i> Compulsory insurance certified by states General limits of liability	Shipowner liable only under <i>Marine Liability Act</i> No compulsory insurance General limits of liability
Tier 2 – International Funds	Access to international compensation funds: - 1992 Fund - Supplemental Fund	Not available	Not available
Tier 3 – Canada’s Ship-Source Oil Pollution Fund (SOPF)	Access to SOPF	Access to SOPF (becomes Tier 2)	Access to SOPF (becomes Tier 2)
Totals	Total amount of compensation available: Approx. \$1.35 billion	Total amount of compensation available: Approx. \$250 million* NOTE: these limits no longer apply, as described below.	Total amount of compensation available: Approx. \$250 million* NOTE: these limits no longer apply, as described below

As outlined above, international and domestic funds are available as compensation for a spill of bunker fuel. In the case of a spill of fuel oil involving a container vessel, the regime in the shaded column above would apply. While this Transport Canada written submission (which was filed in October 2018) noted total compensation of approximately \$250 million would be available under the Ship-source Oil Pollution Fund (**SOPF**), during CCG’s presentation at the May 28, 2019 topic-specific session, it was clarified that in December 2018, amendments to the *Marine Liability Act* removed the limit as to the amount of compensation available from the SOPF, and it is now an unlimited amount.²⁵⁹

During the public hearing, questions arose with respect to the availability of the SOPF domestic fund, which can provide compensation to victims of oil spills. Indigenous groups were concerned as to whether the SOPF would provide compensation to Indigenous groups whose traditional practices may be impacted by damage resulting from a spill.²⁶⁰ Part 7 of the *Marine Liability Act*, outlines the SOPF and the process under which a claim can be made. Pursuant to section 107 of the *Marine Liability Act*, claimants of the SOPF can include individuals who fish or hunt for food or animal skins for their own consumption or use. As outlined in section 107 of the *Marine Liability Act*, claims may be filed for loss or future losses for this subsistence activity in accordance with the provisions of the Act.

²⁵⁹ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3165.

²⁶⁰ CEAR Doc 1972, Transcript, Volume 21, June 17, 2019, at p. 146

Further details regarding the SOPF and the Canadian marine liability regime generally were provided in Transport Canada's response to Undertaking #65.²⁶¹

G. Transport Canada – environmental protection measures

Transport Canada is also mandated to conduct programs and activities that work to safeguard against environmental risks and protect Canada's marine environment. These include the following:

- The management of ballast water;
- Biofouling (the attachment of organisms to the bottom of a vessel, including aquatic invasive species);
- The management of vessel discharges; and
- The management of vessel air emissions.

All of these environmental protection measures are addressed through international convention adopted domestically or, in the case of biofouling, are in the process of being developed by the IMO. As noted above, Port State Control inspection and actions are used to enforce international requirements on foreign vessels.²⁶²

H. Canadian Coast Guard – communications with mariners

Part of CCG's role is to ensure the safety of marine shipping by contributing to the prevention of incidents. CCG has launched a number of enhancements to navigational communications with mariners, some of which are described in its written submissions.²⁶³ Such initiatives include developing AIS area messages as well as providing marine visibility data.²⁶⁴

At the public hearing, CCG also provided an overview of the Collaborative Situational Awareness Portal (**CSAP System**), which is a project to extend CCG's common operating picture to other response partners. CCG explained the CSAP System as follows:

"So, CSAP is essentially a release of our internal common operating picture that we've had for some time now, and you can see on the right-hand side, a view of our common operating picture with the Canadian Coast Guard. This is our system we use as one of many tools within our operations centres, and on the left is the collaborative situational awareness portal or CSAP, not a fan of that title, that we've released out.

²⁶¹ CEAR Doc 1997, Transport Canada response to Undertaking #65.

²⁶² CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B, pp. 32-33.

²⁶³ CEAR Doc 1615, CCG Written Submissions.

²⁶⁴ CEAR Doc 1615, CCG Written Submission, at p.6.

So essentially the core of the system currently is the ability to release coast guard and as well as satellite-based AIS data, out to our response partners and folks that we're collaborating with under the Oceans Protection Plan.

So CSAP also has the capability of releasing the Canadian hydrographic services nautical charts as one of the base mapping components, but in addition to real time AIS you have the capability of essentially being able to access the historical AIS logs for vessels so you can go and see the historical vessel positions of any number of vessels that are located within the system."²⁶⁵

In short, CCG's incident response mandate requires collaboration with a wide range of partners, including Indigenous groups, ports, other government departments, and commercial and Indigenous fishers.²⁶⁶ CCG outlined that CSAP can be used to monitor vessel traffic, as well as potentially allowing support for search and rescue efforts between the response partners enumerated above. As several Indigenous communities indicated, there is interest for collaboration and participation in incident response. Where the technology is made available to Indigenous communities, the CSAP system may serve to facilitate that participation. CCG indicated that it is working with Indigenous communities to distribute access to the CSAP system.²⁶⁷

I. Pacific Pilotage Authority

The federal *Pilotage Act*,²⁶⁸ establishes pilotage authorities in four regions across Canada, including the Pacific. Each authority has the power to establish a compulsory pilotage area. In these areas, most ships, including all container ships, must have a licensed pilot or a pilotage certificate holder on board when transiting through a compulsory pilotage area.

If RBT2 is constructed, all container vessels would be subject to mandatory pilotage between Brotchie Ledge near Victoria and Roberts Bank.²⁶⁹ As indicated by Captain Stephen Brown, for the VFPA, having local pilotage contributes a great deal to ensuring safety and prevention of incidents.²⁷⁰

J. Oceans Protection Plan program improvements

As presented by Transport Canada at the topic-specific session on May 28, 2019 and in its written submission, the OPP is a series of 58 Government of Canada initiatives that are

²⁶⁵ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3235.

²⁶⁶ CEAR Doc 1781, CCG oral presentation, May 28, 2019, at p. 3.

²⁶⁷ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3237.

²⁶⁸ RSC 1985, c P-14.

²⁶⁹ CEAR Doc 316, MSA, at s. 3, pp. 3-5.

²⁷⁰ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3050.

being delivered to meet the goals of protecting Canada's coast while supporting the economy.²⁷¹ The OPP is comprised of four priority areas:

- A world leading marine safety system, by strengthening our existing marine safety system;
- Protecting the marine environment by preserving and resorting marine ecosystems;
- Strengthening Indigenous partnerships; and
- Investing in science and local knowledge to produce a stronger evidence base for marine safety and oceans protection.

Many of the OPP initiatives are designed to address concerns raised through previous project consultations, as well as consultations involving the Project.²⁷² The OPP is a whole-of-government strategy and is led by five government departments, including Transport Canada, CCG, ECCC, DFO, and NRCan, with a strong emphasis on establishing partnerships with Indigenous groups, and working in collaboration with stakeholders, coastal communities, the scientific community, the marine industry, and provinces and territories, among others.²⁷³

Of the 58 OPP initiatives, Transport Canada highlighted several initiatives that are of particular relevance to the Project. Those initiatives included the following:²⁷⁴

- Improvements to Marine Safety System – Prevention
 - The development of the Enhanced Maritime Situation Awareness, which is a user-friendly maritime information system designed to share a wide range of maritime information, including vessel traffic, weather and hydrography with Indigenous and coastal communities;
 - Improvements to navigational charts, products, and services in Pacific ports and waterways to enhance the safety of navigation and reduce risks of marine traffic;
 - Improved weather information to provide mariners with enhanced weather information;
 - Improvements to marine pilotage through modernization of the *Pacific Pilotage Act* to enhance the effectiveness, efficiency, and accountability of the pilotage system; and
 - Improvements to anchorages by establishing a national framework for best practices for ships at anchor.
- Improvements to Marine Safety System – Response
 - Strengthening of the 24/7 emergency response capacity to improve interoperability and coordination in the event of a marine incident;

²⁷¹ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3113.

²⁷² CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3113.

²⁷³ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3114.

²⁷⁴ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3112-3127.

- Improvements to CCG's infrastructure, including four new search and rescue stations in BC, in the areas of Victoria, Hartley Bay, Port Renfrew, and Tahsis in Nootka Sound;
- Improvements to increased emergency towing capacity;
- Modernization of the environmental response assets and equipment to minimize the environmental, economic and public safety impacts of marine pollution, including through the acquisition of new response equipment, such as 18 response caches in BC; and
- Training by CCG to auxiliary members in basic oil spill response.
- Preservation and Restoration of Marine Ecosystems
 - Coastal environmental baseline programs and cumulative effects of marine shipping initiatives, which are collectively designed to enhance knowledge of marine ecosystems and detect and identify changes in marine ecosystems and enhance understanding of potential cumulative impacts and stressors of marine shipping. As outlined by Transport Canada at the public hearing, this program is designed to address cumulative effects of marine shipping in a regional area such as the south coast of BC;
 - Consultation and collaboration with Indigenous groups to understand the effects of the activities on the coastal environments;
 - Improvements to protection of aquatic ecosystems and marine mammals, including testing technologies to detect presence of whales in near real time in Canadian waters;
 - Research to better understand the impact of underwater noise on marine mammals, including SRKW; and
 - Restoration activities through a Coastal Restoration Fund, including approved projects to help protect and restore coastal marine ecosystems vulnerable to marine shipping and development, in collaboration with Indigenous groups and local communities. Such efforts are also designed to contribute to the improvement of prey availability for SRKW.
- Strengthening Indigenous Partnerships
 - Collaboratively, with Indigenous communities, working to build local emergency response capacity, marine training, waterways management and setting habitat restoration priorities;
 - Provide training in search and rescue, spill report assessments, and emergency spill response;
 - Working with Indigenous coastal communities to create local vessel control areas to minimize safety risks and environmental impacts; and
 - Partnering with Indigenous coastal communities and seeking their advice in assessing the status of coastal ecosystems and understanding cumulative effects of shipping activities with the purpose of ultimately allowing Indigenous communities to play a role in decisions about marine safety and environmental protection.
- Investing in Science and Local Knowledge

- o Research regarding the fate, behaviour, and trajectory of oil spills; and
- o Research regarding drift prediction and near-shore modelling to improve effective and efficient incident response.

(d) Key issues raised and VFPA response

The key issues related to Project-associated vessels transiting the marine shipping area that were raised during sufficiency review and the public hearing are discussed below.

(i) Vessel traffic projections

Several participants at the public hearing questioned the number of vessels projected to transit through the marine shipping area and call at Port of Vancouver container terminals.

As outlined in the MSA, VFPA's response to Undertaking #1,²⁷⁵ and subsequent submissions, the VFPA's ship call projections in the EIS and in the MSA relied on two supporting reports:

1. For the EIS and MSA – WorleyParsons Canada (2011), *Projections of Vessel Calls and Movements at the Roberts Bank Marine Terminals* (the **WorleyParsons Report**), provided a review of trends in shipping characteristics, including the ongoing trend to larger container ships, and used projections of vessel size characteristics to generate predicted numbers of ship calls (and movements) for Deltaport and RBT2 terminals;²⁷⁶ and
2. For the MSA – Seaport Consultants Canada Inc. (2014), *Update of Projections of Container Ship Characteristics for Roberts Bank Terminal 2* (the **Seaport Report**), partially updated the contents of the WorleyParsons Report by providing a then-current evaluation of projected container ship sizes.²⁷⁷

Using the projected distribution of vessel sizes described in the WorleyParsons Report, and as stated in the EIS,²⁷⁸ the VFPA anticipated the Project would generate 260 container ship calls annually when the terminal reaches its 2.4 million vessel TEU design capacity around 2030 (based on 2011 expected Project timelines). For the purposes of conservatively assessing the effects of the Project and of Project-associated shipping in the EIS and MSA, respectively, the VFPA assumed the number of ship calls associated with the design capacity would occur immediately upon the commencement of operation (i.e., in 2025), instead of at a later date (i.e., in 2030) following a gradual increase in throughput.²⁷⁹

The information presented in the Seaport Report confirmed the trend towards larger vessels. The VFPA acknowledged in IR responses that, over time, this trend would result in fewer RBT2 ship calls being required to achieve throughput capacity.²⁸⁰ At the general

²⁷⁵ CEAR Doc 667, VFPA response to Orientation Session #2: Undertaking #1.

²⁷⁶ CEAR Doc 667, VFPA response to Orientation Session #2: Undertaking #1, at Appendix A.

²⁷⁷ CEAR Doc 667, VFPA response to Orientation Session #2: Undertaking #1, at Appendix A.

²⁷⁸ CEAR Doc 181, EIS, Volume 1, at s. 4.4.2.1.

²⁷⁹ CEAR Doc 181, EIS, Volume 1, at s. 4.3.2.

²⁸⁰ CEAR Doc 984, VFPA response to IR4-02; CEAR Doc 1547, VFPA response to Additional Information Request February 22, 2019: 3. Ship Traffic.

session on May 15, 2019, the VFPA presented Exhibit 5, which illustrated the observed trend of increasing container volumes with a similar number of ships calling at Port of Vancouver container terminals.²⁸¹ The record of container ship calls and throughput at the Port of Vancouver from 1995 to 2018 presented in this exhibit demonstrates that the Port of Vancouver has handled an increasing number of TEUs per vessel call during this period. In 1995, each vessel calling Port of Vancouver container terminals averaged 1,208 TEUs, whereas in 2018, the average was 4,481 TEUs. Regardless of this anticipated and observed trend, the VFPA assumed for the purposes of conservatively assessing potential effects from the Project and associated shipping that 260 vessels would call annually at RBT2, and the number of ship calls would not change throughout Project operation.²⁸²

In 2018, Mercator International provided an assessment of earlier vessel call forecasts, based on observed developments in the container shipping industry, such as an accelerated trend towards larger ship sizes and the formation of new service alliances (the **2018 Mercator Report**).²⁸³ Using forecasts for overall container volumes provided by OSC,²⁸⁴ the 2018 Mercator Report noted that shipping alliances work together to each offer regular, generally weekly, service to Pacific Northwest ports, including the ports of Vancouver, Seattle/Tacoma, and Prince Rupert from a range of mostly Asian ports and concluded the following:

- There will be fewer overall ship calls to the Port of Vancouver in 2035 (15 weekly calls),²⁸⁵ with or without RBT2, as compared to 2017 (16 weekly calls), despite an increase in container volumes;²⁸⁶
- The total number of container ships calling at Port of Vancouver container terminals in 2035 will be the same, whether or not RBT2 is built (i.e., 15 weekly or 780 annual vessel calls); and
- If RBT2 proceeds, some vessels calling at other Port of Vancouver container terminals will call at RBT2 instead. In particular, the 2018 Mercator Report predicts that—including about 2.5 vessels currently calling at the existing Deltaport terminal,²⁸⁷ and one vessel currently calling at each of the Burrard Inlet and Fraser River container terminals would call at RBT2 instead. The Project-related incremental increase of two weekly services at Roberts Bank (i.e., 104 calls), therefore, has decreased from the five weekly incremental services assumed in the EIS and MSA (i.e., 260 calls per year).

²⁸¹ CEAR Doc 1735, Exhibit 5 presented by the VFPA on May 15, 2019.

²⁸² CEAR Doc 934, VFPA responses to IR4-01, IR4-02; CEAR Doc 1547, VFPA response to Additional Information Request February 22, 2019: 3. Ship Traffic.

²⁸³ CEAR Doc 1362, RBT2 Container Vessel Call Forecast Study by Mercator International (2018 Mercator Report).

²⁸⁴ CEAR Doc 934, VFPA response to IR1-03, at Appendix IR1-03-A.

²⁸⁵ Due to more current estimates for regulatory process timelines for the Project, the 2018 Mercator Report indicates that instead of RBT2 operations starting in 2025, they would start in 2030 and ramp up over a similar five-year long period from 2030 to 2035. This timeframe aligns with the current timelines illustrated in PCU Figure 4-9 (CEAR Doc 1210).

²⁸⁶ CEAR Doc 1735, Exhibit 5 presented by the VFPA on May 15, 2019.

²⁸⁷ The total number of weekly vessel calls to the Deltaport Terminal and RBT2 is assumed in the 2018 Mercator Report to be nine, and since these terminals are designed with the same throughput (2.4 million TEUs per year), it is assumed by the VFPA for assessment purposes that 4.5 services will call weekly at each terminal.

Based on the 2018 Mercator Report findings for 2035, the VFPA expects that container ship traffic through Segments A, B, C, D, and G of the marine shipping area will decrease by 24% compared to the traffic levels assumed in the MSA.²⁸⁸ Therefore, based on the decrease in container vessels transiting the marine shipping area and the fact that there will be no additional vessels as a result of RBT2, the assessments presented in the EIS and MSA either adequately or over predict the environmental effects during RBT2 operation.

The 2018 Mercator Report is the most in-depth analysis on the record in this proceeding regarding the anticipated number of vessels associated with the Project. No other participant has provided another assessment of vessel traffic projections, nor has there been any evidence submitted to refute the accuracy of the 2018 Mercator Report findings.

In addition, Transport Canada did not dispute and instead took into account the 2018 Mercator Report in reviews for sufficiency and technical merit of the VFPA's assessment. Transport Canada stated the following in its written submission filed April 15, 2019:

"TC notes that in the Mercator Report the Proponent has indicated that marine vessel traffic is not anticipated to increase as a result of the proposed RBT2 project. TC has considered this in its reviews for sufficiency and technical merit of information (see CEAR #1303 and #1440), as well as in the information presented in this written submission."²⁸⁹

Transport Canada has therefore relied on the 2018 Mercator Report findings in conducting its analysis. In light of the above, it is reasonable and appropriate for the Review Panel to rely on the 2018 Mercator Report analysis with respect to the projected number of vessels that are expected to transit the marine shipping area, and those that will transit to RBT2, should the Project be built.

(ii) Cumulative vessel traffic

The Friends of the San Juans,²⁹⁰ amongst others, has raised concerns regarding vessel traffic increases in the marine shipping area and potential environmental and public health effects, including impacts to marine mammals and other organisms from underwater noise, increased risk of oil and/or chemical spills, discharges of water ballast that may include harmful or invasive organisms, and increased air emissions. Specifically, the Friends of the San Juans submitted a Salish Sea Vessel Traffic Projections infographic (last updated in June 2019) that was discussed during the June 12, 2019 general session.²⁹¹

²⁸⁸ CEAR Doc 1547, VFPA response to Additional Information Request February 22, 2019: 3. Ship Traffic, at Table A2.

²⁸⁹ CEAR Doc 1618, Transport Canada written submission.

²⁹⁰ CEAR Doc 1626, Friends of the San Juans written submission; CEAR Doc 1876, Friends of the San Juans oral presentation on June 12, 2019; CEAR Doc 1963, Friends of the San Juans comments; CEAR Doc 1976, Friends of the San Juans comments.

²⁹¹ CEAR Doc 1876, Friends of the San Juans oral presentation on June 12, 2019, at slide 12; CEAR Doc 1963, Friends of the San Juans comments.

The VFPA and its consultants forecasted future traffic levels by applying a growth rate of between 1% to 2% per year from 2012 traffic levels to 2030 for most vessel type categories, and incorporated additional vessel information as necessary to accurately reflect existing or future conditions.²⁹² During the public hearing, the VFPA submitted Undertaking #35 that provided an update to traffic forecasts for Segments B and D for all vessel types to account for the 2018 Mercator Report container vessel forecast and the revised timing for full terminal operation in 2035.²⁹³

In 2035 without RBT2, approximately 6.0% of the total vessel movements in Segment B and 3.3% in Segment D are associated with the Deltaport Terminal at Roberts Bank. In 2035 with RBT2, approximately 7.7% of the total vessel movements in Segment B and 4.2% in Segment D are associated with both Roberts Bank container terminals (with RBT2 representing half). Therefore, the redistribution of 208 container vessel movements per year to and from RBT2 from other Port of Vancouver terminals represents approximately 1.7% and 0.9% of total vessel traffic in Segments B and D, respectively.

In accordance with section 17 of the EIS Guidelines, which directed the VFPA to maximize the use of existing material in the assessment of Project-associated marine shipping, the VFPA used growth rates from published projections from Seaport Consultants Canada in a report prepared for the Trans Mountain Expansion Project, and the 2012 vessel movement estimates for the marine shipping area were based on published vessel movements from the Trans Mountain Expansion Project TERMPOL Reports.²⁹⁴

The VFPA submits that the use of growth rates for vessel type categories is an alternative and acceptable approach to determine likely future cumulative traffic levels. Given the uncertainty associated with proposed projects proceeding through permitting or proceeding once permitted, the growth rate approach provides reasonable future vessel traffic projections, and is an accepted approach for the assessment of marine shipping activities. Transport Canada's economic analysis team has reviewed the growth rate approach and, without validating the forecasts and capacity needs of west coast ports, has determined the approach is "broadly reasonable based on the most recent publicly available data."²⁹⁵

The VFPA is confident that the effects assessments in the MSA adequately reflect cumulative traffic levels, based on the VFPA's comparison of projected vessel movements using the hybrid growth rate approach to a project-based approach provided in the response to IR4-09, and updated traffic levels provided in Undertaking #35 (i.e., total traffic levels assumed and assessed in the MSA for 2030 are similar to the updated projections for 2035).²⁹⁶

²⁹² CEAR Doc 934, VFPA response to IR4-09; CEAR Doc 316, MSA, at Appendix 10-A, s. 2.4.2; CEAR Doc 391, VFPA response to MSA IR #7. See also CEAR Doc 934, VFPA response to IR4-04 for further explanation by marine shipping area segment.

²⁹³ CEAR Doc 1899, VFPA response to Undertaking #35. See also CEAR Doc 934, VFPA response to IR4-04, at Figure IR4-04-A2.

²⁹⁴ CEAR Doc 934, VFPA response to IR4-09.

²⁹⁵ CEAR Doc 982, Transport Canada response to TC IR-01.

²⁹⁶ CEAR Doc 1899, VFPA response to Undertaking #35.

In addition, the VFPA provides the following comments in response to other statements made by the Friends of the San Juans:²⁹⁷

- The Discovery LNG, Woodfibre LNG, and WesPac LNG projects have not been omitted from the RBT2 environmental assessment in error.²⁹⁸ The issuance of an export licence by the National Energy Board for a project does not indicate a project is certain or even likely to proceed.²⁹⁹ The VFPA considered projects and activities to be certain or reasonable foreseeable if the project or activity has been publicly announced and information regarding project scope (e.g., vessel traffic associated with the project) and timing is publicly available at the time the project and activity inclusion list was developed.³⁰⁰
- The environmental effects of a hypothetical malfunction or accident that could result in a collision between an RBT2 container ship and an LNG carrier have been documented in the VFPA's response to IR11-08.³⁰¹ Further clarification on perceived versus actual risks from such a collision was provided during the May 28, 2019 topic-specific session. On behalf of the VFPA, Dr. Colin Moore, an expert in marine incident and spill quantitative risk assessment, explained:

"In the [event] of a collision between container ship or really any other ship and an LNG tanker, there is a risk of penetration of the LNG tanks themselves and subsequent leakage of the LNG into the double hull envelope of the LNG vessel and into the waters or onto the water surface.

LNG is flammable. But it is not explosively flammable under most circumstances. The expectation, and this is actually been proven by testing, is that flash fire would form on the pool of LNG. It tends to burn back to the source. And is relatively limited in extent.

As Ms. O'Hara stated, the range of danger to humans is quite short. So the crew is at risk. But in general, the public is not."³⁰²

(iii) Larger container vessels

Several participants at the public hearing expressed concern regarding the potential environmental effects of larger container vessels transiting the marine shipping area.³⁰³

²⁹⁷ CEAR Doc 1963, Friends of the San Juans Response to comments made during the June 12 Public Hearing Session.

²⁹⁸ CEAR Doc 1963, Friends of the San Juans Response to comments made during the June 12 Public Hearing Session.

²⁹⁹ CEAR Doc 391, VFPA response to MSA IR #7, at p. 7.

³⁰⁰ CEAR Doc 181, EIS, Volume 2, at s. 8.1.9.1.

³⁰¹ CEAR Doc 934, VFPA response to IR11-08.

³⁰² CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 2929-2930.

Participants suggested larger ships may increase air, atmospheric noise, and light emissions, increase the size of wake-generated waves, as well as generate more underwater noise.

The 2018 Mercator Report projects that larger vessels will be coming sooner than originally assumed in the EIS and MSA effects assessments, based on larger vessels on order as of 2017.³⁰⁴

It is important to clarify that although the MSA described a representative vessel with capacity for approximately 9,365 TEUs³⁰⁵ and overall length of 338 m (Large Post-Panamax class vessel), some effects assessments considered larger vessels to ensure that the assessments were conservative.³⁰⁶ As examples, the assessments of air quality and underwater noise were based on an Ultra Large Container Ship (15,000 TEUs) and a Mega-Max Vessel (18,000 TEUs), respectively. As outlined in the response to Undertaking #2, the same classes of vessel will transit through the marine shipping area in 2035, with or without the Project.³⁰⁷ Although the 2018 Mercator Report projects that larger vessels will be arriving sooner than assumed in the MSA, the Project would not influence the arrival of larger vessel classes in the marine shipping area. The dominant vessel size class in 2035, with or without the Project is the Large Post-Panamax class—the same class identified as the MSA representative vessel.³⁰⁸

The effects assessments presented in the MSA will not change as a result of the trend towards larger vessels. The VFPA has provided further information in Undertaking #36 to support this conclusion.³⁰⁹ Based on a description of the characteristics (main engine size, maximum design speed, and cruising speed) for representative container vessels for each size class identified in the 2018 Mercator Report,³¹⁰ the VFPA drew the following conclusions:

- Within each class, newer ships generally have smaller main engines;
- Smaller engines are associated with slower maximum design speeds; and
- The newer, larger Ultra Large Container Ship and Mega-Max classes generally have similar main engine sizes as Neo-Panamax vessels.³¹¹

³⁰³ See for example, CEAR Doc 1925, Transcript, Volume 20, June 14, 2019, at pp. 4633-4634; CEAR Doc 1896, Transcript, Volume 17, June 11, 2019, at pp. 4161; CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 2953.

³⁰⁴ CEAR Doc 1362, 2018 Mercator Report.

³⁰⁵ The 8,000 TEU to 10,000 TEU size class represents the largest proportion (65%) of vessel size ranges anticipated to call in 2030 at RBT2 (as indicated in MSA Table 4-3 (CEAR Doc 316) and Table IR4-02-1 in the response to IR4-02 (CEAR Doc 934).

³⁰⁶ CEAR Doc 1473, VFPA response to Panel Information Session (January 30, 2019) Undertaking #2.

³⁰⁷ CEAR Doc 1473, VFPA response to Panel Information Session (January 30, 2019) Undertaking #2.

³⁰⁸ CEAR Doc 1473, VFPA response to Panel Information Session (January 30, 2019) Undertaking #2, at Figures 3, 4.

³⁰⁹ CEAR Doc 1900, VFPA response to Undertaking #36.

³¹⁰ CEAR Doc 1362, 2018 Mercator Report, at pp. 94, 96.

³¹¹ CEAR Doc 1900, VFPA response to Undertaking #36.

The VFPA's assessment of potential Project-related marine shipping on intermediate effects is conservative. Key points from this assessment, presented by component, include the following:

- Air quality – The VFPA expects NO_x emissions from Project-associated container vessels will be lower than those predicted in the EIS and MSA, since:
 - Fewer container vessels (i.e., a 24% decrease) will call at Port of Vancouver container terminals in the future, with or without RBT2, and fewer additional vessels will call at Roberts Bank in the future with RBT2;³¹²
 - The VFPA conservatively assumed that the maximum hourly emission scenario for NO_x vessel emissions reflected only Tier I and II compliant vessels (see Chapter XVII of these Closing Remarks for additional information). Mercator International projects that between 54% and 72% of vessels will be Tier III-compliant by 2035;³¹³ and
 - Newer ships will be capable of connecting to shore power while at berth, and the EIS air quality assessment assumed no benefit from this. Since 2010, the VFPA has implemented the EcoAction Program to incentivize positive environmental practices that exceed regulatory compliance to improve air quality, such as connecting to shore power. The program now includes incentives for quieter ships. Container vessel participation in the EcoAction Program has averaged 62% of total billable container vessel calls to the Port of Vancouver from 2016 to 2018, which reflects that marine carriers are continuously improving the environmental performance of their vessels in response to increasingly stringent regulations.³¹⁴
- Wave environment – The assessment in the MSA is conservative since:
 - The 2018 Mercator Report projects that no additional container vessels will transit the marine shipping area in the future with the Project—as a result, there will be no additional wake-generated waves with RBT2; and
 - Of the factors that determine wave height (vessel speed, vessel hull form, distance from transit line), vessel speed is the only factor that could change with the increased use of larger vessels. Larger vessels can have smaller main engines compared to smaller vessels and travel at slower speeds, thereby resulting in smaller wake wave heights.³¹⁵
- Atmospheric noise – With the projected 24% decrease in container vessel traffic in the marine shipping area and since ships are being designed to be quieter, atmospheric noise will not increase in the future, with or without the Project.³¹⁶
- Underwater noise – The MSA provided underwater noise predictions for Project-associated vessels in transit based on the acoustic modelling of 260 Mega-max class container vessels (18,000 TEUs) per year to be conservative. As outlined in

³¹² CEAR Doc 1547, VFPA response to Additional Information Request February 22, 2019: 3. Ship Traffic.

³¹³ CEAR Doc 1846, Exhibit 30 from the VFPA.

³¹⁴ CEAR Doc 1901, VFPA response to Undertaking #37.

³¹⁵ CEAR Doc 1900, VFPA response to Undertaking #36.

³¹⁶ CEAR Doc 934, VFPA response to IR4-02.

Chapter XIII of these Closing Remarks, Undertaking #20 provided the results of updated underwater noise modelling during terminal operations, including a comparison of updated underwater noise predictions based on the findings of the 2018 Mercator Report.³¹⁷ Based on new data on underwater noise emissions from vessels obtained from the VFPA-led ECHO Program, the VFPA is confident that the assessments provided in the EIS and MSA are conservative. The VFPA predicts that the use of larger vessels with RBT2 will not result in appreciable differences in underwater noise, since the larger Neo-Panamax and Ultra Large Container Ship class vessels will generate similar underwater noise to Large Post-Panamax vessels when cruising at the same speed. If larger vessels transit at slower speeds, underwater noise will decrease.

- Light – Larger ships will not result in increased light trespass and sky glow levels since the requirements for navigational lights under the *Canada Shipping Act, 2001*, do not increase once ships are larger than 50 m in length.³¹⁸ Since container vessel traffic is projected to decrease in the future, the light assessment presented in the MSA is conservative.

(iv) Degradation of water quality

Several participants at the public hearing expressed concern regarding the marine shipping industry's effects to water quality, specifically in terms of chronic oiling, the use of anti-fouling agents, and discharges of ballast water, bilge water, and sewage.³¹⁹

With respect to Project-associated vessels and potential issues of chronic oiling and the use of antifouling agents, Transport Canada stated that it has no concerns if vessels operate in accordance with the *Canada Shipping Act, 2001*, and its supporting regulations. Transport Canada carries out inspections of foreign vessels calling in Canada to ensure compliance.³²⁰

The VFPA does not anticipate a change in water quality from ballast water discharges from Project-associated vessels, as these potential sources of contaminants are regulated.³²¹ Transport Canada Marine Safety and Security leads the oversight of ballast water management under the *Ballast Water Control and Management Regulations*³²² to maintain and improve marine safety and protect the health of the marine environment.³²³ Ships travelling to a Canadian port must have a Ballast Water Management Plan that explains how ballast water will be managed safely and effectively. Vessels that take on ballast water outside Canada must not release it in Canadian waters unless it has been managed. Ballast water may be managed by exchanging it at sea, through onboard treatment systems, pumping it to the shore for treatment, or keeping it on the ship and not releasing it in

³¹⁷ CEAR Doc 1800, VFPA response to Undertaking #20.

³¹⁸ Refer to CEAR Doc 934, VFPA response to IR6-03, for additional information.

³¹⁹ See for example, CEAR Doc 1860, Transcript, Volume 16, June 1, 2019, at p. 3955; CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3106; CEAR Doc 1915, Transcript, Volume 19, June 13, 2019, at p. 4483.

³²⁰ CEAR Doc 982, Transport Canada responses TC IR-02, TC IR-03.

³²¹ CEAR Doc 316, MSA, at s. 7.3.

³²² SOR/2011-237.

³²³ CEAR Doc 1986, Transport Canada response to Undertaking #61.

Canadian waters. Under the *Ballast Water Control and Management Regulations*, vessels must exchange their ballast water at least 200 nautical miles from shore where the water is at least 2,000 metres deep for vessels on trans-ocean crossings, or 50 nautical miles from shore where the depths of water are at least 500 metres deep for vessels on continental voyages.³²⁴ Under the Port State Control vessel inspection program, Marine Safety Inspectors examine for compliance.³²⁵

Information on how Transport Canada regulates and oversees bilge water and sewage management is detailed in *Canada's Marine Safety and Security System* (August 2018 Revision).³²⁶ Discharges from vessels are governed under the *Vessel Pollution and Dangerous Chemicals Regulations*.³²⁷ Transport Canada states that it is highly unlikely that untreated bilge water would be discharged, as vessels have a bilge holding tank and bilge water is treated onboard through an oily water separator and can only be discharged when it meets the conditions set out under these Regulations. With respect to sewage, treated sewage may be discharged within three nautical miles from shore, while untreated sewage may be discharged 12 or more nautical miles from shore.³²⁸

Based on Transport Canada's regulatory oversight of vessel discharges and enforcement programs, the VFPA is confident that Project-associated vessels will not degrade water quality in the marine shipping area.

(v) Anchorages

Several participants questioned the shipping industry's use of anchorages, the VFPA's control over them, and whether they would be used with greater frequency as a result of the Project.³²⁹

Container vessels calling on terminals within the Port of Vancouver operate on a scheduled service and adjust their speeds as required to arrive at the terminal within an assigned arrival window.³³⁰ Thus, anchorages are anomalies and occur infrequently as a result of extreme storm events requiring refuge anchorage for safety reasons, or to accommodate unexpected ship-specific maintenance, personnel, or operation issues that may arise. From 2012 to 2016, 3% of container vessels calling to Port of Vancouver container terminals required an anchorage.³³¹ There are no plans or requirements for anchoring of Project-associated container ships.

During the May 28, 2019 topic-specific session, Transport Canada explained that the "right to anchor a vessel is part of common law right of navigation."³³² Transport Canada clarified

³²⁴ *Ballast Water Control and Management Regulations*, at s. 6, 7.

³²⁵ *Ballast Water Control and Management Regulations*.

³²⁶ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B.

³²⁷ SOR/2012-69.

³²⁸ *Vessel Pollution and Dangerous Chemicals Regulations*, at s. 96.

³²⁹ See for example CEAR Doc 1644, Islands Trust Council written submission.

³³⁰ CEAR Doc 316, MSA, at s. 4.2.2.2; CEAR Doc 934, VFPA response to IR5-01a.

³³¹ CEAR Doc 934, VFPA response to IR5-01a.

³³² CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3118, 3196.

that under the OPP National Anchorages Initiative, which is currently in development, the management and use of anchorages will be reviewed based on feedback from industry, Indigenous groups, and islanders to establish best practices for ships at anchor.³³³ In addition, Transport Canada outlined its interim protocol for southern BC anchorages:

"[T]o address concerns in the short-term, Transport Canada in partnership with southern British Columbia pilotage authorizes and industry, introduce the interim protocol for the use of southern British Columbia anchorages.

The protocol which will inform a national framework includes temporary and voluntary procedures to balance the use of anchorage locations and mitigate the impacts of ships at anchor. Under this protocol, partners have established mechanisms to monitor anchorages activity, gather related data as well as respond to community concerns."³³⁴

As the national review gets underway, and as an interim measure to ensure that no single anchorage is overused, the VFPA temporarily manages the assignment of anchorage locations along the south coast of BC to ensure equitable rotation through suitable locations.³³⁵

(vi) Vessel wake-generated waves and small craft safety

Several Indigenous groups at the public hearing expressed concerns related to vessel wake affecting fishing and recreational vessel safety and impacting their ability to harvest.³³⁶

The existing wind-wave climate varies greatly across the marine shipping area in response to differences in local wind conditions, variations in fetch length, and incoming swell from Juan de Fuca Strait. The majority of wind-generated wave heights are in the range of 10 to 50 cm, but they can reach up to two metres.³³⁷ The VFPA has provided additional information on various aspects of existing wave environment and Project-associated vessel wake.³³⁸

While acknowledging existing concerns raised by Indigenous groups, the VFPA does not expect that vessel wake from Project-associated vessels will introduce new navigational hazards for small-craft operators, including operators undertaking fishing activities, because of the existing energetic wave climate and based on the 2018 Mercator Report findings that

³³³ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3118, 3196.

³³⁴ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3118.

³³⁵ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3196.

³³⁶ See for example, CEAR Doc 1915, Transcript, Volume 19, June 13, 2019, at p. 4476; CEAR Doc 1974, Transcript, Volume 23, June 20, 2019, at p. 4785; CEAR Doc 1972, Transcript, Volume 21, June 17, 2019, at pp. 94-95.

³³⁷ CEAR Doc 1783, VFPA oral presentation, May 28, 2019, at slide 11.

³³⁸ CEAR Doc 934, VPFA responses to IR7-13 to IR7-23, IR12-08, IR14-01; CEAR Doc 1987, VFPA response to Undertaking #63.

container traffic is projected to decrease from levels experienced today, as well as the expectation that larger vessels calling on the Port of Vancouver in the future will have lower design speeds, and as a result, generate smaller waves.³³⁹ For these reasons, the VFPA does not expect Project-related marine shipping to add to the existing impacts.

That assessment does not negate the evidence that incidents have occurred where Indigenous fishers have had negative interactions with vessel wake waves while harvesting, and experience safety concerns as a result of such incidents.

In light of the individual accounts of various Indigenous fishers which were reported at the hearing, such vessel wake wave incidents appear to be a function of a variety of factors unrelated to the Project. Such factors may include the particular geography of a harvesting area resulting in potential for shoaling off banks, proximity of harvesting activities to the international shipping lane or transiting through the international shipping lane.

As explained by Indigenous harvesters, prime harvesting areas may either overlap with the international shipping lane, or Indigenous fishers may need to traverse the shipping lanes to access harvesting areas. It is the proximity of such harvesting activities to the vessels transiting in the shipping lanes that results in an unsafe situation for Indigenous fishers. This interaction is not specific to marine shipping associated with the Project, but may occur as a result of any shipping activity in the international shipping lane.³⁴⁰

As is outlined in Chapter V, the international shipping lane is established pursuant to international agreement, and is adopted through the Canada Shipping Act, 2001 and the Collision Regulations. Pursuant to the Collision Regulations, container ships must navigate a course through the shipping lane. They do not have discretion to seek to avoid Indigenous fishers by transiting outside of the shipping lane, unless there is an immediate and urgent risk of a collision.

In response to concerns heard during the community session on June 18, 2019, Transport Canada indicated that they will undertake a study in 2019 to consider the feasibility of potential modifications to the traffic separation scheme in Juan de Fuca Strait, and are committed to working with Indigenous groups directly to identify the parameters and considerations that should be taken into account as part of that feasibility work.³⁴¹ The VFPA will collaborate with the appropriate regulatory authorities and Indigenous groups to support the provision of real-time information regarding the movements of Project-associated traffic throughout the marine shipping area and the identification of measures that may reduce the impact of international shipping lanes to fishing by Indigenous groups.³⁴²

³³⁹ CEAR Doc 1362, 2018 Mercator Report. See also CEAR Doc 1900, VFPA response to Undertaking #36.

³⁴⁰ We note that the GPS coordinates of the fishing vessel in the video presented by Pacheedaht First Nation and Ditidaht First Nation (CEAR Doc 1978) were located in the international shipping lane.

³⁴¹ CEAR Doc 1996, Transport Canada response to Undertaking #66.

³⁴² CEAR Doc 2001, Updated Project Commitments, at Appendix B, Table B1, Commitment #1.

(vii) Shoreline erosion

Parks Canada and some Indigenous groups expressed concerns about vessel wake waves eroding the shoreline and shoreline archaeological or cultural and spiritual sites.³⁴³ As outlined in the MSA, the VFPA selected wave environment for assessment partially in response to concerns from Indigenous groups that damage to sensitive ecosystems through erosion may have a detrimental effect on the shoreline resources and their ability to harvest traditional foods.³⁴⁴

The wave environment assessment considered ship wake with respect to its contribution to the existing wind wave climate that dominates the coastal processes of shorelines along the marine shipping route.³⁴⁵ Segment B of the marine shipping area is the only segment in which shorelines fall within the zone of influence from wake-generated waves from a container vessel travelling at typical speed (assuming calm conditions, defined as waves with height less than 10 cm).³⁴⁶ The VFPA's wave assessment conservatively assumed that 520 additional vessel movements would occur through the marine shipping area annually from RBT2 by the year 2030 on an annual basis, and determined that wake from Project-associated vessels would generate approximately the same number of waves as a single three-hour wind event. Under this vessel traffic assumption, therefore, vessel wake waves would occur 0.034% of the time in a year.³⁴⁷ Based on the revised vessel traffic forecasts in the 2018 Mercator Report, there will be no additional contribution of wake waves to the marine shipping area as a result of the Project.

Parks Canada recommended that the VFPA, in consultation with Parks Canada, establish an erosion monitoring program for coastal archaeological sites and areas of archaeological potential on federal lands in the zones of influence.³⁴⁸ The VFPA disagrees with this recommendation, given the following:

1. Shoreline processes in the marine shipping area are dominated by wind-generated waves, and that vessels calling at RBT2 will not contribute additional wake waves to the existing wave climate.³⁴⁹ The Project will not influence shoreline erosion processes and no measurable effects to shoreline structures and sites of physical and cultural heritage importance are predicted; and
2. Parks Canada acknowledged during the May 24, 2019 topic-specific session that "we're not necessarily the experts when it comes to wave energy and all of its characteristics and facets, and we would definitely seek that professional advice from others like NRCan."³⁵⁰ However, NRCan stated that "predicted wave heights generated by vessels are well within the range of natural wave conditions and would

³⁴³ See for example, CEAR Doc 1974, Transcript, Volume 23, June 20, 2019, p. 4774; CEAR Doc 1972, Transcript, Volume 21, June 17, 2019, at p. 150; CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2289.

³⁴⁴ CEAR Doc 316, MSA, at s. 7.2.1.

³⁴⁵ CEAR Doc 316, MSA, at s. 7.2.

³⁴⁶ CEAR Doc 316, MSA, at s. 7.2.2.2.

³⁴⁷ CEAR Doc 934, VFPA response to IR7-21.

³⁴⁸ CEAR Doc 1664, Parks Canada written submission.

³⁴⁹ CEAR Doc 1987, VFPA response to Undertaking #63.

³⁵⁰ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2295.

not have a significant cumulative impact on shoreline erosion.”³⁵¹ As a result, the VFPA submits that an erosion monitoring program for coastal archaeology sites and areas of archaeological potential is unnecessary.

4. Accidents or malfunctions

The VFPA and other federal regulatory agencies presented and discussed the assessment of potential accidents or malfunctions related to RBT2 and the marine shipping area at the May 28, 2019 topic-specific session. Although the primary focus was on potential marine shipping-related accidents or malfunctions, these presentations also addressed some elements of the assessment presented in the EIS.³⁵²

(a) Overview

A brief overview of the VFPA’s efforts to minimize risks and respond to potential accidents or malfunctions within its jurisdiction, and at RBT2 specifically, is provided below, followed by highlights of Canada’s marine safety and security regime, which is applicable in both the VFPA’s jurisdiction and the marine shipping area.

Port facilities have operated at Roberts Bank for more than 40 years without any major adverse environmental effects due to an accident or malfunction. The VFPA is committed to ensuring that the construction and operation of RBT2 achieves high safety standards.³⁵³ As noted in the EIS and IR responses, the VFPA’s Port Information Guide promotes safe and efficient navigation within the local waters managed by the VFPA, including Roberts Bank, and is updated regularly.³⁵⁴ Among other things, the Port Information Guide outlines practices and procedures related to arrival and departure checklists, navigation, movement of dangerous goods, waste removal, marine mammal critical habitat, speed, use of pilots, anchorage procedures, environmental requirements, vessel discharges, noise and lights, adverse weather conditions, bunkering, and cargo operations, including loading/discharging and cleaning. The Port Information Guide applies to all vessels in the port, including pleasure craft and recreational vessels, and to all persons responsible for the planning, operation, conduct, and safe navigation of such vessels, including the VFPA’s tenants.

The VFPA has adopted several Project design features to minimize the potential for accidents or malfunctions. The key features include 1) a terminal configuration that reduces the potential for vessel accidents during berthing, ship-to-shore container handling, and departure; 2) an overpass on Roberts Bank Way North to avoid the need for level crossings, thereby minimizing vehicle and railway conflicts; and 3) expansion of the tug basin to accommodate additional escort tugs, thereby increasing marine safety.

The VFPA has committed to developing a suite of detailed Project-specific environmental management plans to minimize the probability of and consequence from an accident or

³⁵¹ CEAR Doc 1627, NRCan written submission.

³⁵² CEAR Doc 181, EIS, Volume 5, at s. 30.

³⁵³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #1, 14, 16.

³⁵⁴ CEAR Doc 181, EIS, Volume 5, at s. 30.3; CEAR Doc 934, VFPA response to IR1-01 at Appendix IR1-01-A.

malfunction during the construction and operation phases of the Project.³⁵⁵ For both phases, the plans include Environmental Training Plans,³⁵⁶ Health and Safety and Emergency Response Plans,³⁵⁷ and Spill Preparedness and Response Plans.³⁵⁸ In the event of an emergency within its jurisdiction, the VFPA's 24-hour Operations Centre allows the VFPA to provide operational assistance to enable a collaborative, effective, and unified response.

(i) Canada's marine safety and security system

The regulatory regime governing marine shipping is outlined in Section 3(c), above. Marine shipping is governed by Canada's marine safety and security system. Transport Canada, CCG, the Canadian Hydrographic Service, and NRCan all play key roles in marine safety, security, and environmental protection.³⁵⁹

Transport Canada oversees Canada's Marine Oil Spill Preparedness and Response Regime, under the authority of the *Canada Shipping Act, 2001*. As the Transport Canada-certified marine response organisation on Canada's west coast, WCMRC supports this regime. WCMRC's mandate includes the protection of wildlife, economic and environmental sensitivities, and the safety of both responders and the public. Other entities, such as municipal, provincial, and federal governments and authorities (including the VFPA), and Indigenous groups play a role in supporting these initiatives.

As noted by Transport Canada and CCG at the topic-specific session on May 28, 2019, several initiatives under the federally-led OPP are enhancing Canada's marine safety and security regime. Examples of such initiatives include the Enhanced Maritime Situation Awareness, Regional Response Planning, 24/7 Emergency Response Capacity to Effectively Manage Marine Incidents, Increased Emergency Towing Capacity, and the Coastal Environmental Baseline Program.³⁶⁰ These initiatives are described in greater detail in Section 3.(c) (ii) above).

The VFPA will actively participate as a key stakeholder in these OPP and other regional federal government initiatives and programs and, as appropriate, coordinate the VFPA's own consultation with Indigenous groups on Project-associated marine shipping in alignment with those initiatives.³⁶¹

³⁵⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Table A1.

³⁵⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #22.

³⁵⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #23.

³⁵⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #26.

³⁵⁹ CEAR Doc 1783, VFPA oral presentation, May 28, 2019, at slide 5; CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix B.

³⁶⁰ CEAR Doc 2001, Updated Project Commitments, Appendix B, Table B2 outlines regional initiatives and programs intended to reduce adverse effects of marine shipping, in general, and Table B3 lists the federal recommendations and accommodations as part of the federal approval of the Trans Mountain Expansion Project.

³⁶¹ CEAR Doc 2001, Updated Project Commitments, at Appendix B, Table B1, Commitment #2. See also CEAR Doc 1902, VFPA response to Undertaking #40.

(b) Key issues raised and VFPA response

The key issues related to potential accidents or malfunctions of Project-associated vessels in the marine shipping area that were raised during sufficiency review and the public hearing are discussed below.

(i) Vessel collisions

ECCC stated that their sufficiency review of the EIS and MSA identified collisions and accidents and malfunctions as concerns for the Project within the marine shipping area and that it "continues to recommend that the Proponent develop and adopt mitigation measures to avoid or reduce the potential for collisions with transiting vessels."³⁶²

As outlined by the VFPA during the May 28, 2019 topic-specific session, established measures to reduce safety and environmental risks from container and other deep-sea commercial vessels include the following:

- CCG's 24-hour Vessel Traffic Management System;
- IMO, Transport Canada, and port authority-approved and charted Traffic Separation Systems;
- Compulsory marine pilotage;
- Visual and electronic navigation aids;
- Communication tools between vessels, including ferries;
- Escort tugs for vessels so designated by the Pacific Pilotage Authority and/or the port authority; and
- The option to anchor in any safe location in the event of unexpected circumstances.³⁶³

RBT2-associated vessels will operate in accordance with these established measures, and any other measures that are adopted prior to the start and during terminal operations. Since the marine shipping area is beyond the VFPA's navigational jurisdiction, the VFPA does not expect to lead the development and adoption of measures to address the effects of marine shipping. Nevertheless, the VFPA is committed to actively participating as a key stakeholder in regional federal government initiatives and programs.³⁶⁴

(ii) Spill probability modelling

ECCC has recommended the following, in consideration of the VFPA's response to IR11-08:

"...spill probability modelling be required to support the Proponent's assessment of an accident scenario involving a collision between a container ship and tanker carrying crude oil,

³⁶² CEAR Doc 581, ECCC comments; CEAR Doc 1637, ECCC written submission.

³⁶³ CEAR Doc 1783, VFPA oral presentation, May 28, 2019, at slide 6.

³⁶⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix B, Table B1, Commitment #2. See also CEAR Doc 1902, VFPA response to Undertaking #40.

particularly as the Proponent estimates the potential worst-case oil spill volume to be higher than original estimates. The Proponent's initial assessment of a worst-case accident scenario in the EIS only related to a container ship grounding incident which was predicted to result in a maximum spill volume of 7,500 m³ of vessel fuel only."³⁶⁵

The VFPA submits that its response to IR11-08 is robust. The VFPA acknowledged differences between the container vessel grounding and container-tanker vessel collision scenarios, including the increase in the oil spill volume (7,500 m³ versus 40,000 m³). The VFPA also assumed that bunker fuel has similar properties in both spills and that spills of this magnitude will have high consequences, regardless of the actual volume released. In addition, the VFPA's worst-case scenario assumed that the spill would disperse *unmitigated* into MSA Segments A and E to the north and into Segments C, D, and G to the south.³⁶⁶

Further to earlier requests to provide additional modelling³⁶⁷ and more recent recommendations from ECCC,³⁶⁸ the VFPA reiterated during the May 28, 2019 topic-specific session that further modelling is not required, as it will not change the outcomes of the assessment and is not part of approach to the assessment of marine shipping outlined in the EIS Guidelines.³⁶⁹ As noted in section 17 of the EIS Guidelines:

"It is likely that a Tier 1 approach (Qualitative; description based on expert opinion and traditional and local knowledge) will be an appropriate level of detail in most cases. For select environmental effects and locations where there may be a higher risk of environmental effects, a Tier 2 approach (Semi-quantitative; measured site-specific data and existing site information) would likely be an appropriate level of detail."

"To the degree possible, the proponent should maximise the use of existing material that is relevant to marine shipping activities associated with the Project which is beyond proponent's care and control and within the 12 nautical mile limit of the territorial sea. Existing material may be utilized from academic studies, work of government and non-government working groups, past or ongoing environmental assessments, Aboriginal traditional knowledge reports or any other source the proponent deems appropriate for its presentation of this material." (emphasis added)³⁷⁰

³⁶⁵ CEAR Doc 1637, ECCC written submission.

³⁶⁶ CEAR Doc 934, VFPA response to IR11-08.

³⁶⁷ Examples include CEAR Doc 641, Ecojustice comments and CEAR Doc 581, ECCC comments.

³⁶⁸ CEAR Doc 1637, ECCC written submission.

³⁶⁹ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3214-3217.

³⁷⁰ CEAR Doc 1680, EIS Guidelines.

Consistent with this guidance, the VFPA's assessment of accidents and malfunctions employed both Tier 1 and 2 approaches, as well as quantitative risk assessments (Tier 3), and stochastic modelling (Tier 3) completed for the Trans Mountain Expansion Project. From this modelling, which predicted the general transport and behaviour of hypothetical spill events in higher incident risk areas, the VFPA selected the hypothetical grounding and heavy fuel oil spill location at South Pender Island based on consideration of environmental sensitivities, worst-case oil types and quantities released, and the season posing the greatest environmental risks.³⁷¹

ECCC also stated that it was unclear “whether the Proponent’s estimate of a potential worst-case spill was based solely on one type of oil (i.e. petroleum cargo) or on a mix of multiple oil types that may include petroleum cargo and vessel fuel oils and lubricants.”³⁷² As the VFPA stated in several documents and during the public hearing, the VFPA based the plausible worst-case scenario involving a powered grounding of a container ship on a hard substrate and resulting in a spill of 7,500 m³ on maximum credible spill size for a hard grounding that is three times the maximum IMO-regulated tank size (2,500 m³).³⁷³

Furthermore, model predictions would not inform response and recovery strategies. Effectively responding to oil spills is dependent upon oil type and the environment and conditions where spills occur.³⁷⁴ Specific response measures would be selected based not only on the product spilled, but also on conditions at the time of the spill and site-specific response plans. The response to IR11-04 provides additional information on the development of site-specific response plans under WCMRC’s Coast Response Program.

The VFPA would also like to clarify that the response to IR11-11 identified that modelling undertaken for the Trans Mountain Expansion Project, and used to inform the MSA assessment for grounding scenario involving a 7,500 m³ heavy fuel oil spill, was conducted assuming a spill of 8,250 m³ of heavy fuel oil.³⁷⁵ A spill of heavy oil has a higher potential impact during all seasons relative to a light fuel oil spill, and potential impacts are highest in the spring when considering the composite of all resources averaged over all areas in the marine shipping area.³⁷⁶ The MSA scenario for oil released in Segment B during the spring includes effects predictions for areas deemed to be of highest vulnerability for marine birds.³⁷⁷ The VFPA is confident that, based on the approach outlined in the EIS Guidelines, that the response to IR11-11 provides information on the potential effects from a heavy fuel oil spill in areas and times of year that represent plausible worst-case environmental attributes, conditions, and response times accounting for species presence, abundance, and seasonal use of the area by marine birds.

³⁷¹ CEAR Doc 316, MSA, at s. 10.3.3.1.

³⁷² CEAR Doc 1637, ECCC written submission.

³⁷³ As examples, CEAR Doc 181, EIS, Volume 5, at Appendix 30-A; CEAR Doc 316, MSA, at s. 10.3.3.1; CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3214-3217.

³⁷⁴ CEAR Doc 934, VFPA responses to IR11-04, IR11-10.

³⁷⁵ CEAR Doc 934, VFPA response to IR11-11.

³⁷⁶ CEAR Doc 934, VFPA response to IR11-04.

³⁷⁷ CEAR Doc 934, VFPA response to IR11-11.

As part of the Spill Preparedness and Response Plans, the VFPA has committed to working in confidence with WCMRC, as required, and Indigenous groups, as identified and appropriate based on interest, to implement the plans in consideration of identified archaeological sites and areas of importance from information provided by appropriate agencies and Indigenous groups.³⁷⁸

In response to ECCC's recommendation to develop a Wildlife Emergency Response Plan for the Project,³⁷⁹ the VFPA has also committed to incorporate wildlife information (such as species, populations, and spatial and temporal distribution) in the Spill Preparedness and Response Plans and measures and strategies required to report, respond, and monitor spill emergencies.³⁸⁰ Since Transport Canada is the lead regulatory agency managing Canada's Marine Oil Spill Preparedness and Response Regime, and the marine shipping area is outside of the VFPA's navigational jurisdiction, it would be inappropriate for the VFPA to make commitments on behalf of Transport Canada with respect to the contents of emergency response plans for the marine shipping area.

5. Conclusion

For the EIS and MSA effects assessments, the VFPA conservatively assumed that container vessel traffic to Port of Vancouver terminals would increase in the future, and the additional 260 vessels calling at RBT2 would remain constant in the future, regardless of the increasing container vessel size trend. Based on revised container vessels forecast presented in the 2018 Mercator Report, there will be no difference in the number of ships in the marine shipping area in the future with or without the Project and the Project will not influence the arrival of larger vessel classes. With respect to the number and size of vessels calling in the future, the effects assessments either adequately or overpredict the effects anticipated from RBT2 during operation.

The southern BC coast is a mature vessel traffic area that is regularly used by deep sea vessels.³⁸¹ Marine shipping associated with the Project is and will continue be governed by Canada's marine safety and security system. This system is both comprehensive and subject to continuous improvement. As was outlined by Transport Canada and CCG during the public hearing and in their written submissions, improvements to Canada's marine safety and security regime are currently being developed through the OPP. In addition, the shipping industry, through the IMO, is working towards improvements in environmental protection.

The VFPA supports initiatives by agencies and authorities to reduce shipping-related risks and environmental effects associated with marine shipping, both within and outside of its jurisdiction. The VFPA will actively participate as a key stakeholder in the OPP Working

³⁷⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #26.

³⁷⁹ CEAR Doc 1454, ECCC comments on the sufficiency of information, at p. 19; CEAR Doc 1637, ECCC written submission, p. 53.

³⁸⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #26.

³⁸¹ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 2895.

Group or other federal initiatives, and will consult and collaborate with Indigenous groups, regulatory agencies, and stakeholders, as relevant to the Project.

In light of the VFPA's limited jurisdiction over marine shipping associated with the Project, if the Review Panel determines that there are effects from marine shipping associated with the Project, it is appropriate for the Review Panel to make recommendations of any suggested measures to the Minister and Governor in Council. Any conditions imposed on the VFPA with respect to aspects of marine shipping that fall outside of its jurisdiction, which is prescribed by statute, could not be implemented.

CHAPTER V. REGULATORY ENGAGEMENT AND PUBLIC CONSULTATION

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
1. Section 7 – Engagement and Consultation	181
VFPA Technical Reports	
1. TAG Engagement Record (EIS Appendix 7.4-A)	181
2. TAG Direction and Advice Tables (EIS Appendix 7.4-B)	181
Public Hearing Documents	
1. Undertaking #3: From the Vancouver Fraser Port Authority – Traffic Projections through George Massey Tunnel	1833

2. Overview

The VFPA has engaged in a comprehensive consultation and engagement program with local communities, regulators, Indigenous groups, industry, and stakeholders since the early stages of Project planning.³⁸² The VFPA's engagement activities are ongoing and will continue through the permitting, detailed design, construction, and operation phases of the Project. Chapter VI of these Closing Remarks describes Indigenous consultation and engagement, whereas this chapter focuses on engagement with regulators, local government, the public, and stakeholders.

The VFPA took into consideration the input received throughout the consultation process with all levels of government, local communities, and stakeholders. The information gathered has been instrumental in informing the environmental assessment process, including designing the Project. For example, as previously described in Chapter III of these Closing Remarks, based on engagement with regulators early in the planning process, the VFPA chose to locate the proposed marine terminal in subtidal waters to reduce direct and indirect environmental effects. Ongoing regulatory, local government, and public engagement has also informed and influenced the development of the VFPA's mitigation measures and Project commitments, as exemplified in the most recent submission of the Updated Project Commitments.³⁸³

The VFPA's consultation activities go beyond the requirements of the CEA Agency's Public Participation Guide.³⁸⁴ The VFPA recognizes the current and ongoing value and importance of engaging with all levels of government, local communities, and stakeholders in achieving its vision to be the most sustainable port, which means delivering economic prosperity through trade, maintaining a healthy environment, and enabling thriving communities. The

³⁸² CEAR Doc 181, EIS, Volume 1, at s. 7.

³⁸³ CEAR Doc 2001, Updated Project Commitments.

³⁸⁴ Public Participation in Environmental Assessment under the *Canadian Environmental Assessment Act, 2012*.

VFPA's previous and ongoing commitment to regulatory and local government and public engagement is described in further detail below.

(a) Regulatory engagement

The VFPA has worked closely with regional, provincial, federal, and US regulatory agencies throughout the environmental assessment phase of the Project. Early consultation with regulators allowed the VFPA to introduce the Project and jointly review regulatory procedures and processes for the Project. For example, as discussed in Chapter III of these Closing Remarks, the VFPA's engagement with regulators to discuss the development of a second container terminal at Roberts Bank dates back to the early 2000s. Through that engagement, the VFPA eliminated certain design concepts that regulators indicated would not receive regulatory approval.³⁸⁵

Early engagement with regulators also led to a determination that it would be beneficial to the environmental assessment to have coordinated meetings between the VFPA, scientific experts, and regulators to share Project information effectively. Ultimately, this led to the TAG process, discussed in other chapters of these Closing Remarks.³⁸⁶ The VFPA also met with members of the CEA Agency and the BC EAO to discuss the draft project description to ensure that it would meet the appropriate regulatory requirements.

In February 2014, the VFPA initiated a Working Group to coordinate a multi-stakeholder engagement process between the VFPA, federal and provincial governments, and Indigenous groups to provide opportunities for engagement on Project EIS study methodology and information to be included in the EIS. The Working Group met four times between February and June 2014, following the terms of reference based on the provincial *Environmental Assessment Advisory Working Group Terms of Reference*.³⁸⁷ The Working Group's findings have been available publicly through the VFPA's Project website and the CEA Agency registry since 2014.³⁸⁸

In addition to the Working Group process, the VFPA has maintained regular engagement with federal and provincial departments on individual topics. The VFPA has received valuable information through this process and has incorporated that information into all aspects of the Project. Specifically, the VFPA responded to recent recommendations brought forward by municipal, provincial, and federal governments, as part of the public hearing process, by clearly addressing each recommendation and providing linkages to current or new Project commitments, where applicable (see Appendix A of these Closing Remarks).

The VFPA has also extended its engagement across the US border. The VFPA recognizes that the Project is close to the Canada-USA border, and many of the ships that will call at Roberts Bank will also call at nearby US ports such as Seattle-Tacoma. While the Project is

³⁸⁵ The evaluation of alternative means is discussed in more detail in Chapter III of these Closing Remarks.

³⁸⁶ CEAR Doc 181, EIS, Volume 1, at Appendix 7.4-A.

³⁸⁷ EAO 2013. The Working Group's Terms of Reference are located in CEAR Doc 181, EIS, Volume 1, at Appendix 7.1-A.

³⁸⁸ CEAR Doc 200, 2014 Working Group Materials.

not subject to US regulation, the VFPA is committed to providing US regulators with information to better understand the Project. In 2014, the VFPA engaged with the US Environmental Protection Agency by providing information on the Project, and discussed the Project with the Washington State Department of Ecology, offering to provide additional information to both parties, if requested.³⁸⁹ This engagement is consistent with the 2003 Memorandum of Understanding between the Washington State Department of Ecology and the BC EAO.³⁹⁰

The VFPA has fulsomely engaged with regional, provincial, federal, and US regulators as part of the environmental assessment process, and remains committed to continue engagement and consultation throughout the life of the Project.

(b) Local government and public engagement

The VFPA has engaged with local governments and the public since early 2011 to facilitate opportunities for parties to learn about potential Project-related effects and benefits and provide input on the Project. Initial engagement began with seeking input from communities, stakeholders, and local governments on how parties wanted to be consulted about the Project, and on what topics. Throughout the environmental assessment process, the VFPA welcomed local government, public, and stakeholder input and community knowledge regarding the technical, environmental, economic, social, heritage, and health effects and benefits of the Project.³⁹¹

The VFPA's engagement with the public and local governments pre-EIS submission included numerous activities and outreaches, including a public-enquiry response program; field study notices and project information sheets; updates to the Port Community Liaison Committee – Delta; a Project website and an online engagement platform called PortTalk; a Project email database; responses to interview questions; technical media briefings; social media updates; household mailers; phone-call reminders for those registered for consultation events; small group meetings; open houses; submission of information bulletins and news releases in local newspapers; media notifications regarding opportunities for public consultation; and the establishment of a Delta Community Office to allow community members to speak with VFPA staff directly about port operations, initiatives, and projects.³⁹²

The Delta Community Office also hosts tours and events for community members, including a speaker series that features port-related experts such as marine biologists, marine pilots, representatives from the Canadian Coast Guard, and container industry tours. The Delta Community Office team has had thousands of interactions with members of the public since it opened in October 2014, including walk-in visitors and guests at Delta Community Office events on and off site. The VFPA has also conducted a community outreach program, in

³⁸⁹ CEAR 1814, Transcript, Volume 10, May 25, 2019, at pp. 2426-2427.

³⁹⁰ CEAR Doc 181, EIS, Volume 1, at s. 7.1.1.6.

³⁹¹ CEAR Doc 181, EIS, Volume 1, at s. 7.3.

³⁹² CEAR Doc 181, EIS, Volume 1, at s. 7.3.2.1.

which the VFPA participated in dozens of meetings and met with stakeholders between December 2011 and December 2014. The VFPA delivered presentations regarding the Project, responded to questions, and notified attendees about upcoming consultation activities.³⁹³ This outreach continues today.

Since 2012, the VFPA has engaged with local governments regarding the Project, primarily through the Local Government Elected Roundtable and the Local Government Technical Liaison meetings, which were both established to facilitate two-way information sharing about the proposed Project and to provide a forum for staff and elected officials from local governments to identify and discuss municipal and community issues and interests.³⁹⁴ In 2016, the VFPA made a series of changes to better facilitate regular engagement regarding a broader range of port-related topics.

For elected officials, the VFPA now engages with local government through the Mayors' Roundtable – South of Fraser, which provides a forum for the VFPA and elected officials from local governments in the Lower Mainland to share information and community interests, as well as identify opportunities for collaboration. For municipal staff, the Local Government Technical Liaison Committees for the City of Delta and City of Richmond have been replaced with quarterly staff liaison committees, which provide an opportunity for the staff to engage with VFPA staff regarding port-related topics, including RBT2.³⁹⁵

Prior to submitting the EIS, the VFPA conducted another three rounds of design consultation reflecting the feedback received. The VFPA documented and reported on all feedback received from members of the public during the pre-submission phase as part of the EIS, including submissions from the eight public comment periods.³⁹⁶

The VFPA has considered, and continues to consider, all feedback received during consultation throughout the environmental assessment process, and has incorporated the input of local government, as well as specific stakeholder groups, when refining Project designs or developing mitigation measures. For example, the VFPA has recently committed to consult with the Delta Farmers Institute on the construction Land and Marine Traffic Management Plan in light of concerns expressed on potential traffic impacts from the Project.³⁹⁷ The VFPA also continues to engage with the Area I Crab Fisherman Association, as described in Chapter XII of these Closing Remarks. Moreover, the VFPA's assurance in continuing to provide local government, stakeholders, and the public with up-to-date information regarding the Project was formalized in its commitment to make the Construction and Operation Environmental Management Plans and their sub-plans publicly available on the RBT2 website.³⁹⁸

³⁹³ CEAR Doc 1755, Transcript, Volume 3, May 16, 2019, at pp. 382-383

³⁹⁴ CEAR Doc 181, EIS, Volume 1, at s. 7.3.2.2.

³⁹⁵ CEAR Doc 1755, Transcript, Volume 3, May 16, 2019, at pp. 381-383.

³⁹⁶ CEAR Doc 181, EIS, Volume 1, at Appendix 7.3-B.

³⁹⁷ CEAR Doc 1765, Transcript, Volume 4, May 17, 2019, at p. 1049; CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #14.

³⁹⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #14, 15.

The VFPA recognizes the value and importance of engaging with local government, communities, and stakeholders. The VFPA will continue to engage meaningfully in future phases of the Project, including permitting, detailed design, construction, and operation.

3. Key issues raised and VFPA response

(a) Traffic through George Massey Tunnel

At the May 16, 2019 general session, the effects of the Project on traffic through the George Massey Tunnel (**GMT**) was raised as a potential issue by several hearing participants.³⁹⁹ The Panel Chair requested, as Undertaking #3, an assessment of the number of 'port' trucks that use the GMT to assess potential future traffic congestion through the GMT owing to the movement of container trucks to and from RBT2.

In accordance with the EIS Guidelines, the VFPA assessed road and rail traffic within the VFPA's jurisdiction, which corresponds to the area within the marine terminal and widened causeway.⁴⁰⁰ The undertaking in contrast focused on traffic outside the VFPA's jurisdiction, and also outside the scope of the assessment as defined in the Review Panel's Terms of Reference.

As stated in the response to Undertaking #3, the Project is expected to generate similar container truck traffic volume and distribution as the existing Deltaport Terminal. For the undertaking, the VFPA identified October as a peak month for shipping traffic at the Deltaport Terminal. The VFPA collected truck movement data in both the southbound and northbound directions through the GMT using the VFPA's Smart Fleet Trucking Strategy GPS system, which provides GPS tracking data on all trucks that access the Port's deep-sea terminals. The VFPA compared the number of container trucks using the GMT with total usage to illustrate the percentage of container truck traffic using the GMT to access the Deltaport Terminal.⁴⁰¹

Peak daily container truck traffic through the GMT was 947 in the northbound direction and 1,077 in the southbound direction, comprising 2.2% and 2.5% of total traffic respectively. Total monthly container truck traffic for October relative to all traffic was 1.2% and 1.5% in the northbound and southbound directions, respectively. However, only 69% of all GPS-tracked container trucks utilizing the GMT originate from, or are destined for, the Deltaport Terminal. As a result, only 1,404 container trucks out of the total peak daily value of 2,024 (947 northbound plus 1,077 southbound) container trucks were associated with the Deltaport Terminal, representing 1.6% of total daily traffic through the GMT.⁴⁰²

If the Project is approved, the VFPA expects a maximum increase of container truck traffic from a current daily peak of approximately 2.5% to a maximum of approximately 5%, and monthly maximum increase from 1.5% to a maximum of approximately 3%, assuming non-

³⁹⁹ See, for instance, CEAR Doc 1755, Transcript, Volume 3, May 16, 2019, at pp. 457, 620, 711, 714, 720.

⁴⁰⁰ CEAR Doc 181, EIS, Volume 1, at s. 4.1. See also CEAR Doc 1680, EIS Guidelines, at s. 3.1.

⁴⁰¹ CEAR Doc 1833, VFPA response to Undertaking #3.

⁴⁰² CEAR Doc 1833, VFPA response to Undertaking #3, at pp. 1-2.

container truck traffic remains at current levels. However, the VFPA expects that the proportion of double-ended moves (i.e., a container load on both inbound and outbound trips) will increase substantially in the near future. An increase in double-ended moves relative to all container truck trips, destined to/from the terminal, would reduce the total amount of container truck traffic through the GMT relative to current levels.⁴⁰³

Despite the fact the Project is expected to have only a small incremental increase on container truck traffic through the GMT, the VFPA recognizes that the GMT is a key point of congestion along one of the Lower Mainland's most important transportation corridors and is supportive of solutions that lead to decreased traffic congestions and increase travel-time reliability through this corridor.

(b) Fraser River Estuary Management Program

At multiple public hearing sessions, there was discussion about the importance of re-establishing the Fraser River Estuary Management Program (the **FREMP**) to assist in managing the ecological health of the Fraser River and its estuary.⁴⁰⁴ The FREMP was an inter-governmental program—terminated in 2013—that provided a coordinated avenue for decision-making on the Fraser River. The six funding partners to the FREMP were Environment Canada; DFO; the Greater Vancouver Regional District; the BC Ministry of Environment, Lands, and Parks; the Fraser River Harbour Commission; and the North Fraser River Harbour Commission. It should be noted that for a period of time, Transport Canada was also a partner in the FREMP. Each agency retained its own authority; however, the FREMP brought senior government decision-makers together on the overall management of the estuary, provided for collaboration on studies such as shoreline habitat classification, and facilitated inter-agency decision-making, including permitting activities within the Fraser River.

The VFPA, as the previous Fraser River Harbour Commission and North Fraser River Harbour Commission, was an active participant in the original FREMP. While not a permitting body, the FREMP provided project advice to proponents and permitting agencies were still required to undertake permit reviews in accordance with their own legislated mandates, and to that end, the VFPA incorporated advice from this group into project permit conditions. As stated in the public hearing, the VFPA remains committed to actively participating in any future FREMP. However, re-establishing the FREMP or creating a modified model would require input from a variety of different stakeholders, including Indigenous groups, federal and provincial regulators, local municipalities, and local stakeholders. Indeed, a number of comments during the public hearing noted the absence of Indigenous groups from the original FREMP that should be addressed in a future FREMP.⁴⁰⁵ The VFPA agrees and would support inclusion of Indigenous groups in any new iteration of the FREMP. The VFPA also

⁴⁰³ CEAR Doc 1833, VFPA response to Undertaking #3, at p. 2.

⁴⁰⁴ See, for instance, CEAR Doc 1765, Transcript, Volume 4, May 17, 2019, at pp. 838-839; CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at pp. 2255-2256, 2374-2377; CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 2840-2841; CEAR Doc 1915, Transcript, Volume 19, June 13, 2019, at pp. 4460-4462; CEAR Doc 1975, Transcript, Volume 24, June 24, 2019, at pp. 4925-4928.

⁴⁰⁵ CEAR Doc 1975, Transcript, Volume 24, June 24, 2019, at pp. 4926, 4928.

expects that any potential members of a new FREMP would need to agree to a terms of reference for the establishment of the group, rather than having a set of terms of reference imposed upon it. Finally, the VFPA expects that, given the complexity of regulatory jurisdiction involved, such a body would serve in an advisory role as opposed to a regulatory role. The VFPA is committed to participate and collaborate in a future iteration of FREMP, when and if re-instated.

4. Conclusion

The VFPA is committed to continuing to engage and work with port users, all levels of government, Indigenous groups, local communities, and stakeholders to ensure that Canadians continue to benefit from the Port of Vancouver for generations to come. The VFPA is proud of the work and efforts made to date in consulting with federal, provincial, and municipal regulators, as well as members of the public, to ensure that all stakeholders have access to the information they need for meaningful participation in the environmental assessment process.

The VFPA has considered feedback received to date in its assessment, which provided valuable advice that improved the quality of the VFPA's assessment of the Project, including the most recent Updated Project Commitments.⁴⁰⁶ The VFPA remains committed to ongoing meaningful consultation by listening and responding to input provided by communities, stakeholders, all level of governments, and Indigenous groups during potential future phases of the Project, including permitting, detailed design, construction, and operation. In summary, the VFPA is committed to developing the Project to benefit Canada's economy in a way that protects the environment and reflects community input.

⁴⁰⁶ CEAR Doc 2001, Updated Project Commitments, at Appendices A, B, and C.

CHAPTER VI. INDIGENOUS CONSULTATION AND ENGAGEMENT

1. Overview

Consultation with Indigenous groups is fundamental to project planning, review, and assessment. RBT2 is proposed in an area that lies adjacent to TFN, in close proximity to Musqueam, and an area within which Indigenous groups engage in current use of lands and resources for traditional purposes (**Current Use**) and exercise asserted or established Aboriginal and treaty rights. The VFPA has engaged extensively with Indigenous groups in the Project area and throughout the marine shipping area to ensure that the VFPA has been able to fully assess the potential impacts and benefits for Indigenous groups related to the Project and/or marine shipping associated with the Project.

In making these submissions, the VFPA is cognizant that the Review Panel's role in respect of Indigenous consultation is set out in the Final Terms of Reference:

"Aboriginal consultation is integrated with the review panel and regulatory process to the extent possible."⁴⁰⁷

The Review Panel's mandate is to "to collect information on behalf of the Crown" as outlined in the Terms of Reference; however, "[t]he federal government maintains the duty to consult throughout the environmental assessment process..."⁴⁰⁸

In assisting with this information collection, the VFPA recognizes that while there are different legal drivers for the assessment of potential effects on Current Use and for the assessment of potential impacts on rights, *both* Current Use and rights relate to the Indigenous use of lands and resources for traditional purposes.⁴⁰⁹ As it is not the role of the VFPA (nor the Review Panel) to determine which uses for traditional purposes are rights-based where this has not already been established through treaty (e.g., Tsawwassen First Nation Final Agreement, Douglas Treaty rights) or case law (e.g., Musqueam under the *Sparrow* decision), the VFPA included *all* descriptions of uses of lands and resources for traditional purposes provided by Indigenous groups in the baseline summaries for the Current Use and rights assessments⁴¹⁰, on the presumption that any use of lands and resources for traditional purposes could represent the exercise of rights, if not already established as such.

This chapter is structured as follows:

- Section 2 outlines the legal principles that apply to consultation with Indigenous groups on the Project and marine shipping associated with the Project;

⁴⁰⁷ CEAR Doc 1680, Final Terms of Reference, at s. 3.6.

⁴⁰⁸ CEAR Doc 1680, Final Terms of Reference, at s. 3.7.

⁴⁰⁹ A statutory requirement under subsection 5(1)(c) of *CEAA 2012* drives the assessment of effects on Current Use, and a common law requirement pursuant to the Crown's duty to consult drives the assessment of impacts on rights,

⁴¹⁰ CEAR Doc 181, EIS, Volume 5, at s.32.2.4; CEAR Doc 316, MSA, s. 9.5.4; CEAR Doc 930, AIEIS, s. 7.2.4; CEAR Doc 572, AIMSA, s. 7.2.

- Section 3 reviews the roles of the Crown, the Review Panel, and the VFPA in the application of those principles;
- Sections 4 and 5 review the specific efforts of the VFPA, and the CEA Agency to consult with Indigenous groups on the Project and marine shipping associated with the Project;
- Section 6 provides an overview of the findings of the Current Use assessment, and summarizes the comprehensive suite of mitigation commitments made by the VFPA;
- Section 7 addresses the participation of Indigenous groups in the public hearing sessions, and the VFPA's efforts to continue to work with Indigenous groups in relation to the specific issues raised by each group;
- Section 8 outlines the VFPA's ongoing consultation efforts planned for the period between the close of the public hearings in June 2019 and when the Review Panel files its report; and
- Section 9 provides a brief conclusion.

2. **Applicable legal principles**

The Crown's duty to consult with Indigenous peoples is grounded in the honour of the Crown. The duty arises when the Crown has knowledge, real or constructive, of the potential existence of the Aboriginal right or title and contemplates conduct that might adversely affect it.⁴¹¹ The test for when the duty to consult arises can be broken down into three elements: (1) the Crown's knowledge, actual or constructive, of a potential Aboriginal claim or right; (2) contemplated Crown conduct; and (3) the potential that the contemplated conduct may adversely affect an Aboriginal claim or right.⁴¹²

- In respect of the first element (Crown knowledge), the Crown must have real or constructive knowledge of an asserted or established Aboriginal or treaty right. In the case of a treaty the Crown, as a party, will always have notice of its contents.⁴¹³ In cases of asserted rights, the threshold is not high.
- In respect of the second element (Crown conduct), the type of government action that engages the duty to consult is not confined to government exercise of statutory powers. Further, government action is not confined to decisions or conduct which have an immediate impact on lands and resources. A potential for adverse impact suffices. Thus, the duty to consult extends to "strategic, higher level decisions" that may have an impact on asserted or established Aboriginal or treaty rights.
- In respect of the third element (adverse effect), the claimant Indigenous group must show a causal relationship between the proposed government conduct or decision and a potential for adverse impacts on asserted or established Aboriginal or treaty rights. Past wrongs, including previous breaches of the duty to consult, do not suffice.⁴¹⁴

⁴¹¹ *Haida Nation v British Columbia (Minister of Forests)*, 2004 SCC 73 at paras. 16 and 35 [*Haida*]

⁴¹² *Rio Tinto Alcan Inc. v Carrier Sekani Tribal Council*, 2010 SCC 43 at para. 31 [*Rio Tinto*].

⁴¹³ *Mikisew Cree First Nation v Canada (Minister of Canadian Heritage)*, 2005 SCC 69 at para. 34 [*Mikisew*].

⁴¹⁴ *Rio Tinto*, *supra* at paras. 40-50.

Third parties, such as project proponents, do not have a legal duty to consult. The Crown alone remains legally responsible for the consequences of its actions and interactions with third parties that affect Aboriginal interests. However, as noted by the Supreme Court of Canada:

“The Crown may delegate procedural aspects of consultation to industry proponents seeking a particular development; *this is not infrequently done in environmental assessments.*”⁴¹⁵

The scope and content of the duty to consult and accommodate varies with the circumstances. In general terms, the scope of the duty is proportionate to a preliminary assessment of two variables: the strength of the case supporting the existence of an asserted Aboriginal right or title, and the seriousness of the potentially adverse effect upon an Aboriginal or treaty right, whether asserted or established.⁴¹⁶ This produces a “spectrum” of consultation. In cases where the claim to title is weak, the Aboriginal right limited, or the potential for infringement minor, the only duty may be to give notice, disclose information and discuss any issues raised in response to the notice.⁴¹⁷ At the other end of the spectrum, where a strong *prima facie* case for the claim is met or the right is already established (i.e., the claim has been proven in court or agreed to by the Crown and an Indigenous group, such as through treaty), the right and potential infringement is of high importance to the Indigenous group, and the risk of non-compensable damage is high, “deep consultation”, aimed at finding a satisfactory interim solution, may be required.⁴¹⁸ While the precise requirements will vary with the circumstances, the consultation required in these cases may entail the opportunity to make submissions for consideration, formal participation in the decision-making process, and provision of written reasons to show that Indigenous concerns were considered and to reveal the impact they had on the decision.

The consultation must be substantial and meaningful—it must incorporate accommodation where appropriate, and “entails testing and being prepared to amend policy proposals in the light of information received, and providing feedback.”⁴¹⁹ Consultation with each Indigenous group must be based on the unique fact circumstances pertinent to it.⁴²⁰

In fulfilling its duty of consultation, the Supreme Court of Canada has stated that the Crown is not held to a standard of perfection. Instead, the question is whether the regulatory scheme or government action, viewed as a whole, accommodates the collective Aboriginal or treaty right in question. The effort required is reasonableness.⁴²¹

⁴¹⁵ *Haida*, *supra* at para. 53; emphasis added.

⁴¹⁶ *Haida*, *supra* para. 39.

⁴¹⁷ *Haida*, *supra* at para. 43.

⁴¹⁸ *Haida*, *supra* at para. 44.

⁴¹⁹ *Mikisew Cree First Nation v Canada (Minister of Canadian Heritage)*, 2005 SCC 69 at para. 54; *Clyde River (Hamlet) v Petroleum Geo-Services Inc.*, 2017 SCC 40 at para. 34 [*Clyde River*]; *Haida Nation*, *supra* at para. 46.

⁴²⁰ *Gitxaala Nation v Canada*, 2016 FCA 187 at para. 236.

⁴²¹ *Tsleil-Waututh Nation et al v Canada (Attorney General) et al*, 2018 FCA 153 at para. 509 [*Tsleil-Waututh*], citing *Haida Nation*, *supra* at para. 62.

There is no duty on the Crown to engage in a dialogue directly with an Indigenous group or develop special consultation measures if an established regulatory process will suffice, and Parliament may choose to fulfill procedural aspects of the duty to consult through an environmental assessment process conducted by a regulatory authority.⁴²²

The consultation requirement during environmental assessment is not an inquiry into environmental effects *per se*—rather, the inquiry is into the impact of the project on the asserted or established right.⁴²³ Consultation must also take into account existing limitations on Indigenous rights. As a result, the cumulative effects and historical context may inform the scope of the duty to consult.⁴²⁴ To assist with this process, the VFPA included information on cumulative effects and historical context for each Indigenous group's use of lands and resources for traditional purposes and the exercise of asserted or established rights in EIS Section 32.2.4, MSA Section 9.5.4, Additional Information to the EIS – *WSÁNEĆ* Nation (**AIEIS**) Section 7.2.4, and Additional Information to the MSA – Musqueam First Nation and Tsleil-Waututh Nation (**AIMSA**) Section 7.2, to the extent this information had been reported by Indigenous groups to the VFPA by the time those submissions had been filed, and to the extent the VFPA was able to publicly disclose the information. Refer to Section 4 for further discussion of the VFPA's approach to supporting this aspect of consultation through its Current Use and rights assessment methodology.

In the EIS, MSA, AIEIS, and AIMSA, the VFPA included information provided by Indigenous groups regarding their perspectives on cumulative effects and historical context.⁴²⁵ In addition, many Indigenous groups made submissions to the Panel regarding the impact that prior developments have had on their traditional territory and their ability to engage in use of lands and resources for traditional purposes and exercise of rights.

Based on the views shared by Indigenous groups, the VFPA understands that their perspective is that existing impacts have been significant. The VFPA understands, however, that the Review Panel is conducting an environmental assessment of the potential impacts of RBT2, not the cumulative impacts of past projects or other activities in and of themselves.

The Supreme Court of Canada has addressed the distinction in the context of Indigenous consultation in a manner that is instructive to the conduct of environmental assessment.

"The third element of a duty to consult is the possibility that the Crown conduct may affect the Aboriginal claim or right. The claimant must show a causal relationship between the proposed government conduct or decision and a potential for adverse impacts on pending Aboriginal claims or rights. Past wrongs,

⁴²² *Tsleil-Waututh*, *supra* at para. 490, *Katlocheeche First Nation v Canada (Attorney General)*, 2013 FC 458 at paras. 150-153.

⁴²³ *Clyde River*, *supra* at para. 45. *Tsleil-Waututh First Nation*, *supra* at para. 504.

⁴²⁴ *Chippewas of the Thames v Enbridge Pipelines Inc.*, 2017 SCC 41, at para. 42 [*Chippewas of the Thames*].

⁴²⁵ CEAR Doc 181, EIS, Volume 5, at s. 32.2.4.

including previous breaches of the duty to consult, do not suffice. ...

An underlying or continuing breach, while remediable in other ways, is not an adverse impact for the purposes of determining whether a particular government decision gives rise to a duty to consult...

[The case law] confines the duty to consult to adverse impacts flowing from the specific Crown proposal at issue — not to larger adverse impacts of the project of which it is a part. The subject of the consultation is the impact on the claimed rights of the *current* decision under consideration."⁴²⁶

The Supreme Court of Canada stated more recently:

[41] The duty to consult is not triggered by historical impacts. It is not the vehicle to address historical grievances. In *Carrier Sekani*, this Court explained that the Crown is required to consult on "adverse impacts flowing from the specific Crown proposal at issue - not [on] larger adverse impacts of the project of which it is a part. The subject of the consultation is the impact of the claimed rights of the *current* decision under consideration... *Carrier Sekani* also clarified that [a]n order compelling consultation is only appropriate where proposed Crown conduct, immediate or prospective, may adversely impact on established or claimed rights"...

[42] That said, it may be impossible to understand the seriousness of the impact of a project on s. 35 rights without considering the larger context... Cumulative effects of an ongoing project, and historical context, may therefore inform the scope of the duty to consult... This is not "to attempt to redress of past wrongs. Rather, it is simply to recognize an existing state of affairs, and to address the consequences of what may result from" the project. [Citations omitted, emphasis in original]⁴²⁷

The same logic applies in undertaking an environmental assessment. Consideration of the evidence and submissions from Indigenous groups must focus on the causal relationship, if any, between the proposed Project and any potential for adverse impacts on asserted or established Aboriginal and treaty rights. Past wrongs, including previous industrial developments and impacts, do not suffice. The focus is on assessing whether there are any

⁴²⁶ *Rio Tinto, supra* at paras. 45-54; quotes from paras. 45, 48, and 53.

⁴²⁷ *Chippewas of the Thames, supra* at paras. 41-42.

adverse impacts flowing from the specific proposal (RBT2) at issue — not to larger adverse impacts of the development (the existing Deltaport and causeway) of which it may be a part. The subject of the assessment is the potential impact of the *current* project under consideration.

Where the current project under consideration may contribute to these existing effects post-mitigation—that is, is likely to result in residual effects that could combine with the residual effects of other projects and activities that have been or will be carried out—a cumulative effects assessment would be undertaken.

Such a cumulative effects assessment in the context of the Project is not an open-ended inquiry into the impact of past projects generally. There are other mechanisms that may be employed for such an assessment, and certain Indigenous groups indicated an interest in such mechanisms to the Review Panel.⁴²⁸ Based on guidance from the CEA Agency in the EIS Guidelines, the RBT2 Project’s environmental assessment is not a regional assessment, and any cumulative effects assessment carried out for the Project must be understood in that context. Refer to Chapter VII of these Closing Remarks for further discussion of the inclusion of past projects in the cumulative effects assessment for the Project.

3. Review of consultation roles in the context of RBT2

(a) The Role of the Crown

The federal government has the primary role in the Crown consultation process for the Project. Section 3.7 of the Terms of Reference states:

“The federal government maintains the duty to consult throughout the environmental assessment process and will be responsible for the items detailed in section 3.8, where necessary.”

Section 3.8 of the Terms of Reference confirms that the federal government will be responsible for:

- a. the validity of potential or established Aboriginal or Treaty rights asserted by an Aboriginal group or the strength of such claims;
- b. the scope of the Crown’s duty to consult an Aboriginal group;
- c. whether the Crown has met its respective duty to consult or accommodate in respect of rights recognized and affirmed by section 35 of the *Constitution Act, 1982*;

⁴²⁸ For example, Tsawwassen First Nation states that it has “long advocated for a cumulative effects assessment conducted on a regional basis for the entire Fraser River Lowland.” CEAR 1828, TFN Oral Presentation for June 1, 2019, at slide 23.

d. whether the project would be an infringement of potential or established Aboriginal or Treaty rights; and

e. any matter of Treaty interpretation (historic or modern)."

In this case, as discussed below, the CEA Agency is the Crown Consultation Coordinator, and has been tasked with providing "additional instructions to the proponent in cases where further research and engagement effort by the proponent may be required to support Canada's ability to fulfil the duty to consult with one or more Aboriginal groups that may be adversely affected by the Project..."⁴²⁹ The approach is described in the CEA Agency's submission to the Review Panel:

"The Government of Canada uses and relies on, where appropriate, existing consultation mechanisms, processes and expertise such as environmental assessment and regulatory approval processes in which Indigenous consultation activities may be necessary.

The Government of Canada takes a 'Whole of Government' approach to Indigenous consultation in the context of environmental assessments...For the environmental assessment of the Project, the Agency acts as the Crown Consultation Coordinator to integrate the consideration of impacts on established or potential Aboriginal or Treaty rights into the environmental assessment process to the greatest extent possible and identify mitigation measures for inclusion in decision statements as potential means for addressing any such impacts."⁴³⁰

(b) The role of the Review Panel

The Review Panel has an important role in supporting this Crown consultation process. As discussed above, the Review Panel has the mandate to collect information on behalf of the Crown. Section 3.7 of the Terms of Reference states:

"Through these Terms of Reference, the Review Panel is given the mandate to collect information on behalf of the Crown as outlined in sections 3.9 to 3.11."

Section 3.9 of the Terms of Reference clarifies the information that the Review Panel shall accept as part of the environmental assessment. The type of information identified in section 3.9(a) through (c) closely corresponds to the factors identified in the case law. The Supreme Court of Canada held that the test for when the duty to consult arises can be

⁴²⁹ CEAR Doc 1680, EIS Guidelines, at s. 9.2, 17.5.

⁴³⁰ CEAR 471, CEA Agency submission, pp. 2-3.

broken down into three elements: (1) the Crown's knowledge, actual or constructive, of an asserted or established Aboriginal or treaty right; (2) contemplated Crown conduct; and (3) the potential that the contemplated conduct may adversely affect an asserted or established Aboriginal or treaty right.⁴³¹ The Terms of Reference outline the role of the Review Panel in supporting this assessment by confirming that it "shall accept" and "provide a summary of":

- Information presented by Aboriginal persons or groups regarding the location, extent and exercise of potential or established Aboriginal or Treaty rights that may be affected by the project (section 3.9(a));
- Information... that relates to any potential adverse impacts of the project on potential or established Aboriginal or Treaty rights... (section 3.9(b)); and
- Information about the potential seriousness of potential impacts of the project on the exercise of potential or established Aboriginal or Treaty rights.... (section 3.9(c)).

The final item listed in section 3.9 speaks to the role of Review Panel in supporting the Crown's consideration of "accommodation" measures:

- Information presented by participants in the review panel process concerning measures proposed to mitigate and/or avoid any identified adverse impacts on potential or established Aboriginal or Treaty rights and interests. (section 3.9(d))

Section 3.11 further clarifies the role of the Review Panel in supporting consideration of "accommodation" by the Crown:

"The Review Panel may use the information received through the review panel process to make recommendations which, if implemented, would avoid or mitigate the environmental effects of the project; including those environmental effects that might adversely impact potential or established Aboriginal or Treaty rights."

(c) The role of the VFPA

As discussed above, third parties do not have a legal duty to consult. The Crown alone remains legally responsible for the consequences of its actions and interactions with third parties that affect Aboriginal interests. However, the Crown may delegate "procedural aspects" of consultation to industry proponents seeking a particular development; something that is "not infrequently done in environmental assessments."⁴³²

It is acknowledged that the VFPA is an agent of the Crown for the purposes of engaging in port activities.⁴³³ As a result, some may argue that the VFPA may have a greater role to

⁴³¹ *Rio Tinto*, *supra* at para. 31; see also *Mikisew* *supra* at para. 34 (applying the duty to consult in the context of a historic treaty); and *Beckman v Little Salmon/Carmacks First Nation*, 2010 SCC 53 (applying the duty to consult in the context of a modern land claim agreement).

⁴³² *Haida*, *supra* at para. 53; emphasis added.

⁴³³ *Canada Marine Act*, SC 1998, c 10, at s. 28(2)(a).

play in the duty to consult. They may point to other situations where Crown agents have been found to bear the duty to consult in circumstances where that Crown agent was the decision-maker.⁴³⁴

However, in the context of this environmental assessment process, the VFPA is clearly not the Crown decision-maker. The VFPA's role is that of the proponent. As such, it is responsible for "procedural aspects" of consultation.⁴³⁵

The VFPA, as a proponent, was directed to "engage with Aboriginal groups whose potential or established Aboriginal and Treaty rights and related interests may be affected by the Project." The relevant Indigenous groups were identified by the Crown. When the scope of the assessment was broadened to include marine shipping the VFPA, as a proponent, was again directed to "meet with and engage" those Indigenous groups identified by the Crown that may be affected by marine shipping activities to obtain their views on:

- "Effects of changes to the environment on Aboriginal peoples..., and
- Potential adverse impact of the Project on potential or established Aboriginal or Treaty rights."⁴³⁶

The EIS Guidelines were clear that "[i]nformation provided related to potential adverse impacts on potential or established Aboriginal or Treaty rights will be considered by the Crown in meeting its common law duty to consult..."⁴³⁷

(d) The Review Panel's report and the decision-making process

The Review Panel's report will inform the Governor in Council with respect to the adequacy of the consultation process throughout the environmental assessment. However, the determination of whether consultation is adequate will ultimately rest with the Governor in Council. In addition to the consultation that the Crown has already undertaken with respect to the Project, the Crown will also have consultation obligations upon receipt of the Review Panel's report. This will include informing itself of the impact the Project will have on affected Indigenous groups, and, if appropriate, communicating its findings to the Indigenous group and attempting to substantially address the Indigenous group's concerns.⁴³⁸

However, this decision-making process lies in the future. The current task is to look at the process to date and to collect, summarize, and present the information that will be used to support the future decision-making process. As discussed further below, based on the

⁴³⁴ See for example *Rio Tinto*, *supra* at para. 81.

⁴³⁵ To the extent that other participants may argue that the VFPA itself bears the Crown's legal duty to consult in the context of this environmental assessment, the VFPA respectfully submits that the Review Panel's mandate does not extend to making such determinations. Recall that section 3.8(c) of the Terms of Reference confirms that the federal government will be responsible for determining "whether the Crown has met its respective duty to consult or accommodate...;"

⁴³⁶ CEAR Doc 1680, EIS Guidelines, at s. 9.2, 17.5.

⁴³⁷ CEAR Doc 1680, EIS Guidelines, at s. 9.2.

⁴³⁸ *Mikisew*, *supra* at para. 55, *Tsleil-Waututh*, *supra* at para. 503.

consultation activities undertaken directly by the Crown and/or the VFPA, and the public hearing process conducted by the Review Panel, the consultation efforts have clearly been extensive and robust to this point in the process.

4. The CEA Agency's Indigenous consultation efforts

The CEA Agency has provided information about the Project to Indigenous groups, has advised Indigenous groups about upcoming steps in the environmental assessment process, and has invited Indigenous groups to participate in the assessment of the Project.

On the same day that the Minister of the Environment announced that the Project would undergo environmental assessment by review panel, the CEA Agency wrote to a number of Indigenous groups to introduce the Project, and to share a draft consultation work plan for comments. In these letters, the CEA Agency provided a preliminary determination of the depth of consultation for each Indigenous group, and invited comment on the level of consultation and to apply to the CEA Agency's Participant Funding Program.⁴³⁹ The CEA Agency then invited these Indigenous groups to comment on the draft Terms of Reference for the Review Panel.⁴⁴⁰

When the Minister updated the EIS Guidelines and Final Terms of Reference to include marine shipping associated with the Project, the CEA Agency expanded the number of Indigenous groups it contacted about the Project to include Indigenous groups potentially affected by the marine shipping associated with the Project. The CEA Agency introduced the Project to these additional Indigenous groups, provided a preliminary depth of consultation assessment, and proposed a consultation work plan for each Indigenous group.⁴⁴¹ Several Indigenous groups challenged the CEA Agency's initial depth of consultation assessments. The CEA Agency considered those challenges and, where necessary, revised the depth of consultation assessment.⁴⁴²

The CEA Agency specifically invited comments on the completeness and the sufficiency of the information provided by the VFPA during the public comment periods held in the environmental assessment.⁴⁴³

Subsequent to the filing of the EIS, MSA, AIEIS, and AIMSA by the VFPA in 2015 and 2016, the CEA Agency invited Indigenous groups to comment on a proposed assessment methodology to determine the impacts of the Project on Aboriginal rights. The CEA Agency characterized its methodology as a "rights-based assessment," one that would assess the level of impact on rights through various pathways (access, resource, and experience), applying specific criteria to determine the potential severity of the adverse impact, and

⁴³⁹ CEAR Docs 13 to 25.

⁴⁴⁰ CEAR Docs 141 to 153.

⁴⁴¹ CEAR Docs 278 to 304.

⁴⁴² See, for instance, Lyackson correspondence with CEA Agency (CEAR Docs 733, 926, and 948) and Pacheedaht correspondence with CEA Agency (CEAR Docs 384, 402, and 407).

⁴⁴³ CEA Agency Invitation for Comment on Completeness, see CEAR Docs 184, 320 to 341, and 381. Review Panel Invitation for Comment on Sufficiency, see CEAR Docs 1002 to 1050, 1219, and 1366.

using Indigenous group-specific thresholds, which the CEA Agency indicated could differ from the thresholds used by the VFPA in its assessment of effects on a particular valued component.⁴⁴⁴

On January 16, 2018, the CEA Agency requested that the VFPA “integrate the collection of information about impacts on rights and proposed accommodation measures into the information that is being collected in response to the Review Panel’s Information Request Package #10.” In an attachment to that letter, the CEA Agency included information about its proposed methodology, stating that the CEA Agency “is currently updating the Government’s approach to assessing potential impacts of a designated project on the exercise of... rights.”⁴⁴⁵ The VFPA understood, by way of this letter, that the CEA Agency would apply this proposed methodology in the Crown’s future consultation and accommodation report for the Project. Further, the VFPA was being asked to provide, through its responses to IR Package #10, information that might be helpful to the Crown’s assessment of potential impacts on the exercise of asserted or established rights. The CEA Agency has confirmed that the VFPA’s understanding was correct, and that the proposed methodology was only provided for informational purposes.⁴⁴⁶

The CEA Agency also noted in its letter of January 16, 2018 that it expected many of the VFPA’s responses to IR Package #10 “will address potential impacts on rights and accommodation options,” but that “the Crown would like to ensure that Indigenous groups have the opportunity to identify potential gaps where they believe information related to potential impacts on rights has not captured in relation to the potential environmental effects under section 5(1)(c) of CEAA 2012.”⁴⁴⁷

For clarity, the VFPA conducted a rights assessment that was separate from but informed by the Current Use assessment, which had been in turn informed by the assessments for valued components with linkages to Current Use and the exercise of rights. The VFPA respectfully submits that its rights methodology was adequate and appropriate. It was also consistent with the EIS Guidelines, which, at section 10.2, requested that the “EIS... describe, *from the perspective of the proponent*, the potential adverse impacts of the project on the ability of Aboriginal peoples to exercise the potential or established Aboriginal and Treaty rights and related interests identified in section 9.2” (emphasis added). The only methodological guidance provided was a recommendation to adapt “the impact matrix methodology described in section 10.1.1 [of the EIS Guidelines pertaining to the methodology to assess environmental effects, including those related to Aboriginal peoples]... for this purpose.”⁴⁴⁸

⁴⁴⁴ CEAR Docs 1439 and 1137.

⁴⁴⁵ CEAR Doc 1137, Letter from the CEA Agency to the VFPA dated January 16, 2018.

⁴⁴⁶ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1469.

⁴⁴⁷ CEAR Doc 1137, Letter from the CEA Agency to the VFPA dated January 16, 2018.

⁴⁴⁸ CEAR Doc 1680, EIS Guidelines, at p. 27. The introduction to section 10.1.1, under the heading “Impact Matrix,” states (p. 24): “An impact matrix methodology in combination with identification of [valued components] should be used to evaluate environmental effects of the proposed project, including those related to Aboriginal peoples.” The environmental effects to be assessed are those defined under section 5 of *CEAA 2012*, including subsection 5(1)(c) related to Aboriginal peoples (e.g., including Current Use).

The VFPA also respectfully submits that its assessment of Current Use is consistent with the CEA Agency's technical guidance for *Assessing the Current Use of Lands and Resources for Traditional Purposes under the Canadian Environmental Assessment Act, 2012*, issued as a draft by the CEA Agency in December 2015. The guidance defines "current use" as uses by Indigenous peoples that are actively being carried out at the time of the assessment and uses that are likely to occur in the reasonably foreseeable future provided that they have continuity with traditional practices, traditions, or customs.

Although the EIS and MSA assessments were conducted prior to the issuance of the draft guidance (i.e., prior to March 2015 and October 2015, respectively), the baseline information that the VFPA requested from each Indigenous group and summarized in the EIS, MSA, AIEIS, and AIMSA is not limited to uses by Indigenous groups that were actively being carried out at the time of the assessment and that were likely to occur in the reasonably foreseeable future. Rather, the baseline summaries also contain information, as provided by Indigenous groups, regarding each Indigenous group's past use (i.e., use that grounds the exercise of rights), their perspectives on existing effects that have constrained their use over time and that therefore limit their present use (or exercise of rights), and their expressed desire to increase or restore use (the exercise of their rights) in the future, based on past levels and patterns of use.⁴⁴⁹

As discussed in Section 2, the VFPA's approach to the baseline summary content was intended to assist the Crown in understanding and taking into account existing limitations on the exercise of Aboriginal rights. The VFPA's approach to including Indigenous perspectives on cumulative effects and historical context was also intended to support a total cumulative effects assessment if the Current Use assessment had concluded the Project would likely contribute to these existing effects post-mitigation. Neither the Current Use nor the rights assessments reached that conclusion, and therefore a cumulative effects assessment, per the methodology adopted for the assessment of valued components for the EIS, was not conducted. Refer to Chapter VII, Section 3, of these Closing Remarks for further discussion of issues and concerns raised related to cumulative effects assessment methods.

The VFPA also respectfully submits it was supporting the CEA Agency's consultation efforts when it assessed intangible cultural heritage as part of the Current Use assessment. The VFPA is of the view that its approach is consistent with the requirements of the CEA Agency's *Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing that is of Historical, Archaeological, Paleontological or Architectural Significance under the Canadian Environmental Assessment Act, 2012*.⁴⁵⁰ The VFPA notes that all lands and resources within traditional territories (or otherwise defined areas of use) were broadly identified by Indigenous groups as heritage, valued as integral to their practices, traditions, and customs, their cultural continuity, and sense of place and identity. The group-specific descriptions of lands (locations) and resources identified as important by

⁴⁴⁹ CEAR Doc 934, VFPA response to IR10-26.

⁴⁵⁰ CEAR Doc 388, VFPA response to AIR #29. See also CEAR Doc 934, VFPA response to IR10-22.

Indigenous groups to the VFPA—provided in the baseline summaries for the Current Use and rights assessments—reflects this broad understanding of heritage, which is made up of tangible and intangible elements. Other assessments within the EIS considered the more tangible elements of heritage—specifically, visual resources and archaeological and heritage resources—and these assessments informed the consideration of heritage within the Current Use assessment.

The VFPA understands that the CEA Agency's consultation efforts with Indigenous groups regarding the Project continue. The VFPA will continue to support the CEA Agency in its efforts, as well as collaborate with the CEA Agency where the VFPA's collaboration is of interest to Indigenous groups.

5. The VFPA's Indigenous consultation efforts

As the proponent for the Project, the VFPA is in the best position to provide Indigenous groups with information related to the Project, and to collect information from Indigenous groups with respect to the Project's potential effects on Current Use, and potential impacts on rights. For this reason, and in accordance with the EIS Guidelines, the VFPA engaged as early as possible in the project planning process with Indigenous groups that may be affected by the Project or that have potential or established Aboriginal and treaty rights and related interests in the Project area.⁴⁵¹

The VFPA has ensured that Indigenous groups have had clear, accurate, and up to date information about the Project throughout the environmental assessment process, and has held regular meetings and workshops with Indigenous groups to discuss potential effects of the Project. The VFPA's engagement with Indigenous groups will not end at the close of the environmental assessment process. The VFPA remains committed to maintaining a positive relationship with Indigenous groups throughout the permitting, construction and into the operation of the Project, as evidenced in the Updated Project Commitments, submitted to the Review Panel on July 5, 2019.⁴⁵²

As the Crown Consultation Coordinator, the CEA Agency identified Indigenous groups who may be affected by the Project, and directed the VFPA to consult those Indigenous groups. Originally, the CEA Agency identified those Indigenous groups who would be affected by the Project only. When the Minister revised the EIS Guidelines and Terms of Reference, the CEA Agency directed the VFPA to also contact those Indigenous groups who could be affected by the marine shipping associated with the Project.⁴⁵³

The VFPA's consultation record with the respective Indigenous groups is robust. The VFPA actively engaged with all of the identified Indigenous groups through a wide variety of meetings, workshops, and forums with Indigenous groups to collect:

⁴⁵¹ CEAR Doc 1680, EIS Guidelines, at p. 1.

⁴⁵² CEAR Doc 2001, Updated Project Commitments.

⁴⁵³ CEAR Doc 177, EIS Guidelines, at s. 17.5.

- Indigenous traditional knowledge (or ITK);
- Information on the use of lands and resources by Indigenous groups for traditional purposes and exercise of rights;
- Views on the potential effects of the Project on Indigenous groups; and
- the means to avoid or mitigate those effects.

In the EIS, the VFPA presented a summary table identifying interests and issues raised by each Indigenous group and the VFPA's responses.⁴⁵⁴ The VFPA has submitted these tables to the Review Panel, and continues to update them throughout consultation and engagement.⁴⁵⁵

The VFPA's primary objective in consultation with Indigenous groups is to support positive, productive, and lasting relationships between the VFPA and Indigenous groups. To this end, the VFPA designed its consultation activities to meet the following objectives:

- Provide potentially affected Indigenous groups with timely access to relevant information that allows them to understand the proposed Project and comment on its impacts on their community, activities, and other interests;
- Consider the input of Indigenous groups with respect to methods of engagement and consultation;
- Facilitate Indigenous group participation in the environmental assessment process through provision of capacity funding and access to technical expertise as it relates to the Project;
- Seek Indigenous group input into the environmental assessment process and methods, such as the selection of valued components;
- Facilitate the identification and collection of ITK, including the consideration and incorporation of ITK into the EIS and MSA;
- Provide Indigenous groups with reasonable opportunities to present and communicate their interests and issues in relation to the Project to both the VFPA and relevant regulatory agencies through Project planning;
- Consider the feedback of Indigenous groups related to potential impacts on their asserted or established rights or interests during the development and implementation of the Project, and address concerns raised by avoiding, mitigating, or otherwise accommodating such issues; and
- Facilitate effective working relationships among the VFPA, regulatory agencies, and potentially affected Indigenous groups.⁴⁵⁶

The VFPA's consultation efforts have been meaningful and sincere. Where the VFPA has identified a Project component or activity that may adversely affect Aboriginal or treaty rights, the VFPA has taken steps to avoid or mitigate the potential impact, and remains committed to addressing these potential impacts with affected Indigenous groups.

⁴⁵⁴ CEAR Doc 181, EIS, Volume 1, at Appendix 7.2-B. See also CEAR Doc 316, MSA, at s. 5.1.5, Appendix 5-B.

⁴⁵⁵ CEAR Doc 934, VFPA response to IR10-01.

⁴⁵⁶ CEAR Doc 181, EIS, Volume 1, at s. 7.2.1.1.

The VFPA has provided funding, and developed participation and capacity agreements with Indigenous groups to support the consultation process. Through these agreements, the VFPA provided capacity funding to Indigenous groups to support gathering of information and traditional use studies. The VFPA has identified groups with whom it reached such agreements in Section 7.2.1.7 of the EIS, the group-specific subsections within MSA Section 9.5.4, AIMSAs Section 2.3, and AIEIS Section 2.2.1.1.⁴⁵⁷ Refer to Section 5.(a), below, for further discussion regarding traditional use studies.

The VFPA provided Indigenous groups with information about the Project through a number of different methods, including meetings, prepared summaries of information and responses to IRs, presentations, conference calls, information sheets, links and documents provided in hardcopy, in person, and electronically, and Project information disclosure on its website and the CEA Registry for the Project.⁴⁵⁸ The VFPA has also monitored Indigenous groups' comments on the Project through the CEA Registry, and has responded to Indigenous groups' comments both directly through follow-up meetings as well as through the registry and IRs.

The VFPA continues to consult with Indigenous groups in relation to the Project. Section 8 provides details on these ongoing efforts. Part of these efforts include, but are not limited to, negotiation of mutual benefit agreements. Refer to Section 6.(b) for further discussion of these agreements.

(a) Indigenous traditional knowledge and traditional use studies

The VFPA has incorporated ITK into its assessment wherever possible.⁴⁵⁹ The VFPA engaged in a number of activities to collect ITK, which it has incorporated into the EIS, the MSA, and its responses to IRs. The VFPA's methods for collecting ITK include literature reviews, meetings and workshops with Indigenous groups, questions and interviews with Indigenous Elders and community members, and funding of additional studies. In doing so, the VFPA has gone above and beyond the requirements of the CEA Agency's guidance, set out in *Considering Aboriginal traditional knowledge in environmental assessments conducted under the Canadian Environmental Assessment Act - Interim Guidance*.

Several Indigenous groups⁴⁶⁰ have argued that the Review Panel lacked sufficient information to proceed to a public hearing because those groups had not provided Project-specific traditional use studies. For instance, the T'Sou-ke First Nation indicated that "[w]ithout a Project-specific [marine traditional use study] from T'Sou-ke, the Board has insufficient information before it to proceed to a public hearing." [Emphasis in original]⁴⁶¹

⁴⁵⁷ See CEAR Doc 1531, VFPA response to Additional Information Request February 22, 2019 #2 Traditional Land Use Studies.

⁴⁵⁸ CEAR Doc 181, EIS, Volume 1, at s. 7.2.1.5; see also CEAR Doc 316, MSA, at s. 5.1.4.

⁴⁵⁹ CEAR Doc 934, VFPA response to IR10-02.

⁴⁶⁰ CEAR Doc 1629, Esquimalt Nation written submissions, at pp. 5-6; CEAR Doc 1654, Scia'new (Beecher Bay) First Nation written submissions, at pp. 5-6; CEAR Doc 1619, T'Sou-ke First Nation written submissions.

⁴⁶¹ CEAR Doc 1550, From Gowling WLG on behalf of T'Sou-ke First Nation to the Review Panel re: Proposed inclusion of Project-related Marine Shipping, at p. 2.

T'Sou-ke further claimed the VFPA had used its traditional knowledge without T'Sou-ke consent.

With respect, there is no support for this proposition at law. The Supreme Court of Canada was clear when it expressed the reciprocal obligations on First Nations participating in a consultation process:

...it will frequently be possible to reach an idea of the asserted rights and of their strength sufficient to trigger an obligation to consult and accommodate, short of final judicial determination or settlement. To facilitate this determination, claimants should outline their claims with clarity, focussing on the scope and nature of the Aboriginal rights they assert and on the alleged infringements.⁴⁶²

It has been open to Indigenous groups throughout the environmental assessment of the Project and marine shipping associated with the Project to submit any information with respect to its marine traditional use that it wanted the Review Panel to consider. The VFPA provided all Indigenous groups consulted on the Project and marine shipping associated with the Project an opportunity to provide and review information about their traditional use prior to submission of the applicable filing. In the case of the MSA, the VFPA was specifically directed by the EIS Guidelines to use existing information to the extent possible,⁴⁶³ which is the approach the VFPA undertook with T'Sou-ke First Nation, using the evidence T'Sou-ke had submitted on the record in the Trans Mountain proceeding before the National Energy Board.

Despite taking this approach of using existing, publicly available information, the VFPA nonetheless pursued Indigenous groups, including T'Sou-ke, to confirm that any existing information that had been used to summarize traditional use in draft subsections of MSA Section 9.5.4 was accurate and appropriate. Twenty Indigenous groups provided consent to the VFPA to use publicly available information related to the Trans Mountain project, or did not raise concerns. The VFPA requested approval from T'Sou-ke First Nation to use content from its submission for the Trans Mountain proceeding, as documented in a letter in January of 2019.⁴⁶⁴ Draft content was provided to T'Sou-ke for review, and, despite multiple attempts by the VFPA to contact T'Sou-ke, no comments were received.

The VFPA acknowledges that Project-specific traditional use studies can provide additional relevant information to further inform an assessment of the seriousness of potential impacts, which will impact the level of consultation required. This is evidenced by the VFPA's offers of funding to support Indigenous groups to conduct such studies. However, the VFPA submits that there is no support at law for the proposition that such studies must be funded or undertaken for every single project with every single Indigenous group, even though the

⁴⁶² *Haida, supra*, at para. 36.

⁴⁶⁴ Letter from Vancouver Fraser Port Authority to T'Sou-ke First Nation, January 14, 2019

⁴⁶⁴ Letter from Vancouver Fraser Port Authority to T'Sou-ke First Nation, January 14, 2019

VFPA was willing to do so, and completed prior to beginning the assessment to formulate any "idea of the asserted rights and of their strength."⁴⁶⁵ The public hearing process itself also provides a forum for Indigenous groups to provide information to the Review Panel with respect to the seriousness of potential impacts. We note that T'Sou-ke did participate in the public hearing and provided evidence of this nature.⁴⁶⁶

Further, a traditional use study led directly by the Indigenous group is also not a required element of a satisfactory consultation process. This issue has been settled and confirmed by a number of superior courts and various administrative decision bodies.⁴⁶⁷

The Review Panel has acknowledged it is appropriate to rely on publicly available information with respect to traditional use, including traditional use studies prepared for other projects. As the Review Panel stated in a letter to T'Sou-ke, it is open to the Indigenous groups to provide any updated information on traditional use that was not included in previous traditional use studies.⁴⁶⁸

The VFPA respectfully submits that its approach to gathering ITK and funding traditional use studies was adequate to fulfill its responsibilities in the context of this environmental assessment. Indeed, as discussed throughout this submission, numerous Indigenous groups provided ITK that enabled a better assessment to be undertaken.

The VFPA is grateful to Indigenous groups for providing ITK that supported a better assessment. The VFPA collected ITK through literature reviews, meetings and workshops with Indigenous Elders and community members, and funding of additional traditional use studies. The VFPA will continue to support the ongoing integration of ITK and traditional use information during project planning, and if approved, as the Project proceeds.

6. Current Use and rights assessments

(a) Overview

The VFPA conducted a thorough and robust assessment of Current Use and impacts on rights, in accordance with the EIS Guidelines and subsection (51) (c) of *CEAA 2012*. The assessment was primarily based on information provided directly to the VFPA by Indigenous groups in traditional use studies, and through consultation inputs. A full list of information sources for the Current Use assessment are described in Section 32.2.3 of the EIS.⁴⁶⁹

Based on available information, the VFPA predicted the following potential effects on Current Use as a result of the Project:

⁴⁶⁵ *Haida, supra* at para. 36.

⁴⁶⁶ CEAR Doc 1915, Transcript, Volume 19, June 13, 2019, at pp. 4534-4599.

⁴⁶⁷ *Ka'a'Gee Tu First Nation v Canada (Attorney General)*, 2007 FC 763 at paras. 129-130; British Columbia Utilities Commission, *Reconsideration of the Interior to Lower Mainland Transmission Project*, February 3, 2011 at page 85; *Dene Tha' First Nation v Alberta (Energy and Utilities Board)*, 2005 ABCA 68 at para. 18; *West Moberly First Nations v British Columbia (Energy and Mines)*, 2014 BCSC 924 at paras. 111-119.

⁴⁶⁸ CEAR Doc 1560, Letter from Panel Manager to T'Sou-ke Nation, April 8, 2019.

⁴⁶⁹ CEAR Doc 181, EIS, Volume 5, at s. 32.2.3.

- A potential measurable change in access to preferred Current Use locations for TFN and Musqueam First Nation and an associated (indirect) potential measurable change in quality of experience (cultural practices/heritage);
- No measurable change in access for other Indigenous groups as a result of Project-related displacement effects and no associated (indirect) measurable change in quality of experience; and
- No measurable change (over existing conditions) in availability and quality of resources for Current Use (after consideration of mitigation measures for linked valued components), or in quality of experience for Current Use purposes for all Indigenous groups other than for TFN and Musqueam (based on the potential access effect noted above).

Mitigation measures to address potential effects of the Project, described in Section 6.(b), are considered by the VFPA to be applicable to all Indigenous groups, regardless of the predicted level of potential effect (i.e., not measurable or measurable) before the application of mitigation. The VFPA has included a Follow-up Program element that includes ongoing consultation to continue integration of Indigenous knowledge and help verify predictions and mitigation effectiveness for the Project.

Taking into account measures to avoid, reduce, and otherwise manage or mitigate potential adverse effects, including ongoing consultation, the Project is not expected to result in residual adverse effects on Current Use.

While existing cumulative effects on Current Use as a result of prior developments may be significant, a significance determination and cumulative effects assessment were not undertaken given that residual adverse effects as a result of the Project or marine shipping associated with the Project are not anticipated.

The VFPA also provided information to support the Crown's assessment of the potential impacts of the Project and marine shipping associated with the Project on the exercise of asserted or established Aboriginal and treaty rights. The VFPA understands that while rights, such as the right to fish, hunt, or gather, do not overlap precisely in time and space with Current Use activities, including fishing, hunting, and gathering, there is a close linkage between rights and the Current Use activities assessed in the EIS, MSA, AIEIS, and AIMS.A.⁴⁷⁰ Mitigation measures identified to address or reduce potential adverse effects of the Project on Current Use are considered effective at also addressing or reducing potential impacts on the exercise of asserted or established Aboriginal and treaty rights.⁴⁷¹

(b) Mitigation

Several questions were raised by the Review Panel and Indigenous groups regarding the validity or effectiveness of mitigation measures for potential effects on Current Use and potential impacts on the exercise of rights, and particularly the view that consultation

⁴⁷⁰ CEAR Doc 181, EIS, Volume 5, at s. 32.3.2

⁴⁷¹ CEAR Doc 181, EIS, Volume 5, at s. 32.2.7

processes or 'private' agreements between the VFPA and Indigenous groups were being relied upon for the conclusion of no residual effects.

The measures for Current Use and rights were presented in different sections of the EIS, MSA, AIEIS, and AIMSAs.⁴⁷² The suite of proposed measures, as described in the Updated Project Commitments, continue to be developed and evolve as consultation continues.⁴⁷³ They are a mix of elimination, reduction, and control measures,⁴⁷⁴ including but not limited to consultation mechanisms and agreement commitments, and were intended to be considered in the aggregate across all four Current Use indicators (i.e., access, availability and quality of resources, quality of experience/cultural heritage). The VFPA notes that the indicators for Current Use—which pertain to access, resources, and experience—are the same indicators proposed by the Crown for its rights-based methodology.⁴⁷⁵

The measures proposed in EIS Section 32.2.7 for Current Use and Section 32.3.3 for rights are inclusive of the measures proposed for intermediate and valued components that are linked to Current Use and rights (e.g., marine fish, marine invertebrates), but are not limited to those measures.

Appendix A to the Updated Project Commitments,⁴⁷⁶ which contains a compilation of proposed mitigation measures and commitments for the Project, indicates that virtually all of the 81 mitigation measures and commitments proposed by the VFPA relate to mitigation of potential effects on Current Use and the exercise of rights.

The compiled list includes existing and proposed mutual benefit agreements with Indigenous groups; however, the VFPA is not relying on these agreements for the conclusion of no residual effects on Current Use or the exercise of rights. Refer to Section 6.(b)(iv) below for discussion of mutual benefit agreements generally and in relation to the Project.

As per the Updated Project Commitments, examples of elimination (or avoidance), reduction, and control measures that inform the finding of no residual effects of the Project on Current Use and the exercise of rights include, but are by no means limited to, the following:

- As part of the Dredging and Sediment Discharge Plan, the VFPA will develop eulachon-specific mitigation that will be used during dredging activities that have the potential to disturb returning eulachon. The VFPA will undertake a hydroacoustic pre-construction test/study in the Project area to aid in reconnaissance, testing, and effectiveness of deploying hydroacoustic technologies (e.g., split-beam echosounder)

⁴⁷² CEAR Doc 181, EIS, Volume 5, at s. 32.2.7 for Current Use, and s. 32.3.3 for rights; CEAR Doc 316, MSA, at s. 9.5.6 for Current Use, and s. 9.5.11.3 for rights; CEAR Doc 930, AIEIS, s. 7.2.7 for Current Use, and s. 7.8.3 for rights; CEAR Doc 572, AIMSAs, at s. 7.4 for Current Use, and s. 7.8.3 for rights.

⁴⁷³ CEAR Doc 2001, Updated Project Commitments.

⁴⁷⁴ CEAA 2012 defines 'mitigation' as, "in respect of a project, the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means."

⁴⁷⁵ See Section 4 of this Chapter, above.

⁴⁷⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A.

to detect eulachon. During the month of April, and prior to and during dredging in the dredge basin, the VFPA will deploy hydroacoustic technologies (e.g., split-beam echosounder) to detect in real time and guide dredging activities away from schools of migrating eulachon;⁴⁷⁷

- Throughout construction, the VFPA will ensure that in water works below -5 m CD are scheduled outside of the fisheries-sensitive windows for Dungeness crabs (October 15 to March 31) unless agreed to by DFO and mitigation is developed and implemented to the satisfaction of a qualified professional(s);⁴⁷⁸
- During construction, the VFPA is committed to minimizing handling of crab, and to working with Indigenous groups, in implementation of crab salvage mitigation, as part of the Marine Species Management Plan;⁴⁷⁹
- Throughout construction, the VFPA will ensure that in water works above -5 m CD will be scheduled outside of the fisheries-sensitive windows for juvenile salmon (March 1 to August 15), unless agreed to by DFO and mitigation is developed and implemented to the satisfaction of a qualified professional(s);⁴⁸⁰
- The VFPA will ensure the cranes' colour is optimized to reduce contrast and enhance blending with the landscape, which may involve recommendations by a qualified professional(s);⁴⁸¹
- Prior to the start of construction, the VFPA will ensure a test trench, or series of trenches, is excavated across the eastern end of the causeway expansion area within the area of moderate archaeological potential (Figure 8 of EIS Appendix 28-A). The excavation will be completed under the direction of a professional archaeologist, with assistance of Indigenous monitors. If fish trap stakes are encountered during the test excavations, the excavation will be expanded along the orientation of the feature toward the existing causeway. If fish trap stakes are encountered, the location of stakes will be mapped and samples will be taken as they become visible, including measures to conserve organic materials to preserve the stake samples. The samples will be sent to a lab for radiocarbon dating to determine the relative age of the artifacts;⁴⁸²
- For a period of four years after completion of the terminal containment dykes, a professional archaeologist will annually monitor (visually inspect) for possible tidal erosion of the area of moderate archaeological potential (Figure 8 of EIS Appendix 28-A) and the potential exposure of buried fish trap stakes. The work will be undertaken with the assistance of Indigenous monitors. If fish trap stakes are encountered, the chance find procedure will be implemented, the location of stakes will be mapped and samples will be taken as they become visible, including measures to conserve organic materials to preserve the stake samples. The samples

⁴⁷⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #45.

⁴⁷⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #49.

⁴⁷⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #51.

⁴⁸⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #53.

⁴⁸¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #64.

⁴⁸² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #68.

will be sent to a lab for radiocarbon dating to determine the relative age of the artifacts;⁴⁸³

- The VFPA will continue to support access for Indigenous crabbing for domestic or food, social, and ceremonial (**FSC**) purposes within the area closed to commercial and recreational crabbing;⁴⁸⁴
- The VFPA will implement an Indigenous Monitors Plan, to be developed in consultation with Indigenous groups prior to construction. The plan will provide an overview of the approach to effectively incorporate Indigenous monitors into the construction monitoring framework for biophysical components;⁴⁸⁵ and
- The VFPA will develop an Indigenous Training, Employment, and Procurement Plan for construction and operation. As part of the plan, the VFPA will develop a monitoring process, including a requirement that the contractor annually report on Indigenous employment and training.⁴⁸⁶

In addition to the above measures, the Updated Project Commitments document the VFPA's commitment to including Indigenous groups in the development of the Construction and Operations Environmental Management Plans and 32 sub-plans.⁴⁸⁷

The Updated Project Commitments also document new measures that were not included in the EIS or have been clarified or augmented since the EIS based on input from Indigenous groups, and that serve to address potential effects on Current Use and/or potential impacts on the exercise of rights. For example:

- The VFPA will ensure that monitoring is conducted for the potential presence of spawning herring during construction activities outside the juvenile salmon timing window, in mid- to late February, in areas that spatially overlap with herring spawning habitats (e.g., native eelgrass);⁴⁸⁸
- The VFPA will commit to funding programs or studies, up to \$500,000, that build on recent and ongoing work related to eulachon and sturgeon in the lower Fraser River, following Project approval. Such programs or studies will be conducted in partnership with TFN and Musqueam First Nation;⁴⁸⁹
- For the purposes of addressing perception of shellfish contamination, the VFPA will participate in discussions with interested health authorities (Health Canada, DFO, First Nation health authorities, Indigenous groups) on a collaborative approach to improving the understanding of shellfish quality at Roberts Bank;⁴⁹⁰

⁴⁸³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #69.

⁴⁸⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #74.

⁴⁸⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #31.

⁴⁸⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #42.

⁴⁸⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #14, 16, 18-39.

⁴⁸⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #50.

⁴⁸⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #52.

⁴⁹⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #67.

- In addition to consultation with domestic and FSC crab harvesters on the timing of implementation and spatial area (including configuration) of the proposed navigational closure area expansion, the VFPA commits to specific consultation with TFN, Musqueam, other Indigenous groups (as appropriate), and DFO on the terms of licensing to use the navigational closure areas for domestic or FSC crab harvesting purposes;⁴⁹¹ and
- In the early stages of construction, the VFPA will engage with the Indigenous Advisory Committee and individual Indigenous groups, where requested, to identify opportunities for the development of an Indigenous cultural landscape feature, such as public artwork, Indigenous place name signage, or an architectural element, to acknowledge and support cultural values and practices in the Roberts Bank area.⁴⁹²

In Table B1 of Appendix B of the Updated Project Commitments, the VFPA clarified its role in the suggested measures related to marine shipping associated with the Project that had been presented in the MSA, and the relationship of those suggested measures with regional federal government initiatives and programs with the potential to reduce adverse effects of marine shipping in general, as listed in Table B2 of Appendix B. These regional initiatives and programs include, for example, the OPP, which includes a range of components to improve marine communications, marine safety, emergency and spill response, as well as initiatives and programs specifically targeting SRKW.

The VFPA has committed to participate as a key stakeholder in these and other regional initiatives and programs, and, as appropriate, to coordinate the VFPA's own consultation with Indigenous groups on Project-associated marine shipping in alignment with those initiatives.

(i) The Role of "private" mutual benefit agreements – generally

During the public hearing, the Review Panel raised questions regarding whether a 'private arrangement' with an Indigenous group could be considered by a Panel in terms of a mitigation measure.⁴⁹³ The Panel stated the following:

"The Proponent has not convinced the Panel that 'discussions' regarding the Tsawwassen First Nation in the Consultation Summary are relevant to its assessment since it is a private agreement between a proponent and a First Nation in relation to information on possible commercial arrangements."⁴⁹⁴

The approach of proponents negotiating mutual benefit agreements with Indigenous communities that may be potentially impacted by a proposed development is certainly not new or in any way unusual.

⁴⁹¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #75.

⁴⁹² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #78.

⁴⁹³ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1438, lines 17-22.

⁴⁹⁴ CEAR Doc 1979, Decision on VFPA Request for Confidentiality, June 25, 2019, at p. 3.

Madame Chief Justice Beverley McLachlin on behalf of a unanimous the Supreme Court of Canada stated the following:

"Governments and individuals proposing to use or exploit land, whether before or after a declaration of Aboriginal title, can avoid a charge of infringement or failure to adequately consult by obtaining the consent of the interested Aboriginal group."⁴⁹⁵

One way in which industry has sought to obtain the consent of Indigenous groups is to negotiate mutually acceptable agreements. With rare exceptions, these arrangements are and remain 'private agreements' between the industry proponent and the Indigenous group. But this is not to say that all provisions are purely commercial in nature and not relevant to regulatory decision-making.

To be clear, it is not the specific *content* of the agreement that the Review Panel is to consider or has a mandate to assess. It is not the role of the Review Panel to assess the adequacy of the contents of a private agreement. However, it certainly does not preclude the Review Panel from considering the *existence* of such agreements (or negotiations), and relying on the *expressed views* of the relevant Indigenous group (a) in relation to the Project generally—when expressing 'consent and/or 'support' for the Project—and (b) in relation to the adequacy of proposed mitigation measures.

(ii) 2004 Memorandum of Agreement with Tsawwassen First Nation

The 2004 MOA between TFN and the VFPA,⁴⁹⁶ while still a 'private' agreement, is a publicly available document.

The 2004 MOA provides significant financial and other benefits to TFN. The 2004 MOA at Chapter 1, clause 1, specifies that:

"1. The purpose of this Agreement is to set out the basis for TFN to benefit from the Roberts Bank Port Facility and from the Roberts Bank Port Facility Expansion on Roberts Bank within the Tsawwassen Territory and adjacent to the TFN Reserve and to provide a basis for a mutually beneficial relationship between the Parties."

Chapter 2 of the 2004 MOA specifies that the consultations made and the accommodation proposed herein are accepted as adequate for the potential infringement of the TFN's Aboriginal Interests on Roberts Bank that result from the Roberts Bank Port Facility and the "Roberts Bank Port Facility Expansion."

⁴⁹⁵ *Tsilhqot'in Nation v British Columbia*, 2014 SCC 44 at para. 97.

⁴⁹⁶ CEAR 1995, 2004 MOA.

The 2004 MOA defines the “Roberts Bank Port Facility Expansion” as follows:

“Roberts Bank Port Facility Expansion” means the proposed expansion of the existing Roberts Bank Port Facility container handling facilities by:

- i) the expansion of the existing container handling facility known as 'Deltaport' to add a third berth to that facility...and
- ii) the creation of a new three-berth container terminal called 'Terminal 2'..."⁴⁹⁷

Based on the above definition, the VFPA respectfully submits that the Roberts Bank Port Facility Expansion clearly included *both* the expansion of the Deltaport Container Facility to add a third berth, known as the DP3 Project, and the Terminal 2 Project for the creation of a new three-berth container terminal on the northwest side of the Roberts Bank Facility, now referred to as RBT2.

In the 2004 MOA, the Roberts Bank Port Facility Expansion is ‘conceptually’ shown on Schedule ‘A’.⁴⁹⁸ The VFPA is aware that TFN has expressed the view that “it does not regard the MOA as discharging the federal and provincial Crowns’ duties to consult given that the Project as now proposed is significantly different from the works described in the MOA.”⁴⁹⁹

The VFPA acknowledges that RBT2 Project design has evolved since the 2004 ‘conceptual’ design shown in Schedule A. The 2004 conceptual design had the terminal adjacent to the existing Deltaport facility in shallower, intertidal areas, and included a large ship channel and turning basin that would have required extensive dredging. The currently proposed RBT2 terminal is placed further offshore, with both the terminal and ship channel located in deeper water, significantly reducing both construction and dredging impacts in the sensitive intertidal areas.

The 2004 MOA includes provisions for compensation (chapter 3), establishment of a development fund (chapter 5), business development opportunities (chapter 6), employment provisions (chapter 7), environmental assessment matters (chapter 8), and provisions relating to additional land and water lot matters (chapter 9).

Further, the VFPA gave evidence that it is in ‘active negotiation’ with TFN regarding an ‘addendum’ to the 2004 MOA. On behalf of the VFPA, Mr. Cliff Stewart stated the following:

“The Port Authority is involved in active negotiation with TFN with regard to an addendum to the Memorandum of Agreement

⁴⁹⁷ CEAR 1995, 2004 MOA, at s. 1(u), p. 4 of MOA.

⁴⁹⁸ CEAR 1995, 2004 MOA, at s. 1(u), p. 5 of MOA and Schedule A of MOA.

⁴⁹⁹ CEAR 1639, TFN written submission, at p. 5; see also the earlier submissions from TFN dated October 27, 2016 (CEAR Doc 651) and February 8, 2019 (CEAR Doc 1461), p. 3.

originally signed in 2004. As that negotiation is ongoing, we are not able to get into details of the information included in the memorandum."⁵⁰⁰

Further, in the Updated Project Commitments, the VFPA committed to "continue to abide by the Memorandum of Agreement in place with Tsawwassen First Nation to accommodate for effects of the Project."⁵⁰¹

It is not within the Review Panel's mandate to resolve issues or disputes regarding the applicability or the implementation of the 2004 MOA.⁵⁰² The Review Panel can regard the mitigation measures contained in the 2004 MOA with consideration of the VFPA commitment to continue to abide by the 2004 MOA.

The VFPA remains optimistic that it will be able to conclude a mutually-acceptable arrangement, or addendum, with TFN.

- (iii) The VFPA's commitment to a mutual benefit agreement with Musqueam First Nation

The VFPA and Musqueam have had discussions regarding Project benefits at several points in time since 2013. Mutual benefit agreement-specific discussions commenced in November 2014. In September 2018, the VFPA and Musqueam entered into a RBT2 Negotiation Protocol Agreement whereby the VFPA and Musqueam agreed to work together to negotiate in good faith a mutual benefits agreement for the Project, and since then, negotiations have been taking place in accordance with the protocol.⁵⁰³

During the community session on June 24, 2019, Musqueam First Nation raised the observation that a proposed accommodation agreement was included in the list of mitigation for potential Project effects on Current Use.⁵⁰⁴ These concerns were also raised previously in Musqueam's submissions to the Review Panel.⁵⁰⁵ Musqueam expressed concern that the EIS concluded there would be no residual effect on Musqueam's Current Use based on this proposed mutual benefit agreement, and that such an agreement, in any event, is not a valid form of mitigation. In Musqueam's view, as such an agreement is not considered a valid form of mitigation, the potential effects of the Project have not been mitigated and a residual effect remains. As a result, it is Musqueam's view that a cumulative effects assessment on Musqueam's Current Use should have been conducted.

The VFPA responded to the concerns raised by Musqueam during the June 24, 2019 session, and previously in the responses to IRs.⁵⁰⁶ The VFPA acknowledged that, while there are

⁵⁰⁰ CEAR Doc 1860, Transcript, Volume 16, June 1, 2019, at p. 3926, lines 6-11.

⁵⁰¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #70.

⁵⁰² The 2004 MOA itself contains dispute resolution procedures.

⁵⁰³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #71.

⁵⁰⁴ CEAR Doc 1975, Transcript, Volume 24, June 24, 2019, pp. 4935-4936.

⁵⁰⁵ CEAR Doc 1458, Musqueam First Nation comments on the sufficiency of information; CEAR Doc 1678, Musqueam First Nation written submission.

⁵⁰⁶ CEAR Doc 934, VFPA response to IR10-03 and IR10-06.

existing, significant adverse effects on Current Use, the VFPA's conclusion is that the potential effects of the Project on Current Use are mitigable without relying on the proposed agreement, such that there would be no residual effects of the Project that could combine cumulatively with the effects of other projects that have been or will be carried out.⁵⁰⁷

As noted in Section 6.(b), the Updated Project Commitments,⁵⁰⁸ virtually all of the 81 mitigation measures and commitments proposed by the VFPA to date relate to supporting mitigation of potential effects on Current Use and the exercise of rights. Section 6(b) also provides several examples of measures that have been proposed across a number of assessed components that inform the finding of no residual effects of the Project on Current Use and the exercise of rights (i.e., access, availability and quality of resources, quality of experience/intangible cultural heritage).

CEAA 2012 defines 'mitigation' as, "in respect of a project, the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means." However, the proposed agreement was listed in Section 32.2.7 of the EIS Current Use assessment⁵⁰⁹ not as a mitigation measure *per se* (as the VFPA is of the view the effects are mitigated notwithstanding the proposed agreement), but to underscore the VFPA's commitment to address Project-related concerns in a manner that Musqueam finds acceptable. The VFPA has met with Musqueam since the June 24, 2019 community session to discuss these points, and the parties are continuing to pursue a mutual benefit agreement that is specific to the Project.

(iv) Mutual benefit agreements

The VFPA is very pleased to have concluded mutual benefit agreements with a number of Indigenous groups. These agreements provide meaningful and tangible benefits to signatory communities based on the priorities as identified by the community, which may include support for environmental and sustainability initiatives, health and wellness, education and training, employment, and contracting opportunities.

A number of Indigenous groups have filed letters with the Review Panel indicating their support and/or consent for the Project including:

- Chief Tanya Jimmy of **Tseycum First Nation** advised the Review Panel that Tseycum "supports and consents" to the Project. Tseycum further "acknowledges and agrees that it is satisfied with the mitigation measures provided by Vancouver Fraser Port Authority in respect of the environmental effects of the [RBT2] Project and associated marine shipping...";⁵¹⁰

⁵⁰⁷ CEAR Doc 1975, Transcript, Volume 24, June 24, 2019, pp. 4933-4935.

⁵⁰⁸ CEAR Doc 2001, Updated Project Commitments.

⁵⁰⁹ CEAR Doc 181, EIS, Volume 5, at s. 32.2.

⁵¹⁰ CEAR Doc 1111, Tseycum First Nation submission.

- Chief Georgina Livingstone of **Lake Cowichan First Nation** advised the Review Panel that it “provides consent to the Project.” Lake Cowichan goes on to note that “we are satisfied with the mitigation measures provided by Vancouver Fraser Port Authority in respect of the environmental and socio-economic effects and/or other impacts of the Project and associated marine shipping”;⁵¹¹
- Karen Harry on behalf of the Chief and Council of **Tsartlip First Nation** advised the Review Panel that Tsartlip “supports and consents” to the Project. Tsartlip further “acknowledges and agrees that it is satisfied with the mitigation measures provided by Vancouver Fraser Port Authority in respect of the environmental effects of the [RBT2] Project and associated marine shipping...”;⁵¹²
- Hereditary Chief Pahalicktun, Richard Thomas, of **Lyackson First Nation** advised the Review Panel that Lyackson “supports the Roberts Bank Terminal 2 Project... [and] consents to the... proposed Project.” Lyackson further “acknowledges and agrees that we are satisfied with the mitigation measures proposed by Vancouver Fraser Port Authority in addressing the environmental, socio-economic and other potential effects and impacts effects of the [RBT2] Project and associated marine shipping...”;⁵¹³
- Clara Morin Dal Col, President of the Métis Provincial Council of British Columbia advised the Review Panel that **Métis Nation BC (MNBC)** “supports and consents” to the Project. MNBC further “acknowledges and agrees that it is satisfied with the mitigation measures provided by Vancouver Fraser Port Authority in respect of the environmental and socio-economic effects and/or other impacts of the [RBT2] Project and associated marine shipping...”;⁵¹⁴
- Chief William Seymour of the **Cowichan Tribes** wrote to the Review Panel and stated that Cowichan Tribes “consent to the Vancouver Fraser Port Authority’s Roberts Bank Terminal 2 Project...”;⁵¹⁵
- Chief John Elliott of the **Stz’uminus First Nation** wrote to the Review Panel and stated that Stz’uminus First Nation “consent to the Vancouver Fraser Port Authority’s Roberts Bank Terminal 2 Project...”;⁵¹⁶
- Chief Thomas James of the **Halalt First Nation** wrote to the Review Panel and stated that Halat First Nation “consent to the Vancouver Fraser Port Authority’s Roberts Bank Terminal 2 Project...”;⁵¹⁷ and
- Chief George Harry Jr. of the **Malahat Nation** advised the Review Panel that the Malahat Nation “supports the Roberts Bank Terminal 2 Project...” and “consents to

⁵¹¹ CEAR Doc 1371, Lake Cowichan First Nation comments.

⁵¹² CEAR Doc 1993, Tsartlip First Nation letter of support.

⁵¹³ CEAR Doc 1992, Lyackson First Nation letter of support.

⁵¹⁴ CEAR Doc 1722, Métis Nation BC letter of support.

⁵¹⁵ Letter of consent submitted to the Review Panel August 26, 2019.

⁵¹⁶ Letter of consent submitted to the Review Panel August 26, 2019.

⁵¹⁷ Letter of consent submitted to the Review Panel August 26, 2019.

the proposed Project...” Malahat further “acknowledges and agrees that [it is] satisfied with the mitigation measures proposed by Vancouver Fraser Port Authority in addressing the environmental, socio-economic and other potential effects and impacts of the Roberts Bank Terminal 2 Project and associated marine shipping.”⁵¹⁸

In some cases, these same Indigenous groups had—at an earlier date—made submissions to the Review Panel expressing concerns about the Project and associated vessel traffic having the potential to effect their use of lands and resources for traditional purposes and impact the ability of their community to exercise its Aboriginal and/or treaty rights.⁵¹⁹

Through continued consultation efforts, the VFPA has been able to find satisfactory ways to address and accommodate the expressed concerns of these Indigenous groups. The VFPA is especially pleased that these measures have enabled these groups to grant consent to the Project and endorse the adequacy of the proposed mitigation measures and other Project commitments.

- (v) Ongoing mutual benefit agreements and Project benefit discussions with Indigenous groups

The VFPA continues to pursue mutual benefit agreements with other Indigenous groups that are potentially impacted by the Project or marine shipping associated with the Project. Agreements are in place to support negotiation of mutual benefit agreements with all Indigenous groups that have not yet signed a mutual benefit agreement, with the exception of T’Sou-ke First Nation with whom efforts towards these discussions are ongoing. The VFPA is in active negotiations with these Indigenous groups, and intensely with TFN and Musqueam First Nation.

The VFPA has committed to establishing a shared Legacy Benefits Fund to support local Indigenous groups’ programs and initiatives. The development of terms of reference and planning for the administration of the fund will be determined through the consultative process that is currently underway with Indigenous groups.

7. Participation of Indigenous groups in community, general, and topic-specific sessions

As part of the public hearing process, the Review Panel determined early on to hold community sessions that were designed to “facilitate participation by Indigenous peoples by holding hearing sessions in potentially-affected Indigenous communities.”⁵²⁰

The purpose of the Community Sessions included the following:

⁵¹⁸ Letter of support submitted to the Review Panel August 26, 2019.

⁵¹⁹ See for example CEAR Doc 1623, Tsartlip First Nation written submissions, and CEAR Doc 1991 Lyackson First Nation response to Undertaking #64.

⁵²⁰ CEAR Doc 1529, Public Hearing Procedures, Questions and Answers, at question 5, p. 3.

“to allow... Indigenous peoples, and their experts, to share with the Panel their views and concerns related to the Project, including on the potential environmental effects of the Project and on the location, extent and exercise of Aboriginal or Treaty rights that may be affected by the Project...”⁵²¹

In addition to the content filed on the record, in EIS and other environmental assessment documents, the VFPA also heard directly in-person from representatives of Indigenous groups regarding interests and concerns regarding the Project and marine shipping associated with the Project. Ultimately, the Review Panel held eight days of community sessions between June 1 and June 24, 2019. At these sessions, the Review Panel heard from representatives of 19 Indigenous groups, including the following:

- TFN (June 1);
- Tsleil-Waututh Nation (June 11);
- Esquimalt Nation (June 13);
- Scia’new First Nation (June 13);
- T’Sou-ke First Nation (June 13);
- The First Nations of Maa-nulth Treaty Society⁵²² (June 14);
- Halalt First Nation, Stz’uminus First Nation, and Cowichan Tribes (June 14);
- Lyackson First Nation (June 14);
- Penelakut Tribe (June 14);
- Pacheedaht First Nation (June 17);
- Ditidaht First Nation (June 18);
- Pauquachin First Nation (June 20)⁵²³; and
- Musqueam First Nation (June 24).

In addition, Indigenous group leadership, representatives, and members participated in a number of the general sessions, including the following:

- Chief Harley Chappell – Semiahmoo First Nation (May 16);
- Chief Jim Hornbrook – Hwlitsum First Nation (May 16);
- Lummi Nation and Suquamish Tribe (May 25); and
- Swinomish Indian Tribal Community and Tulalip Tribes (May 25).

Further, Indigenous group leadership, representatives, and members participated in a number of the topic-specific sessions, including Councillor Morgan Guerin of Musqueam First Nation who participated in the session on fish and fish habitat on May 22, and the

⁵²¹ CEAR Doc 1476, Public Hearing Procedures, at Attachment B, s. 2.4.

⁵²² The Maa-nulth Treaty Society presented on behalf of the Huu-ay-aht First Nations, Ka:’yu:’k’t’h’/Che:k’tles7et’h’ First Nations, Toquaht Nation, Uchucklesaht Tribe, and Yuulu?il?at:l:t First Nation.

⁵²³ Initially, the Review Panel was scheduled to hear from two additional Indigenous communities: Tseycum and Tsartlip First Nation. However, these two communities subsequently notified the Review Panel that they would not be appearing before the Review Panel at the session scheduled for June 20, 2019. (See CEAR Doc 1952, Tsartlip First Nation letter, and CEAR Doc 1951, Tseycum First Nation letter). Both Tseycum and Tsartlip filed letters of support (CEAR Doc 1993, Tsartlip First Nation letter of support, and CEAR Doc 1111, Tseycum First Nation submission).

representatives on behalf of TFN who participated in the sessions on fish and fish habitat, marine invertebrates, and marine commercial use on May 22.

The VFPA would like to express its sincere thanks to all of the Elders, leadership, technical representatives, community members, and administration that took the time to participate in the community sessions, general sessions, and/or topic-specific sessions. Further, the VFPA would like to acknowledge and give special thanks for the opening prayers, ceremonies, dances, and meals that were shared to welcome the Review Panel and hearing participants.

(a) The Role of the hearing sessions in advancing the consultation process

The Review Panel's process is, itself, one of the means by which the consultation process is advanced. The Federal Court commented on this issue in the context of a National Energy Board proceeding:

"In determining whether and to what extent the Crown has a duty to consult with Aboriginal peoples about projects or transactions that may affect their interests, the Crown may fairly consider the opportunities for Aboriginal consultation that are available within the existing processes for regulatory or environmental review... Those review processes may be sufficient to address Aboriginal concerns, subject always to the Crown's overriding duty to consider their adequacy in any particular situation. This is not a delegation of the Crown's duty to consult but only one means by which the Crown may be satisfied that Aboriginal concerns have been heard and, where appropriate, accommodated..."⁵²⁴

The extensive participation by Indigenous groups—whether at a community, general, or topic-specific sessions—resulted in numerous opportunities for these groups to bring forward outstanding questions, concerns, and issues, and provided a further opportunity for the VFPA, and an in-person opportunity for the Review Panel, to give those concerns full, fair, and serious consideration.

(b) The VFPA's approach to addressing issues raised by groups during the community sessions

During the community sessions, the VFPA heard specific issues brought forward by each Indigenous group. Some key issues consisted of themes raised by several groups, whereas some topics were unique to specific groups. Other issues related to historical effects of other development, or to existing regional issues beyond the care and control of the VFPA. In

⁵²⁴ *Brokenhead Ojibway First Nation v Canada (Attorney General)*, 2009 FC 484 at para. 25. This statement was adopted by the Alberta Court of Appeal as "accurately stat[ing] the law" in *Tsuu T'ina Nation v Alberta (Environment)*, 2010 ABCA 137 at para. 104.

acknowledgement of the diversity of issues raised, and the importance of these issues to each group, the VFPA will address each issue raised through ongoing consultation with Indigenous groups. The VFPA will continue to engage directly with Indigenous groups through one-on-one meetings and consultations, and as part of negotiations for mutual benefit agreements. The VFPA will also be responding to each issue raised by each Indigenous group leading up to and during the hearings in updated issue-tracking tables (ITTs) to be submitted to the Crown. Refer to Section 8 for further details on the updates to the ITTs, which will cover the period January 1, 2018 to fall of 2019.

8. The VFPA's ongoing Indigenous consultation efforts

As noted during the public hearing and further described in the Updated Project Commitments,⁵²⁵ the VFPA is committed to continued dialogue with Indigenous groups potentially impacted by the Project or Project-associated shipping. In support of this commitment, the VFPA will be undertaking multiple consultation initiatives to advance VFPA-Indigenous group dialogue regarding issues, concerns, and opportunities related to RBT2 prior to and during construction and operation. The initiatives collectively represent the VFPA's ongoing effort to ensure the acceptability of RBT2 to Indigenous groups.

Ongoing consultation initiatives include, but are not limited to, the following:

- **Ongoing direct consultation with individual Indigenous groups:** The VFPA will continue to engage in one-on-one direct consultation with Indigenous groups in a consultation format and on topics of individual groups' choosing. The VFPA believes such direct dialogue will enable the communication of unique, Indigenous group-specific knowledge, perspectives, and concerns related to the Project, ultimately contributing to resolution of issues. It will also enable the advancement of Project commitments, such as additional monitoring and mitigation with focused attention on specific Indigenous priorities.
- **Consultation on updated issues and interests tables (ITTs):** In support of ongoing direct consultation as noted above, the VFPA anticipates providing Indigenous groups updated ITTs that reflect additional issues, views, and concerns expressed by Indigenous groups and responses, between January 1, 2018 and fall 2019. The updated table will include items from ongoing engagement activities, registry postings, hearing records, and other correspondence. The VFPA intends to use the updated ITTs as a consultation tool to ensure the comprehensiveness of the consultation record for the benefit of all parties, as well as to identify and support the resolution of any outstanding issues.
- **Negotiations on mutual benefit agreements:** As noted in Section 6.(b), the VFPA is pleased to have completed mutual benefit agreements with numerous Indigenous groups, and to be in active negotiations with many others.

⁵²⁵ CEAR Doc 2001, Updated Project Commitments.

- **Legacy Benefits Fund:** The VFPA has established a shared Legacy Benefits Fund to support local Indigenous groups' programs and initiatives to be identified through ongoing consultation and dialogue. The development of terms of reference and planning for the administration of the fund will be determined through the consultative process that is currently underway with Indigenous groups.
- **Offsetting workplan implementation and related consultation:** The VFPA is providing funding and advancing community-specific offsetting workplans with each Indigenous group with interests that overlap with the terminal footprint. Offsetting workplans provide a structured mechanism for identifying and prioritizing the offsetting goals and projects as identified by these individual Indigenous groups, and for collaborating on development of a final Offsetting Plan. The plans outline preferred consultation activities to facilitate the knowledge sharing, inclusion of ITK, and meaningful involvement of each group. Offsetting-related site visits with Indigenous knowledge holders, as well as a focused offsetting session at the third Indigenous Advisory Forum being planned for fall 2019, are also being coordinated.
- **Indigenous Advisory Forum:** The VFPA has engaged with, and will continue to engage with, Indigenous groups in a workshop format referred to as the Indigenous Advisory Forum. Previous forums in September 2018 and February 2019 proved effective at supporting knowledge sharing, discussion, and soliciting feedback on mitigation, environmental management plans, offsetting, and the RBT2 Follow-up Program.
- **Indigenous Advisory Committee:** During construction and operation of the Project, the VFPA will convene an Indigenous Advisory Committee. The Indigenous Advisory Committee will be a multi-group communications mechanism for VFPA-Indigenous group dialogue during construction and early years of the operation of the Project with terms of reference that are developed and agreed to by the VFPA and Indigenous groups. The Indigenous Advisory Committee will include representatives of Indigenous groups with interests that overlap with terminal footprint and will be a vehicle for discussions of matters of importance to Indigenous groups, including but not necessarily limited to Project mitigation and commitments, the RBT2 Follow-up Program, environmental management plans, offsetting, and integration of traditional knowledge.
- **Indigenous Monitoring Plan:** Prior to the start of construction, the VFPA will collaborate with Indigenous groups to develop an Indigenous Monitors Plan.⁵²⁶ The plan will provide an overview of the approach to effectively incorporate Indigenous monitors into the construction monitoring framework for biophysical components and for engaging with each Indigenous group regarding the development of group-specific Terms of Engagement. The Terms of Engagement will outline the role of each group's monitor(s), including, at a minimum, training, communication, and inspection frequency and focus.

⁵²⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #31.

- **Indigenous Training, Employment, and Procurement Plan:** The VFPA has committed to engage with the Indigenous Advisory Committee and Indigenous groups to develop an Indigenous Training, Employment, and Procurement Plan for construction and operation.⁵²⁷ In the development of the plan, the VFPA will consult with Indigenous groups regarding economic development opportunities, including training and support requirements to enable employment and procurement opportunities to be realized.
- **Representation on the Follow-up Program Advisory Committee:** Similar to the DP3 Project's Scientific Advisory Committee, the VFPA has committed to a governance body, the Follow-up Program Advisory Committee, with independent oversight of the RBT2 Follow-up Program. The Follow-up Program Advisory Committee will include two Indigenous group nominees, representing TFN and Musqueam First Nation, two regulatory agency nominees, and one from the VFPA. The VFPA is committed to continued consultation with Indigenous groups concerning the Follow-up Program's governance and its structure. The VFPA believes this structure further ensures Indigenous perspectives, knowledge, and priorities will be represented in the RBT2 Follow-up Program, ultimately enhancing the evaluation of monitoring data and input into any required adaptive management recommendations (as discussed in greater detail in response to IR10-11⁵²⁸).

9. Conclusion

The VFPA has engaged extensively with Indigenous groups from the early stages of project planning, through EIS and MSA development and review, and through the public hearing process. The VFPA's consultation with Indigenous groups has informed the assessment of Current Use and rights, as well as a broad suite of mitigation measures proposed for the Project. Throughout the environmental assessment process, the VFPA has heard and responded to all issues raised by Indigenous groups, and will continue to do so through ongoing consultation on specific issues, as well as on initiatives, including the Indigenous Advisory Forum, Indigenous Advisory Committee, and Follow-up Program Advisory Committee; development of environmental management plans, including an Indigenous Monitors Plan and Indigenous Training, Employment, and Procurement Plan, specific mitigation, monitoring and the RBT2 Follow-up Program; the negotiation of mutual benefit agreements; and the RBT2 shared Legacy Benefits Fund.

⁵²⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #42.

⁵²⁸ CEAR Document #934, VFPA response to IR10-11.

CHAPTER VII. EFFECTS ASSESSMENT METHODOLOGY

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
1. Section 8 – Effects Assessment Methods	181
MSA Sections	
1. Section 6 – Effects Assessment Approach	316
CEA Agency IRs and Response	
1. IR #7 – Significance Criteria	314
2. IR #13 – Cumulative Effects Assessment	314
3. AIR #13 – Cumulative Effects Assessment	388
4. MSA IR #2 – Rationale for Effects Characterization	391
5. MSA IR #6 – Additional Projects to be Considered	391
6. MSA IR #7 – Reasonably Foreseeable Projects and Activities	391

2. Overview

The VFPA is a responsible environmental steward, and has participated in multiple environmental assessments for projects at Roberts Bank and elsewhere in its jurisdiction. The VFPA applied well-established environmental assessment methodologies consistent with applicable guidance and used a precautionary approach in the assessment and proposed mitigation of Project effects.

The VFPA conducted an initial evaluation of environmental considerations during the preliminary design stages of the Project, before providing the Project Description to the CEA Agency.⁵²⁹ The result of this ‘mitigation by design’ approach is a revised Project design and construction methodology targeted specifically at reducing environmental effects. This process included assessing the feasibility of the initial designs through the alternative means assessment,⁵³⁰ and inclusion of updated Project construction methodologies to, for example, ensure vibro-replacement techniques are not used in the marine environment.⁵³¹

The Project design also includes design refinements such as rounding the northwest terminal corner to reduce scour, and the scheduling of in-water construction activities to minimize effects to marine species during sensitive life stages (e.g., applying fisheries-sensitive windows for juvenile salmon and gravid Dungeness crab).⁵³² Moreover, both the environmental assessment and design process were iterative; that is, as the ongoing assessment identified potential environmental effects, and changes and refinements in Project design were considered to avoid, reduce, or otherwise mitigate those potential

⁵²⁹ CEAR Doc 539, Summary Report – RBT2 Project Trade-Off Process and Output Document.

⁵³⁰ CEAR Doc 181, EIS, Volume 1, at s. 5; CEAR Doc 897, VFPA responses to IR1-06 to IR1-11; CEAR Doc 1859, VFPA oral presentation, May 31, 2019.

⁵³¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #11.

⁵³² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #49, 53.

effects. This iterative process is typical of an effective environmental assessment process and is reflected in improved assessment outcomes.

The VFPA's assessments drew from past project experience at Roberts Bank, particularly the Adaptive Management Strategy for the DP3 Project, which provided site-specific evidence of environmental responses to development at Roberts Bank and strengthened the VFPA's confidence in effects predictions.⁵³³ The VFPA has extensive experience, over many years, managing the effects of its operations at Roberts Bank and elsewhere, and has applied this experience, as well as the input from Indigenous groups (see Chapter VI of these Closing Remarks) and consultation with regulators and the public (see Chapter V of these Closing Remarks) to develop and refine Project-specific mitigation.

The VFPA conducted its environmental assessment of the Project in accordance with regulatory requirements, relevant guidance, and well-established assessment practices for the evaluation of major projects. As such, the methods used in the assessment and supporting IR responses are consistent with federal and provincial legislation, regulatory guidance, and Project-specific guidelines, including the following:

- The requirements of *CEAA 2012*, including the factors in subsections 19(1) and 19(2);
- Province of BC and Government of Canada effects assessment guidance, including operational policy statements and technical guidance for addressing alternative means, selection of valued components, assessing environmental effects, including cumulative effects, and determining significance, follow-up programs, adaptive management, and precaution; and
- The Minister of Environment and Climate Change's assessment requirements for the Project as listed in the EIS Guidelines,⁵³⁴ and Final Terms of Reference.⁵³⁵

The VFPA adopted a standard five-step framework for the environmental assessment: (i) scoping, (ii) analysis, (iii) mitigation, (iv) significance, and (v) follow-up. The environmental assessment methods are discussed in the EIS⁵³⁶ and the MSA,⁵³⁷ the latter of which examined the effects of marine shipping associated with the Project.

The VFPA based its environmental assessment methods for the Project on the identification of intermediate and valued components of the environment that are meaningful for evaluation of Project effects.⁵³⁸ The VFPA selected and scoped the Project's intermediate and valued components in a collaborative way, based on information collected from multiple lines of evidence, including consultation, scientific literature and technical reports relevant to Roberts Bank, community knowledge and ITK, the results of field studies and

⁵³³ CEAR Doc 934, VFPA response to IR5-29.

⁵³⁴ CEAR Doc 1680, EIS Guidelines.

⁵³⁵ CEAR Doc 1680, Terms of Reference.

⁵³⁶ CEAR Doc 181, EIS, Volume 2, at s. 8.

⁵³⁷ CEAR Doc 316, MSA, at s. 6.

⁵³⁸ CEAR Doc 1727, VFPA oral presentation, May 21, 2019, at slide 8.

modelling,⁵³⁹ and discussions with technical experts and representatives of regulatory agencies who participated in the Project's TAG process. This intermediate and valued component selection process resulted in an environmental assessment focused on issues of most importance. The selected intermediate and valued components provided a robust framework for a comprehensive assessment of the potential changes to the environment that would be caused by the Project and the effects of those changes on the natural and human environment.

The VFPA's assessment of each intermediate and valued component also considered multiple lines of evidence to increase the certainty with which effects assessment predictions were made. Similar to the selection of intermediate and valued components, the assessment incorporated the results of existing scientific literature, Project-specific field studies, modelling, expert opinion, and ITK at Roberts Bank and similar environments, and from previous environmental assessments. This approach is consistent with well-established assessment methods and Project-specific approaches that the VFPA developed in consultation with a Working Group.⁵⁴⁰

In the development of the EIS, the VFPA conducted over 77 environmental studies and over 35,000 hours of fieldwork with contributions from more than 100 professional scientists. Project-specific technical studies continued beyond submission of the EIS and focused on issues of greatest concern to the community and Indigenous groups. For example, starting in 2016, the VFPA undertook three years of additional studies (2016, 2017, and 2018) at Roberts Bank during the western sandpiper northward migration period to examine the relationship between abiotic environmental factors such as salinity and the biofilm community.⁵⁴¹ The EIS development also considered input from Indigenous groups, resulting in the removal of the use of the ITP for sand storage, and in additional field work for crab involving participation by Indigenous field technicians.

The VFPA's analysis of the existing conditions documented the current state of each intermediate and valued component, described whether it is currently viable and self-sustaining, and identified any positive or negative trends in its condition. As acknowledged in relevant technical guidance, the existing conditions of the intermediate and valued components reflect the cumulative effects to date of other past and present projects and activities. The VFPA also described the expected conditions for each intermediate and valued component to account for any further changes from past, present, or expected (i.e., currently underway) projects that have yet to be manifested in the existing conditions but will have occurred by the time the Project proceeds. This approach gives a more accurate representation of the future conditions of the intermediate and valued components at the time the potential effects of the Project would occur.

⁵³⁹ CEAR Doc 181, EIS, Volume 2, at s. 8.1.1.

⁵⁴⁰ See Chapter V of these Closing Remarks for a description of the RBT2 Working Group.

⁵⁴¹ CEAR Doc 1385, 2018 Biofilm Dynamics Technical Data Report.

The VFPA's assessment of residual effects after mitigation used integrity-based thresholds for the determination of significance.⁵⁴² The integrity-based threshold identifies the point beyond which a valued component may be unacceptably compromised. The use of integrity-based thresholds is a better approach for the sustainable management of effects to valued components than adopting a significance threshold relative to an arbitrary baseline condition, because it considers the condition (i.e., the viability or sustainability) of the valued component after it has been affected, rather than how much the valued component has changed.

There is inherent uncertainty in making predictions as part of environmental assessment, and to manage this, the VFPA incorporated a precautionary approach throughout the assessment. In many cases, the VFPA built conservative assumptions into the technical analyses and within the predictions themselves so as not to underestimate potential Project effects. The VFPA has also proposed a comprehensive suite of mitigation measures to avoid, reduce, control, and offset Project effects—even if the VFPA predicted the potential environmental effect would not be significant.⁵⁴³ The VFPA has also committed to an extensive follow-up program to verify selected effects predictions and evaluate effectiveness of mitigation, and to adaptively manage adverse effects that depart from predictions made in the EIS.⁵⁴⁴

It is not appropriate or typical environmental assessment practice to make a significance determination based only on uncertainty. Significance is determined for each VC by setting significance thresholds or criteria. In the case of the Project, these were set as viability or integrity-based thresholds, as noted above. Conservatism, to address any remaining uncertainty, will be applied in making the significance determination and will be reflected in the professional's confidence. In the assessments undertaken for the Project, this was clearly articulated for each significance determination. This methodology is standard practice, appropriate, and was precautionary in nature.

The VFPA has used the best available science, ITK, and input from public and Indigenous group consultation within an accessible and focused environmental assessment framework to ensure that its effects assessment is robust, precautionary, and compliant with legislation, regulatory requirements (including the EIS Guidelines), relevant technical guidance, and well-established assessment practice. The VFPA is confident that the methodological framework for the environmental assessment underpins and enables a comprehensive and appropriate assessment of potential changes the Project may cause to the environment and the potential effects of those changes to the valued components.

⁵⁴² CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1407-1408, 1425.

⁵⁴³ CEAR Doc 2001, Updated Project Commitments.

⁵⁴⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #81.

3. Key issues raised and VFPA response

(a) Definition of negligible residual effects

During the topic-specific session on May 21, 2019, the Review Panel requested clarification on the use of the term 'negligible', and whether the EIS uses the same term for two different parts of the assessment: for potential effects before mitigation and also for residual effects after mitigation. In addition, the Review Panel also requested clarification on the terms 'negligible', 'not detectable', and 'not measurable' as they relate to determinations of significance.⁵⁴⁵

The VFPA defined negligible effects as those that were considered to be not detectable or not measurable.⁵⁴⁶ The VFPA applied the concept of negligibility to effects at two points in the assessment. Firstly, in the initial screening and identification of potential effects before mitigation, and secondly to the description of residual effects after mitigation. In both cases, the VFPA applied the concept of negligible effects to identify those cases where an interaction with the Project did exist, but where no effect could be quantified or otherwise characterized. For example, a change (if any) may be within the margins of error for the analytical method being used or may be indistinguishable from natural variation or from confounding influences, and so an effect may not actually occur and cannot be attributed with any certainty to the Project.

Where other project assessments might, in such cases, simply conclude there is 'no effect'—and, in fact, it is likely there will be no effect for those residual effects that are deemed 'negligible'—the VFPA's conservative approach of identifying negligible potential and residual effects acknowledges that there is inherent uncertainty in the predictive nature of environmental assessment. This approach produces a more robust assessment because, rather than omitting negligible residual effects from discussion, which would have been the case if they were dismissed as 'no effect', the assessment identified them and provided a rationale for why they were considered to be negligible.

The application of the concept of negligibility is another example of the VFPA's conservative approach to effects assessment.

(b) Inclusion of past projects in the cumulative effects assessment

During the topic-specific session on May 21, 2019, the Review Panel questioned whether and why the VFPA changed its position, between the EIS and the response to AIR #13,⁵⁴⁷ on whether and how the effects of past projects were reflected in existing conditions.⁵⁴⁸ Participants during general, topic-specific, and community sessions had also stated in written and oral submissions that the VFPA did not include past projects in the assessment of effects.

⁵⁴⁵ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1414-1424.

⁵⁴⁶ CEAR Doc 181, EIS, Volume 2, at s. 8.1.5.

⁵⁴⁷ CEAR Doc 388, VFPA response to AIR #13.

⁵⁴⁸ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1449-1454.

The VFPA's approach to cumulative effects assessment followed a well-established approach for assessment of major projects and is consistent with *CEAA 2012* and Operational Policy Statements and technical guidance,⁵⁴⁹ and the EIS Guidelines.⁵⁵⁰ All past projects and activities that would have affected the conditions of an intermediate or valued component were considered in the assessment, in the descriptions of existing and expected conditions. As described in responses to IR #13 and AIR #13, a cumulative effects assessment can be broken down into three parts:⁵⁵¹

- A. A description of the effects of past and present projects and activities;
- B. A description of the residual effects of the Project in combination with the effects of past and present projects and activities; and
- C. A description of the residual effects of the Project, *including the effects of past and present projects and activities*, in combination with effects of future certain and reasonably foreseeable projects and activities, i.e., potential incremental cumulative effects.

These three steps correspond to steps A, B, and C on slide 14 of the VFPA's presentation on May 21, 2019 at the topic-specific session.⁵⁵² Rather than presenting the total cumulative effects assessment in one stand-alone section of the EIS for each valued component, the VFPA took the approach of reflecting these three distinct portions of the cumulative effects assessment interwoven with the corresponding step in the overall valued component assessment. The rationale for this approach is described below, and an added benefit of this approach is that the first step of a cumulative effects assessment is provided for all valued components, not just those on which the Project was predicted to have residual effects.

The EIS Guidelines require the VFPA to include consideration of the effects of past and present projects and activities in its description of existing conditions. The guidelines state the following:

"The information describing the existing environment may be provided in a stand-alone chapter of the EIS or may be integrated into clearly defined sections within the effects assessment of each valued component. This analysis will include environmental conditions resulting from historical and present activities in the local and regional study area."⁵⁵³

The VFPA is supportive of this approach, as it recognizes that the effects of past and present projects and activities are reflected in, and cannot be separated from, the actual conditions observed today. For this reason, and in accordance with the EIS Guidelines, the EIS

⁵⁴⁹ Including the CEA Agency's Operational Policy Statement, "Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012" (March, 2015) and Interim Technical Guidance "Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012" (March, 2018).

⁵⁵⁰ CEAR Doc 1680, EIS Guidelines, at s. 9.1.1.

⁵⁵¹ CEAR Doc 314, VFPA response to IR #13; CEAR Doc 388, VFPA response to AIR #13.

⁵⁵² CEAR Doc 1727, VFPA oral presentation, May 21, 2019, at slide 14.

⁵⁵³ CEAR Doc 1680, EIS Guidelines, at s. 9.1.1.

describes these effects within the description of the existing (or expected) conditions for each intermediate or valued component. As outlined above and described at the public hearing, the description of existing conditions therefore makes up the first part (Step A) of the cumulative effects assessment.⁵⁵⁴

To further demonstrate how the valued components have already been affected, Parts 2 and 3 of the valued component-specific schedules provided in response to AIR #13 provided additional information about the effects of past and present projects and activities on each valued component for which a measurable and likely residual effect was predicted (corresponding with Step A above).⁵⁵⁵ This additional information is supplemental to the EIS descriptions of existing conditions, and although it is presented in one document as part of a 'total cumulative effects assessment' to respond to the IR, it does not constitute a change in the position described above, which is that the existing and expected conditions of a valued component reflect all cumulative effects on that valued component to date, and that the description of those conditions is the appropriate place in the assessment to provide this information.

Further, the residual effects of the Project will combine with and cannot occur in isolation of the effects that have already manifested in the condition of the valued component that is being affected. For this reason, the residual effects of the Project have all been evaluated *in combination with* the effects of past and present projects and activities. The evaluation of residual effects makes up the second part of the cumulative effects assessment. This step is reflected in the determination of significance of predicted residual effects sections for each valued component in the EIS, and in part 4 in each schedule of the response to AIR #13 (corresponding to Step B above).

Where the VFPA predicted a measurable and likely residual effect of the Project, the VFPA carried those residual effects forward for an assessment of incremental cumulative effects. In this step, Step C, the VFPA assessed the combined effects of the measurable residual effects of the Project *and* of past and present projects and activities for their potential to interact cumulatively with potential effects of other certain and reasonably foreseeable projects and activities.⁵⁵⁶

In conclusion, in response to the issue raised by the Review Panel, the VFPA maintains that the assessment properly considered the effects of past projects and activities, the predicted residual effects of the Project, and the combination of those effects with the effects of other certain and reasonably foreseeable future projects.

⁵⁵⁴ CEAR Doc 1727, VFPA oral presentation, May 21, 2019, at slide 14. See also CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1451-1453.

⁵⁵⁵ CEAR Doc 388, VFPA response to AIR #13.

⁵⁵⁶ CEAR Doc 1727, VFPA oral presentation, May 21, 2019, at slide 14.

4. Conclusion

The VFPA conducted its environmental assessment of the Project in accordance with the requirements of *CEAA 2012*, the EIS Guidelines, relevant technical guidance from the CEA Agency and the BC EAO, as well as well-established environmental assessment practices. As set out in the chapters that follow, the VFPA conducted its assessment in a conservative and precautionary manner. The VFPA has conducted an environmental assessment that systematically identified, evaluated, and proposed mitigation for the potential consequences of carrying out the Project. The VFPA is committed to the continuation of consultation and engagement, and implementation of a Follow-up Program to evaluate the accuracy of effects predictions and the efficacy of mitigation applied.

CHAPTER VIII. ENVIRONMENTAL MODELLING – ROBERTS BANK ECOSYSTEM MODEL

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
1. Section 8 – Effects Assessment Methods	181
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10. IR3-06 – Roberts Bank Ecosystem Model – Diet Import Rates	984
11. IR3-07 – Roberts Bank Ecosystem Model – Diet	984
12. IR3-08 – Roberts Bank Ecosystem Model – Diet Matrix	984
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14. IR3-10 – Roberts Bank Ecosystem Model – Mortality: Pathogens	984
15. IR3-11 – Roberts Bank Ecosystem Model – Substrate Selection	984
16. IR3-12 – Roberts Bank Ecosystem Model – Dungeness Crab	984
17. IR3-13 – Roberts Bank Ecosystem Model – Spatial Boundaries	984
18. IR3-14 – Roberts Bank Ecosystem Model – Dispersal Rate	984
19. IR3-15 – Roberts Bank Ecosystem Model – Functional Group Life History	984
20. IR3-16 – Roberts Bank Ecosystem Model – Balancing: Seasonal Dietary Shifts	984
21. IR3-17 – Roberts Bank Ecosystem Model – Balancing: Confidence Intervals for Parameter Values	984

Documents Relevant to Topic		CEAR Doc #
22.	IR3-18 – Roberts Bank Ecosystem Model – Sensitivity Analysis: Different Percentages of Diet Allocation	984
23.	IR3-19 – Roberts Bank Ecosystem Model – Validation: Ecotrophic Efficiency Values	984
24.	IR3-20 – Roberts Bank Ecosystem Model – Validation: Biomass Discrepancies	984
25.	IR3-21 – Roberts Bank Ecosystem Model – Validation: Other Methods	984
26.	IR3-22 – Roberts Bank Ecosystem Model – Sensitivity Analysis: Production Differences in Functional Groups	984
27.	IR3-23 – Roberts Bank Ecosystem Model – Sensitivity Analysis: Varying Vulnerability Settings	984
28.	IR3-24 – Roberts Bank Ecosystem Model – Purpose of the EwE Model	984
29.	IR5-29 – Marine Vegetation, Marine Invertebrate and Marine Fish – Lines of Evidence for Productivity Assessment	934
30.	Preamble to Offsetting-related Information Requests (IR7-24 to -27, IR7-30, IR10-10, IR11-13 to -19, IR11-21) - RBT2 Offsetting Approach	934
31.	IR7-25 – Marine Fish Mitigation – Offsetting Concepts	934
32.	IR7-26 – Marine Fish Mitigation – OnSite Offsetting Concepts	934
33.	IR7-28 – Marine Fish – Mitigation, Habitat Compensation	934
34.	IR7-29 – Marine Fish – Mitigation, Offsetting (Eelgrass)	934
35.	IR11-20 – Marine Fish – Effects Assessment for Juvenile Chinook and Chum salmon	934
36.	Updated Project Commitments	2001
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1.	Undertaking #34 – Salinity Modelling	1893

2. Overview

The VFPA has invested significant resources and effort to develop scientific programs, partnerships, and assets to help manage the ecological health and integrity of the complex and dynamic Roberts Bank marine environment. The Roberts Bank ecosystem model is one example of such efforts.

The VFPA assessment used the Roberts Bank ecosystem model as one line of evidence, together with evidence from field studies, other models, literature, previous environmental assessments, expert opinion, and ITK.⁵⁵⁷ The model is a leading-edge tool for forecasting ecosystem productivity, providing the VFPA with robust capability to manage the long-term sustainability of the Roberts Bank ecosystem. Environmental assessments typically rely on largely qualitative predictions and qualitative estimates of uncertainty, which are difficult to test. The Roberts Bank ecosystem model, used in combination with qualitative assessments and other lines of evidence, is an advance in assessment practice. The model yields quantitative forecasts and quantitative estimates of uncertainty in those forecasts. The VFPA has committed to evaluate the accuracy of the forecasts for selected ecosystem components of particular interest as part of this robust Follow-up Program.

⁵⁵⁷ CEAR Doc 934. VFPA response to IR5-29.

Ecopath with Ecosim (**EwE**) is a modelling framework and software suite that has undergone over 30 years of continuous development, led by the University of British Columbia in partnership with 28 other institutions. EwE has been favorably reviewed by United Nations Food and Agriculture Organization and is used by government agencies, including DFO and the US National Oceanic and Atmospheric Administration (**NOAA**). NOAA recognized Ecopath as one of the ten biggest scientific breakthroughs in the organization's 200-year history.⁵⁵⁸

The EwE methodology is well documented in the scientific literature and has been widely used to quantitatively describe marine food webs, fisheries policy exploration, and ecosystem-based fisheries management. The University of British Columbia's Fisheries Centre (now the Institute for the Oceans and Fisheries), a leader in ecosystem modelling and the key developer of the EwE approach, led the adaptation of the EwE model to Roberts Bank, tailoring the approach, technique, and study design to the complexities of the site.⁵⁵⁹

The VFPA retained internationally recognized experts in ecosystem modelling to lead the development of the Roberts Bank ecosystem model, which was built using the best available science and site-specific environmental data. The Roberts Bank ecosystem model and development team was led by Dr. Villy Christensen, one of the two original developers of EwE. These VFPA experts developed and applied the Roberts Bank ecosystem model over a period of several years following initial guidance from the Productive Capacity TAG, which included senior scientists from DFO and ECCC. The TAG had unanimously selected the spatial module (**Ecospace**) of the EwE model framework as the preferred modelling platform to build the Roberts Bank ecosystem model.⁵⁶⁰

The VFPA (as well as the team of experts who developed and applied the model) are confident that the Roberts Bank ecosystem model used the best available science to conservatively assess Project effects on ecosystem productivity at Roberts Bank. The team of experts applying the model used conservative assumptions to increase model sensitivity to potential Project effects. For example, the modellers selected a model area of 54 km² which is large enough to fully encompass forecasted environmental changes yet small enough to maximize sensitivity of groups to those changes. The model area is also large enough to capture indirect effects due to changes in habitat suitability and trophic linkages.⁵⁶¹ In addition, the modellers included conservative dispersal rates for species groups. This approach increased the exposure to lower suitability conditions, decreased access to prey, increased exposure to predators, and maximized the potential effects of the Project. For example, while juvenile Chinook salmon are known to occur at Roberts Bank for several months and can actively move around by swimming, a low dispersal rate (1

⁵⁵⁸ CEAR Doc 934, Preamble to Offsetting-related Information Requests (IR7-24 to -27, IR7-30, IR10-10, IR11-12 to -19, IR11-21) – RBT2 Offsetting Approach, at p. 4.

⁵⁵⁹ CEAR Doc 934, Preamble in Support of Responses to IR3-01 to IR3-24 - Roberts Bank Ecosystem Model, at pp. 3-4.

⁵⁶⁰ CEAR Doc 181, EIS, Volume 3, at s. 10.3.2. See also CEAR Doc 984, Preamble in Support of Responses to IR3-01 to IR3-24 - Roberts Bank Ecosystem Model, at pp. 2-4, and at Appendix IR3-A.

⁵⁶¹ CEAR Doc 934, VFPA response to IR3-05.

km/year) was used to increase their sensitivity to low suitability conditions potentially created by the Project.⁵⁶²

Consistent with DFO's Fisheries Protection Policy Statement, the model fully considers habitat quantity and quality in its assessment of current ecosystem productivity and its forecasts of future productivity changes with the Project, following offsetting.⁵⁶³ The Roberts Bank ecosystem model is a productivity-based model capable of considering an ecosystem in its entirety, including individual species, their food web linkages, net changes in productivity, and their habitat and environmental preferences.⁵⁶⁴ It is also capable of assessing uncertainty, making it a useful tool in the evaluation of mitigation and offsetting.⁵⁶⁵

The forecasts generated from the Roberts Bank ecosystem model informed the assessment of the biophysical components and assisted in the initial development of offsetting measures, as presented within the offsetting framework.

3. Key issues raised and VFPA response

(a) Application of model

In its submission to the Review Panel, DFO stated that the model is less appropriate for highly-mobile functional groups such as salmon than for integrated ecosystem productivity aspects.⁵⁶⁶ DFO concluded that other lines of evidence, including field surveys, other models, literature review, and follow-up monitoring are necessary to more fully evaluate highly-mobile functional groups such as salmon.

The VFPA is confident that the Roberts Bank ecosystem model adequately captures changes in the productive capacity at Roberts Bank for species that have little to no movement, as well as species that are capable of greater dispersal such as salmon and other migratory species. The VFPA used the Roberts Bank ecosystem model to forecast changes in habitat capacity at Roberts Bank with the development of the Project. The model estimated changes in habitat capacity for each functional group, independent of a species' reliance on the Roberts Bank resources. For example, adult Chinook spend only a short time at Roberts Bank on their return migration,⁵⁶⁷ and evidence indicates that adult Chinook are not actively feeding at Roberts Bank as they migrate up-river.⁵⁶⁸

However, the Roberts Bank ecosystem model provides a conservative estimate of the change in productive capacity at Roberts Bank for adult Chinook salmon, due to removal of deep water habitat by the footprint effect of the terminal. Using the Roberts Bank

⁵⁶² CEAR Doc 934, VFPA response to IR13-14.

⁵⁶³ CEAR Doc 1057, DFO response to DFO IR-18

⁵⁶⁴ CEAR Doc 181, EIS, Volume 3, at s. 10.3.2.

⁵⁶⁵ CEAR Doc 984, Preamble in Support of Responses to IR3-01 to IR3-24 - Roberts Bank Ecosystem Model, at Appendix IR3-A, Table 3.6.

⁵⁶⁶ CEAR Doc 1630, DFO written submission, at p 16.

⁵⁶⁷ CEAR Doc 181, EIS, Appendix 10-B, at p. 54

⁵⁶⁸ CEAR Doc 181, EIS, Volume 3, s. 13, at p. 13-100.

ecosystem model, the VFPA conservatively and sufficiently assessed direct and indirect effects to species that depend fully on the Roberts Bank area, as well as those that are there only seasonally. For seasonal species, the model quantified how the proposed Project may affect their access to the productive capacity in the Roberts Bank area.⁵⁶⁹ The VFPA is confident in the applicability of the model as a useful metric of changes in productive capacity due to habitat and food web effects.⁵⁷⁰

The VFPA's use of an ecosystem productivity model is in line with best practice and regulatory policy for large projects, and scientific advice.⁵⁷¹ A pure habitat-based model will only provide estimates of how much habitat area is lost, while the Roberts Bank ecosystem model provides quantitative estimates of the direct and indirect effects of the Project on the biomass and productivity of 57 components of the Roberts Bank ecosystem.

DFO, in its conclusion of the Canadian Science Advisory Secretariat (**CSAS**) review, and reinforced in their response to the Review Panel, considered some assumptions that were applied due to limited data, and stated:

“the model does the best job possible of comparing the biomass and productivity of the Roberts Bank ecosystem with and without the Project; and provides a useful framework to organize information and derive initial estimates of potential changes at Roberts Bank, which was the purpose of the model.”⁵⁷²

The VFPA also notes that that the Roberts Bank ecosystem model is only one line of evidence in the its assessment of potential Project effects on migratory species such as salmon. The VFPA relied on experts to interpret the results and to integrate those results with a number of other lines of evidence, including best available, peer-reviewed science, empirical data from the Project's field surveys,⁵⁷³ previous environmental assessments at Roberts Bank, and conclusions of the assessment of Project-related changes to ICs and other VCs.⁵⁷⁴ The VFPA's assessment of Project-related effects on salmon, including mitigation measures to protect and enhance salmon productivity, are set out in Chapter XI of these Closing Remarks. The VFPA's proposed offsetting program, which will directly benefit salmon, is discussed in Chapter X of these Closing Remarks.

(b) Evaluation of forecasts

During the topic-specific session on May 21, 2019, Panel Member Dr. Steyn questioned the VFPA's proposed use of the Project's Follow-up Program to verify model effects predictions.

⁵⁶⁹ CEAR Doc 181, EIS, Appendix 10-B, 10-C and 10-D

⁵⁷⁰ CEAR Doc 181, EIS, s.10, at p. 10-14.

⁵⁷¹ CEAR Doc 314, VFPA response to IR #6, at pp. 2-3.

⁵⁷² CEAR Doc 1630, DFO written submission, at p. 15.

⁵⁷³ CEAR Doc 388, Appendix AIR10-C, TDR MF-3 Juvenile Salmon Surveys.

⁵⁷⁴ CEAR Doc 934, VFPA response to IR11-20; CEAR Doc 1739, VFPA oral presentation on marine fish on May 22, 2019, at slide 8.

Dr. Steyn was concerned that “verifying predictions” presume a positive outcome, presumes that the model will be shown to be correct, and is a form of confirmation bias.⁵⁷⁵ Dr. Steyn also stated that “model evaluation” was a better term than “model verification.”⁵⁷⁶

The purpose of the VFPA’s Follow-up Program is to evaluate the model forecasts, and does not presume a positive or negative outcome. Consistent with CEAA 2012, the VFPA has selected Follow-up Program elements based on their ability to effectively evaluate the accuracy of EIS predictions and determine the effectiveness of mitigation measures.⁵⁷⁷ The VFPA will compare field measurements to model forecasts, for the purposes of assessing the accuracy of the model in forecasting future conditions.

The Roberts Bank ecosystem model is a robust tool capable of accurately reproducing the current distribution of primary producers at Roberts Bank,⁵⁷⁸ and has been subjected to very extensive sensitivity analyses. The expert modellers responsible for development and application of the ecosystem model undertook numerous sensitivity analyses as part of the environmental assessment and in response to Information Requests from the Review Panel. The modelling team ran more than 9,000 simulations to evaluate the physical and biological input parameters and ecological settings of the model and to assess the sensitivity of the model outputs. The general results were consistent across these simulations. Additionally, the VFPA conducted several goodness-of-fit analyses wherein model estimates of current distributions were compared to mapped distributions of primary producers at Roberts Bank. The analyses determined that the model estimates of current distributions closely matched the actual distributions.⁵⁷⁹

The VFPA ensured that the Roberts Bank ecosystem model is site-specific. The VFPA collected data over several years of sampling at Roberts Bank to use as model inputs. The model is more strongly rooted in local data than most ecosystem models. Using local data improves the reliability of model forecasts over using data from elsewhere. The quality of data used in the Roberts Bank ecosystem model places it in the top 15% of 50 EWE models.⁵⁸⁰

The VFPA is confident that the application of the model in the assessment was appropriate and represents an informative and quantitative assessment of potential changes in ecosystem productivity. The model allows the VFPA to forecast how Project-related functions for each group will affect, directly or indirectly, the productivity of other species and groups in the Roberts Bank ecosystem food web. The VFPA has demonstrated how the model was used to forecast onsite productivity gains through proposed offsetting. The net change in biomass for each functional group in the offsetting concept modelling was compared to relative change from biomass estimates under a ‘without the Project’ scenario.

⁵⁷⁵ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1364.

⁵⁷⁶ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1365.

⁵⁷⁷ CEAR Doc 2001, Updated Project Commitments, at pp.12-14.

⁵⁷⁸ CEAR Doc 181, EIS, Appendix 10-C, pg. 57-59.

⁵⁷⁹ CEAR Doc 984, VFPA response to IR3-21.

⁵⁸⁰ CEAR Doc 181, EIS, Volume 2, at Appendix 10-C, p. 47

The VFPA has proposed four Follow-up Program elements as a further step in assessing the accuracy of the model's forecasts.⁵⁸¹ The importance of the Follow-up Program is not to simply evaluate whether or not the modelled forecasts were accurate, but to inform the effectiveness of mitigation measures applied (such as offsetting) or if further adaptive management measures should be applied.⁵⁸² The Follow-up Program will be a key component of the VFPA's ability to monitor and ensure that offsetting sites are functioning as intended and that productivity goals are achieved.

(c) Weighting of evidence

During the topic-specific sessions, Panel Member Dr. Steyn asked how outcomes of the model were weighed against other lines of evidence.⁵⁸³

The VFPA is confident that the model was applied appropriately and conservatively. Recognizing that all models, including the Roberts Bank ecosystem model, have limitations, the VFPA relied on multiple lines of evidence to assess potential Project-related effects to biophysical valued components. Other lines of evidence included other models, extensive field sampling, literature reviews, other environmental assessments, advice from scientific experts, expert opinion, and ITK.

The VFPA appropriately applied evidence from the Roberts Bank ecosystem model as one tool, used in combination with these other lines of evidence to assess potential effects. Different and complementary lines of evidence were used to evaluate other impact pathways not represented in the model, for example, other pathways of effects such as migratory disruption and temporary construction-related effects, including noise, light, and dredging.⁵⁸⁴

The VFPA relied on expert opinion to integrate these multiple lines of evidence and to arrive at overall conclusions regarding predicted productivity changes. In some cases, this involved integrating both qualitative and quantitative information. The VFPA relied on the professional judgment of its independent consultants for this integration. For some valued components, the conclusions of this integration may have resulted in an assessment of productivity change that was different from the results indicated by the Roberts Bank ecosystem model. The scientists conducting the assessments did not "average" the results of multiple lines of evidence. Rather, they sought to determine which pathways of effects were most likely to have a negative effect on each ecosystem component, and drew conclusions based on the magnitude of potential effects along that effect pathway.

For instance, the overall conclusion of the productivity change for Dungeness crab, prior to the application of mitigation, was a 'minor' change, even though the model indicated a

⁵⁸¹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C3 and C4.

⁵⁸² CEA Agency. October 2002 (Updated December 2011). Operational Policy Statement. Follow-up Programs under the *Canadian Environmental Assessment Act*.

⁵⁸³ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1372.

⁵⁸⁴ CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1388-1391.

negligible change to productivity.⁵⁸⁵ Similarly, as described in Chapter XI of these Closing Remarks, the model predicted that changes in juvenile salmon productivity from the terminal and causeway footprints would be positive and within the minor category (ranging between 6% and 30%; for juvenile Chinook and chum salmon, the ecosystem forecasted an increase in productivity of 10% and 9%, respectively, primarily due to forecasted increases in the biomass of benthic macrofauna in the wave shadow of the terminal). However, to account for potential effects on juvenile salmon that may result from Project construction and operation that were not captured by the ecosystem model (e.g., direct mortality, altered migratory pathways), the VFPA integrated other lines of evidence into a qualitative assessment of juvenile Chinook and chum salmon. As other lines of evidence suggest that potential Project-related effects on juvenile salmon would be negative, the VFPA determined that prior to mitigation, the Project may result in a minor loss in juvenile salmon productivity. With mitigation, including offsetting, the VFPA determined that Project-related change in the productivity of juvenile salmon will be negligible.⁵⁸⁶

4. Conclusion

The Roberts Bank ecosystem model is a key line of evidence used in the assessment of potential Project-attributed changes to productivity of the biophysical valued components of the EIS. The model is science-based, quantitative, and objective. The VFPA applied the model across the biophysical assessment to support the development and assessment of mitigation measures. The Roberts Bank ecosystem model forecasts potential direct and indirect effects of the Project transmitted through the food web and ecological interactions such as predation, competition, and movement, and also allows the VFPA to rigorously document the uncertainty in those predictions.

The Roberts Bank ecosystem model represents an innovative, advanced, and conservative tool to forecast and assess Project-related productivity changes within the ecologically dynamic and complex Fraser River estuary marine environment. Ecosystem modelling provides quantitative forecasts of effects, such as the direct effects associated with the Project footprint, and indirect effects such as changes in habitat suitability and related changes in predator prey interactions that cannot be captured by a combination of single species models or through qualitative approaches. The forecasts generated from the model also supported the initial development of offsetting measures.

The VFPA has committed to developing and implementing Follow-up Program elements for several key indicator species to evaluate the model forecasts.⁵⁸⁷ The Follow-up Program will be developed within an adaptive management approach, where corrective action, if deemed necessary, will be implemented to ensure mitigation effectiveness. The VFPA will develop the Follow-up Program elements in collaboration with DFO, Tsawwassen First Nation, Musqueam First Nation other Indigenous groups, and regulators through the next stages of the Project.

⁵⁸⁵ CEAR Doc 934, VFPA response to IR5-29.

⁵⁸⁶ CEAR Doc 934, VFPA response to IR11-20.

⁵⁸⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix C.

The VFPA has invested significant resources to develop scientific programs, partnerships, and assets to help manage the ecological health and integrity of Roberts Bank. The Roberts Bank ecosystem model is one example. The VFPA is confident that continued application of the model will support the VFPA's goal of sustaining the immediate Project area as a productive marine ecosystem.

CHAPTER IX. OFFSETTING

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
1. Section 11 – Marine Vegetation Effects Assessment	181
2. Section 12 – Marine Invertebrates Effects Assessment	181
3. Section 13 – Marine Fish Effects Assessment	181
4. Section 17 – Mitigation for Marine Biophysical Valued Components	181
PCU Sections	
1. Section 3.2.1 – Marine Vegetation	1210
2. Section 3.2.2 – Marine Invertebrates	1210
3. Section 3.2.3 – Marine Fish	1210
CEA Agency IRs and Response	
1. IR #6 – Ecosystem Modelling	314
2. IR #33 – Wetlands Identification and Characterization	314
3. IR #23 – Implications of Federal Policy of Wetlands Conservation	314
Panel IRs and Responses	
1. Preamble to Offsetting-related Information Requests (IR7-24 to -27, IR7-30, IR10-10, IR11-13 to -19, IR11-21) - RBT2 Offsetting Approach	934
2. IR7-24 – Marine Fish Mitigation – Tug Basin	934
3. IR7-25 – Marine Fish Mitigation – On Site Offsetting Concepts: Sandy Gravel Beach	934
4. IR7-26 – Marine Fish Mitigation – On-Site Offsetting Concepts: Net Gain	934
5. IR7-27 – Marine Fish – On Site Offset Features	934
6. IR7-28 – Marine Fish – Mitigation, Habitat Compensation	934
7. IR7-29 – Marine Fish – Mitigation, Offsetting (Eelgrass)	934
8. IR7-30 – Marine Biophysical Components – Offsetting as a Mitigation Measure	934
9. IR7-31 – Marine Biophysical Components – Mitigation Measures/Offsetting	934
10. IR9-05 – Coastal Birds – Residual Effects	934
11. IR10-01 – Current Use of Lands and Resources for Traditional Purposes – Issues, Views and Concerns of Indigenous Groups Specifically: Appendix IR 10-01-C2 – Musqueam First Nation	934
12. IR10-10 – Current Use of Land and Resources for Traditional Purposes, Mitigation Measures, Offsets	934
13. IR11-14 – Mitigation Measure (Offsetting) – Equivalency Analysis for Offsetting	934
14. IR11-15 – Mitigation Measure (Offsetting) – Consideration of Time Lags and Uncertainty	934
15. IR11-16 – Mitigation Measure (Offsetting) – On-site Habitat Concept for Intertidal Marsh	934
16. IR11-17 – Mitigation Measure (Offsetting) – On-site Habitat Concept for Sandy Gravel Beach	934
17. IR11-18 – Mitigation Measure (Offsetting) – On-site Habitat Concept for Subtidal Rock Reef	934
18. IR11-19 – Mitigation Measure (Offsetting) – On-site Habitat Concept for Eelgrass	934
19. IR11-21 – Marine Vegetation – Effects Assessment for Wetlands	934
20. IR11-22 – Marine Vegetation – Blue and red listed wetland communities	934

Documents Relevant to Topic	CEAR Doc #
21. IR13-17 – Marine Vegetation – Wetlands and Blue and Red listed communities, Cumulative Effects Assessment	1360

2. Overview

The VFPA's track record for offsetting the effects of port development on marine ecosystems comprises the most expansive, successful, and long-term program for enhancing aquatic habitat in the history of BC. The VFPA recognizes the importance of offsetting as a mitigation measure for the Project. The VFPA is a committed, long-term steward of the Fraser River estuary and has deep institutional experience to effectively manage the permanent success of offsetting programs. The VFPA has a team of qualified experts that includes biologists, engineers, coastal geomorphologists, and Indigenous consultation specialists who are committed to the long-term success of the Project's offsetting measures to ensure the created habitats are functioning as intended and that ecosystem and species productivity goals are achieved. With offsetting, the VFPA expects the Project will not only result in 'no significant residual adverse effects' to biophysical valued components, but will also achieve a net increase in overall Roberts Bank ecosystem productivity.

The VFPA adopted a hierarchy approach for mitigation measures. First, the VFPA considered measures that would avoid potential adverse effects. Second, the VFPA considered measures that would reduce potential adverse effects where these could not be avoided completely. Third, the VFPA considered measures that would offset residual adverse effects. Additionally, the VFPA has proposed a Follow-up Program to address any uncertainty in either the effects predictions or the effectiveness of mitigation.⁵⁸⁸ This chapter discusses the VFPA's proposed offsetting program, which addresses potential effects that cannot be avoided or reduced/controlled.

The VFPA's offsetting measures currently exist at a preliminary conceptual design level, within an offsetting framework.⁵⁸⁹ The VFPA developed its offsetting framework using multiple lines of evidence, including ITK and Indigenous group input, empirical evidence such as field data, model outputs, literature review, and professional judgment. The framework is consistent with the ecosystem and productivity approach recommended in DFO's policy for large projects,⁵⁹⁰ and expert advice, including that provided by the Productive Capacity TAG.⁵⁹¹ The offsetting framework is consistent with best practice and sets a strong foundation for the development of a final Offsetting Plan.⁵⁹²

The VFPA has proposed onsite offsetting concepts based on the following five principles:

⁵⁸⁸ CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 182. See also CEAR Doc 1704, VFPA oral presentation, May 15, 2019, at slide 5.

⁵⁸⁹ CEAR Doc 181, EIS, Volume 3, at s. 17.

⁵⁹⁰ CEAR Doc 934, Preamble to Offsetting IRs, at p. 2, and CEAR Doc 934, VFPA response to IR11-14, at pp. 2-3.

⁵⁹¹ CEAR Doc 934, Preamble to Offsetting IRs, at p. 2; CEAR Doc 934, VFPA responses to IR11-14, at pp. 2-3, IR7-28, at p. 13; CEAR Doc 314, VFPA response to IR #6, at p. 2; CEAR Doc 181, EIS, Volume 1, at s. 7.4.

⁵⁹² CEAR Doc 181, EIS, Volume 3, at s. 17.3

- Soften the Project's proposed hard shoreline to create habitats that are consistent with the ecological functions of the estuary;
- Enhance or create offsetting habitat that suitably replaces aquatic habitat affected by the Project, but delivers higher ecological value or productivity to that which it is replacing;
- Build habitat types for which there is a successful past precedent;
- Consider physical changes arising from Project development in determining the types of habitats to be built; and
- Include habitats that provide benefits for species of concern to Indigenous groups.⁵⁹³

Based on these principles, the VFPA has proposed onsite offsetting for five habitat types: intertidal marsh, sandy gravel beach, mudflat, subtidal rock reef, and eelgrass, which together are expected to create annual net gains in productivity.⁵⁹⁴ The VFPA has decades of experience in successfully building offsetting habitats, and is confident that these habitats will provide wide benefits to numerous species within the Roberts Bank ecosystem.

The VFPA is proposing to create intertidal marsh habitat along the widened causeway and adjacent to the new terminal.⁵⁹⁵ Intertidal marsh is a key wetland habitat that provides structural habitat used as refuge and foraging areas for fish, invertebrates, and wildlife. Intertidal marsh is also important for shoreline stabilization, carbon storage, and nutrient supply.

Sandy gravel beach habitat is proposed along the widened causeway.⁵⁹⁶ Sandy gravel beaches are primarily unvegetated and provide spawning habitat for forage fish such as surf smelt and sand lance, while also providing important habitat and ecological function for other species such as prey for coastal birds.⁵⁹⁷

Mudflats are primarily unvegetated muddy or sandy wetland habitats exposed to the air by changing tides. Proposed mudflat areas are expected to support large numbers of fish and birds and provide a key growth medium for biofilm.⁵⁹⁸ Onsite mudflat offsetting habitats will specifically address and improve on aspects of function to promote biofilm colonization, such as locating sites at appropriate elevations and using appropriate grain sizes. The VFPA has committed to consult with ECCC to select the best location for the creation of mudflat habitat to support biofilm.⁵⁹⁹ The VFPA has additionally committed to the development of a biofilm construction manual, which will describe techniques and best practices for developing and maintaining this highly productive offsetting habitat type.⁶⁰⁰ The manual is expected to serve as a useful guide for the VFPA in its design and construction of mudflat

⁵⁹³ CEAR Doc 934, Preamble to Offsetting IRs, at p. 6.

⁵⁹⁴ CEAR Doc 934, VFPA response to IR7-26.

⁵⁹⁵ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, at p. 95.

⁵⁹⁶ CEAR Doc 934, VFPA response to IR7-26.

⁵⁹⁷ CEAR Doc 181, Volume 3, at s. 17.3, p. 17-13.

⁵⁹⁸ CEAR Doc 181, Volume 3, at s. 17.3, p. 17-13.

⁵⁹⁹ CEAR Doc 2001, Updated Project Commitments, at p. 8.

⁶⁰⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #43. See also CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at p. 2884.

habitat, as well as for other marine developers and offsetting practitioners active in the Fraser River estuary.

The VFPA is proposing to create areas of subtidal rock reef adjacent to, and contiguous with, existing productive rock reefs constructed as part of the DP3 Project. Subtidal rock reefs provide refuge, foraging and spawning habitat for invertebrates and fish such as crabs, rockfish, and lingcod.⁶⁰¹ They also provide stable habitat for the colonization of sessile marine vegetation, which contributes to the productivity and physical habitat of the site.

Native eelgrass habitat is proposed north of the Project terminal, representing the largest single eelgrass transplant project to be completed in the Pacific Northwest.⁶⁰² Eelgrass beds are highly productive habitats, providing numerous ecological functions such as shelter, spawning, rearing, and foraging habitat for many species, including juvenile Chinook salmon and Dungeness crab. Through its ongoing consultation with Indigenous groups, the VFPA has received requests to enhance current proposed offsetting measures, including increasing the area of onsite eelgrass.⁶⁰³ The VFPA has committed to expanding offsetting, based on Indigenous and regulator input, with a focus on priority species and habitats, such as eelgrass.⁶⁰⁴

Throughout the environmental assessment process, the VFPA has consulted with Indigenous groups on potential onsite offsetting measures for the Project. The VFPA has incorporated ITK into the offsetting framework and is committed to further engagement with Indigenous groups to provide opportunities for input as offsetting planning advances, and to continue to gather information on species and habitat types that are a priority to Indigenous groups.⁶⁰⁵ In addition to priority species and habitats, Indigenous groups have expressed the importance of monitoring for invasive species within offsetting sites. Based on this input, the VFPA has specified that monitoring for invasive species (plants and animals) will be part of the Follow-up Program.⁶⁰⁶ As an example of the VFPA's approach to consultation, the VFPA has developed community-specific offsetting funding agreements with Indigenous groups with interests that overlap with the Project terminal footprint. The VFPA is also developing work plans with each Indigenous group to provide a structured mechanism for identifying and prioritizing Indigenous offsetting goals and projects, and for collaborating on development of the Offsetting Plan. These work plans will provide a structured mechanism for identifying and prioritizing Indigenous offsetting goals and projects, and for collaborating on development of the Offsetting Plan.⁶⁰⁷

Furthermore, in response to feedback received during the VFPA's Indigenous Advisory Forum in February 2019, the VFPA has committed to knowledge sharing habitat and offsetting sessions on topics of interest to Indigenous groups. These information sharing

⁶⁰¹ CEAR Doc 934, VFPA response to IR11-18.

⁶⁰² CEAR Doc 934, VFPA response to IR7-26.

⁶⁰³ CEAR Doc 2001, Updated Project Commitments, at p. 8.

⁶⁰⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #40.

⁶⁰⁵ CEAR Doc 1000, VFPA response to IR7-31.

⁶⁰⁶ CEAR Doc 2001, Updated Project Commitments, at p. 7 and Appendix C, Tables C5, C6, C11

⁶⁰⁷ CEAR Doc 1683, VFPA Response to Additional Information Request February 22, 2019 #1, at p. 5.

sessions will ensure ITK and Indigenous input informs the development and implementation of the Offsetting Plan. The VFPA is also committed to offering and coordinating offsetting-related site visits with Indigenous knowledge holders.⁶⁰⁸

In addition to the measures presented within the offsetting framework, the VFPA is committed to enhancing offsetting, based on Indigenous and regulator input, with a focus on priority species and habitats.⁶⁰⁹ For example, through its ongoing consultation with Indigenous groups, the VFPA has received requests to enhance current proposed offsetting measures, including the following:

- Increasing the area of currently proposed onsite habitat and habitat types (e.g., increased areas of eelgrass are preferred);
- Enhancing the features and/or productivity of currently proposed onsite offsetting (e.g., including of oyster shells to enhance juvenile crab habitat); and
- Identifying and including new offsite opportunities to enhance the productivity and/or habitat of marine species whose population health and/or recovery is a priority for Indigenous groups and federal regulators, such as Chinook salmon.⁶¹⁰

The onsite offsetting measures proposed provide a strong foundation for further consultation with Indigenous groups and regulators toward the goal of strategically enhancing offsetting based on priority species and priority habitats. For example, the VFPA has clearly heard from Indigenous groups regarding the importance of enhancing offsetting to increase the benefits to priority species, such as Chinook salmon, Dungeness crab, and priority habitats such as eelgrass.

The detailed Offsetting Plan will be submitted in support of a *Fisheries Act* Authorization, and will build from the offsetting framework to address the needs of priority species and/or habitat types. The VFPA will develop the Offsetting Plan in collaboration with federal regulators and Indigenous groups as part of the permitting phase of the Project.

It is anticipated that the success and effectiveness of offsetting measures will be monitored as part of permitting requirements of the *Fisheries Act*, and additionally through the VFPA's commitment to develop and implement the Follow-up Program under an adaptive management approach.⁶¹¹ The VFPA is confident that the Offsetting Plan will not only maintain and enhance natural productivity of the Roberts Bank ecosystem, but it also has the potential to make a meaningful contribution to the future health and recovery of Chinook salmon and the endangered SRKW that prey upon them. These two species have been identified as highly important to Indigenous groups, Panel participants, and regulators throughout the public hearing process.

⁶⁰⁸ CEAR Doc 1683, VFPA Response to Additional Information Request February 22, 2019 #1, at p. 13.

⁶⁰⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #40.

⁶¹⁰ CEAR Doc 2010, Updated Project Commitments, at p. 8.

⁶¹¹ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, p. 103. See also CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C5, C6, C10, C11.

3. Key issues raised and VFPA response

(a) Additional offsetting

In its submission to the Review Panel, DFO recommended that additional offsite opportunities within the Fraser River estuary be included in the final Offsetting Plan to remediate, create, or enhance fish habitat.⁶¹²

The offsetting measures proposed to date are appropriate at the conceptual level, providing the foundation for further consultation with Indigenous groups and regulators toward the goal of enhancing proposed offsetting for the Project. As described above, the VFPA has committed to enhancing offsetting for priority species and habitats. This will include additional offsite opportunities within and around the Fraser River estuary to remediate, create, and enhance priority species habitats.⁶¹³

The VFPA is committed to continued consultation with DFO and Indigenous groups to further develop and finalize the Offsetting Plan. The Offsetting Plan will be a key component of the VFPA's application to DFO for a *Fisheries Act* Authorization.⁶¹⁴ Once complete, the VFPA envisions its Offsetting Plan will maintain the productivity of commercial, recreational, and Aboriginal fisheries pursuant to DFO's policy statement and will meet the requirements of the pending amendments to the *Fisheries Act* under Bill C-68.⁶¹⁵

(b) Effectiveness of offsetting

In its submission to the Review Panel, DFO⁶¹⁶ raised concerns on the effectiveness of the VFPA's offsetting, particularly, whether the proposed offset concepts would counterbalance residual adverse effects of the Project on invertebrates, fish, and their habitats. DFO recommended that more than one approach to assess the benefits of offsetting be used.⁶¹⁷

The VFPA is confident that the proposed offsetting measures will achieve the goal of 'no net loss' to ecosystem productivity. The VFPA is committed to ensuring that offsetting measures implemented to offset Project effects are monitored to confirm effectiveness.⁶¹⁸ The VFPA will establish performance indicators in consultation with DFO and Indigenous groups to inform the monitoring program.⁶¹⁹ The VFPA expects that additional monitoring requirements will be included in any *Fisheries Act* Authorization for the Project. If monitoring results indicate that offsetting is not functioning as predicted, the VFPA will apply

⁶¹² CEAR Doc 1630, DFO written submission, at p. 29. See also CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1599.

⁶¹³ CEAR Doc 2001, Updated Project Commitments, at p. 8. See also CEAR Doc 1683, VFPA Response to Additional Information Request February 22, 2019 #1, at p. 6.

⁶¹⁴ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1597.

⁶¹⁵ Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting, November 2013.

⁶¹⁶ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1586-1587.

⁶¹⁷ CEAR Doc 1630, DFO written submission, at pp. 28-29.

⁶¹⁸ CEAR Doc 934, Preamble to Offsetting-related IRs, at p. 10. See also CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C5, C6.

⁶¹⁹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1508.

its adaptive management approach and will implement corrective action, if deemed necessary, to ensure offsetting effectiveness.

The VFPA has committed to including more than one approach to assessing the benefits of offsetting. This could include, for example, estimating the production per functional group per habitat type.⁶²⁰ The approaches to be used to assess the benefits of offsetting will be described within the final Offsetting Plan, and will be developed in consultation with regulators and Indigenous groups.

The VFPA has demonstrated that offsetting projects can be effective. In addition to the approximately 10 hectares of existing, proven, and highly productive habitat credits in the VFPA's habitat bank, the VFPA has inventoried dozens of other offsetting opportunities for further discussion with Indigenous groups and regulators to determine relative priorities in the advancement of the Offsetting Plan.

During the technical session on May 22, 2019 of the public hearing, DFO's representative from their Fish and Fish Habitat Protection Program described habitat banking, and in particular the VFPA's habitat banking, as follows:

"Now, in terms of habitat banking, habitat banking is identified in our policy as one way to undertake an offsetting. There is a few advantages to habitat banking.

What happens in a habitat bank is a proponent goes out, constructs the offsetting, the offsetting is monitored until it is fully productive and then, at that time, it is then entered into a ledger or a tabulation, excuse me, in terms of the available habitat.

So benefits to that is it reduces or eliminates completely the uncertainty. We know the habitat is there, we know it's viable, and it reduces the time lag or eliminates the time lag.

So again, the Port -- as was previously mentioned, the Port is a leader nationally in terms of creation of habitat banks. They have created quite a large bank and they have proven successful in terms of creating habitat bank."⁶²¹

⁶²⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #40.

⁶²¹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1602-1603.

(c) Coastal geomorphic processes

In its submission to the Review Panel, DFO recommended that the design of any future offsetting habitat concepts should consider potential eutrophication and changes in water drainage that could occur as a result of the Project.⁶²²

As presented in the EIS, the VFPA determined that Project-related environmental effects that could change water quality and that could lead to anoxic conditions are unlikely.⁶²³ Nevertheless, the VFPA has considered the geomorphic conditions that are predicted to occur in the future with the Project in place by the Roberts Bank Coastal Geomorphology model in its offsetting concepts.⁶²⁴ The proposed offsetting concepts presented within the offsetting framework have been designed by a multidisciplinary team of marine biologists, coastal engineers and geoscientists, hydrodynamic modellers, and specialists from the VFPA's Habitat Enhancement Program, with appropriate design considerations and accounting for site-specific biophysical conditions and constraints that will prevail with the Project in place.⁶²⁵ The VFPA designed the preliminary onsite offsetting habitat concepts to be ecologically representative of the Fraser River estuary, to mimic natural processes in the intertidal flats, and placed them in areas with the most conducive physical conditions post-Project. For example, to facilitate dewatering and avoid pooling of water during low tide events, and to avoid the associated potential for excessive accumulation of organic carbon and nutrients, the VFPA included an appropriate slope in its intertidal marsh habitat concepts.⁶²⁶

The VFPA has also accounted for potential effects related to climate change in its offsetting concepts, including sea level rise. For instance, for offsetting marsh plants, the VFPA compared offset design to adjacent areas that have established marshes. The VFPA then selected the higher elevation and designed the marshes to that elevation in order to give new offset habitats additional resilience against predicted higher water levels.⁶²⁷

The VFPA has committed to a Follow-up Program element for evaluating predicted changes in the physical environment and governing coastal geomorphic processes, as well as providing foundational information that will facilitate interpretation of data collected in other Follow-up Program elements.⁶²⁸ The purpose of the Follow-up Program will be to verify effects predictions on Project-related changes to geomorphic features and sediment texture, and erosion and deposition. The VFPA has committed to using ortho-rectified aerial photographs to monitor for changes to sensitive habitat types and tidal flat characteristics, while LiDAR and bathymetric surveys will monitor zones of predicted sediment erosion and deposition. The VFPA will also ensure that offsetting habitat concepts will fit in with the

⁶²² CEAR Doc 1630, DFO written submission, at p. 19.

⁶²³ CEAR Doc 181, EIS, Volume 2, at s. 9.7.8. See also CEAR Doc 934, VFPA response to IR12-13.

⁶²⁴ CEAR Doc 934, VFPA response to IR7-27, at p. 2.

⁶²⁵ CEAR Doc 934, VFPA response to IR11-15, at p. 5.

⁶²⁶ CEAR Doc 934, VFPA response to IR12-13, at p. 8.

⁶²⁷ CEAR Doc 1797, Transcript, May 22, 2019, at pp. 1510-1511.

⁶²⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #81, and Appendix C, at Table C2.

natural processes of the intertidal flats.⁶²⁹ The Follow-up Program will be developed in consultation with the Follow-up Program Advisory Committee, DFO, NRCan, and interested Indigenous groups. It will be designed under an adaptive management approach, wherein monitoring results will be used to evaluate if management action is needed.⁶³⁰

The VFPA is confident that the offsetting measures, presently defined at a conceptual level, have adequately captured potential changes related to coastal geomorphic processes. The VFPA has extensive experience in successfully selecting appropriate locations for offsetting, and developing and maintaining offsetting sites such that they are fully functional for the long-term.

(d) Offsetting ratio

In its submission to the Review Panel, ECCC recommended that the VFPA incorporate a minimum 4:1 offsetting ratio to address time lags and technical limitations with offsetting wetland habitats⁶³¹ generally, and intertidal mudflat and intertidal and shallow subtidal sandflats in particular.⁶³² Similarly, Musqueam requested the Review Panel set a condition requiring onsite habitat offsets at a ratio of 10:1 for juvenile Fraser River salmon.⁶³³

The VFPA does not agree that these proposed offsetting ratios are appropriate in the context of this Project. Recognizing the complexity of the Roberts Bank environment, the VFPA incorporated an ecosystem-based approach to evaluate existing and future ecosystem productivity using, among other lines of evidence, the Roberts Bank ecosystem model.⁶³⁴ The outputs of the Roberts Bank ecosystem model informed the types and approximate amounts of offsetting required by the Project, as presented in the offsetting framework. The VFPA used the best available science and focused offsetting concepts to those habitats that would be most productive for fish, vegetation, invertebrates, and birds. This approach is consistent with the recommendations from the Productive Capacity TAG⁶³⁵ and current federal science advice and policy for major projects,⁶³⁶ and additionally aligns with DFO's science guidance on offsetting.⁶³⁷ For instance, Randall et al. state:

“For major projects, productivity-based approaches that evaluate impacts to fisheries will be more meaningful than habitat measures when impacts to aquatic environments are

⁶²⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C2.

⁶³⁰ CEAR Doc 2001, Updated Project Commitments, at p. 13.

⁶³¹ CEAR Doc 1766. ECCC oral presentation, at slide 33. See also CEAR Doc 1637, ECCC written submission, at pp. 48, 57. See also Chapter XIV of these Closing Remarks.

⁶³² CEAR Doc 1637, ECCC written submission at p. 48.

⁶³³ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 1661-1662.

⁶³⁴ CEAR Doc 181, EIS, Volume 3, at s. 10.3

⁶³⁵ CEAR Doc 181, EIS, Volume 1, at s. 7.4. See also CEAR Document 934, Preamble in Support of Responses to IR3-01 to IR3-24 – Roberts Bank Ecosystem Model, at Appendix IR3-A.

⁶³⁶ CEAR Doc 934, VFPA response to IR11-15, at pp. 4-5.

⁶³⁷ Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting, November 2013.

evaluated in the environmental assessment process, along with social, economic and other environmental effects.”⁶³⁸

The VFPA’s approach supports the regulatory objective for maintaining ongoing productivity or habitat function, and is aligned with DFO’s Policy which states: “very large-scale impacts that are likely to result in ecosystem transformation will require the most detailed estimates of impacts to productivity, likely involving quantitative fish population models.”⁶³⁹ The VFPA notes that DFO’s *Fisheries Productivity Investment Policy: A Proponent’s Guide to Offsetting* does not propose specific offsetting ratios, but rather indicates that the amount of offsetting should be determined as part of the key steps in preparing an offsetting plan.⁶⁴⁰

Areas or ratios are often used as an attempt to address factors such as uncertainty as it relates to changes in productivity and the effectiveness of the offsetting habitat, as well as time lag, by simply building more habitat.⁶⁴¹ The VFPA is very experienced in building habitat and is confident that uncertainty can be reduced by focusing on maintaining productivity. Based on the Roberts Bank ecosystem model, an annual net increase in biomass of over 1,100 tonnes with the proposed offsetting is predicted.⁶⁴² The final Offsetting Plan will provide a comprehensive and broadly supported approach to offsetting that will ensure the productivity of the Roberts Bank ecosystem, and marine biophysical valued components, is maintained or enhanced over the long-term.

In addition to assessing ecosystem productivity, the VFPA assessed the condition and function of all wetlands within the Project area. The EIS fully considered marine vegetation, including shallow subtidal habitats, and the proposed offsetting accounts for anticipated losses in productivity from both intertidal and subtidal areas. The assessment determined that with mitigation, including the onsite offsetting currently proposed, there would be no residual effects and no net loss to wetland function.⁶⁴³ The VFPA is confident that the proposed offsetting is adequate to ensure no net loss of wetland function. The VFPA will develop and implement the final Offsetting Plan for the purpose of maintaining and enhancing natural productivity of the Roberts Bank ecosystem.

The VFPA understands that the location, nature, and accounting for offsetting required will be determined by DFO as part of a *Fisheries Act* Authorization, and in consultation with Indigenous groups during development of the final Offsetting Plan. The final Offsetting Plan will be developed in accordance with DFO’s policy and will incorporate proven measures to minimize Project-related effects to productivity.⁶⁴⁴

⁶³⁸ Randall, R. G., M. J. Bradford, K. D. Clarke, and J. C. Rice. 2013. "A Science-based Interpretation of Ongoing Productivity of Commercial, Recreational or Aboriginal Fisheries." DFO Canadian Science Advisory Secretariat. Research Document 2012/112, at p. 13, cited in CEAR Doc 1360, VFPA response to IR11-15, at p. 5.

⁶³⁹ *Fisheries Productivity Investment Policy: A Proponent’s Guide to Offsetting*, November 2013.

⁶⁴⁰ *Fisheries Productivity Investment Policy: A Proponent’s Guide to Offsetting*, November 2013, at p. 16.

⁶⁴¹ CEAR Doc 934, VFPA response to IR11-14.

⁶⁴² CEAR Doc 934, VFPA response to IR7-26.

⁶⁴³ CEAR Doc 934, VFPA Response to IR11-21 – Wetland Functions Assessment.

⁶⁴⁴ *Fisheries Productivity Investment Policy: A Proponent’s Guide to Offsetting*, November 2013.

Therefore, the VFPA submits that the appropriate time to determine the necessary amount of offsetting is at the regulatory stage. Furthermore, the VFPA notes that it will be DFO that issues the *Fisheries Act* Authorization, and not ECCC. While it will be open to DFO and the VFPA to consider ECCC's recommendation as part of the development of the Offsetting Plan, the VFPA submits that the Review Panel should be careful not to fetter DFO's discretion in determining the appropriate amount of offsetting habitat.

The VFPA is committed to further discussion with DFO and Indigenous groups regarding the best approach to offsetting for this Project, and is confident that the Offsetting Plan will successfully maintain and enhance habitat in the Roberts Bank ecosystem. Further, the VFPA is committed to monitoring the success and effectiveness of the offsetting measures, as part of the Follow-up Program and future permitting requirements, and will respond to any deficiencies (if they occur) as part of the VFPA's adaptive management approach. As part of the Follow-up Program, the VFPA will develop and finalize monitoring expectations in consultation with DFO, ECCC, Indigenous groups, and the Follow-up Program Advisory Committee. The VFPA will monitor and maintain created habitats until they are functioning as intended, and productivity goals have been achieved.

(e) Time lag

Regulators (such as DFO⁶⁴⁵ and ECCC⁶⁴⁶) and Indigenous groups (in particular, Musqueam⁶⁴⁷) raised concerns with respect to potential time lags between the onset of the impacts from the Project and the functioning of offset habitat.⁶⁴⁸

The VFPA agrees that time lag is an important consideration when developing offsetting measures and will account for the potential loss in productivity due to time lag within the final Offsetting Plan to ensure that productivity in the Fraser River estuary is maintained.⁶⁴⁹ The VFPA's approach to identifying and addressing productivity losses from time lags will include efforts to avoid and minimize productivity losses, and, if required, create other increases in productivity to account for any residual losses. The quantification of predicted productivity losses will be developed in consultation with DFO and Indigenous groups, as part of the Offsetting Plan.⁶⁵⁰

As described above, the VFPA's history of developing successful offset sites has provided it with the knowledge and experience to effectively address time lag. The VFPA is confident that productivity losses from time lag can be substantially minimized through the implementation of effective construction and planting methods. The VFPA primarily achieves this by ensuring that the vegetation establishes quickly, reducing the duration of time from when the habitat is first disturbed by project construction to when the created habitat is

⁶⁴⁵ CEAR Doc 1630, DFO written submission, at p. 28.

⁶⁴⁶ CEAR Doc 1766, ECCC oral presentation, at slide 33. See also CEAR Doc 1637, ECCC written submission, at pp. 48, 57.

⁶⁴⁷ CEAR Doc 1678, Musqueam First Nation written submission, at p. 10.

⁶⁴⁸ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1599, 1629

⁶⁴⁹ CEAR Doc 934, VFPA response to IR7-27, at p. 3.

⁶⁵⁰ CEAR Doc 934, VFPA response to IR7-27, at p. 4.

thriving and fully productive, therefore offsetting construction impacts. The VFPA will also minimize time lag by constructing offsetting habitat ahead of Project impacts, wherever possible. For example, the proposed rock reef sites can be constructed ahead of Project construction. This would eliminate the time lag for this habitat type because colonization of rock reefs by fish, invertebrates, and macroalgae is known to occur quickly, while some habitat function occurs instantaneously.⁶⁵¹ Another example of how the VFPA has demonstrated its ability to successfully minimize time lag is by propagating marsh plants several years ahead of planting the habitat sites to ensure that healthy plant stock harvested from local native plants is used.⁶⁵² The VFPA may also utilize fully functioning habitat credits from its habitat bank. Further, if necessary, the VFPA will create other increases in productivity to account for any residual losses.⁶⁵³ The measures to be implemented to address time lag will be incorporated into the design and schedule of offsetting sites, and will be presented within the Offsetting Plan.

As discussed above, the VFPA is committed to long-term monitoring and to applying adaptive management techniques to achieve ecosystem and species productivity goals. The VFPA expects that the success and effectiveness of offsetting measures will be monitored as part of permitting requirements of the *Fisheries Act* Authorization, and the RBT2 Follow-up Program.⁶⁵⁴ Through these measures, the VFPA is accountable for ensuring offsetting measures are functioning successfully and that productivity goals are achieved.

(f) Juvenile salmon

In its submission to the Review Panel, Musqueam First Nation stated that the VFPA did not provide evidence that intertidal marshes are the most effective mitigation measure for juvenile Chinook salmon, and requested that the VFPA provide such evidence in the context of 'no net loss.'⁶⁵⁵

The VFPA is confident the proposed offsetting will effectively mitigate potential effects to juvenile Chinook salmon, and that DFO's protection policy as it relates to effects on Chinook salmon can be met. As part of other projects and the Habitat Enhancement Program, the VFPA has successfully built habitats that benefit rearing Chinook salmon for decades. For example, the VFPA-created habitat compensation areas constructed as part of the DP3 Project continue to provide habitat for out-migrating juvenile salmon. Six transplanted marshes were targeted mitigation for juvenile Chinook salmon and other marine fish, and have been proven effective in providing the same functional attributes as naturally occurring marsh, including productive foraging and refuge opportunities.⁶⁵⁶ Effectiveness monitoring

⁶⁵¹ CEAR Doc 934, VFPA response to IR11-15, at p. 3.

⁶⁵² CEAR Doc 934, VFPA response to IR7-27, at p. 5.

⁶⁵³ CEAR Doc 934, VFPA response to IR7-27.

⁶⁵⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C2, C5, C6, C10, C11.

⁶⁵⁵ CEAR Doc 1458, Musqueam First Nation written submission, at p. 7.

⁶⁵⁶ CEAR Doc 934, VFPA response to IR11-28.

has proven juvenile chum and Chinook salmon presence during each year of post-construction sampling, in every constructed habitat type.⁶⁵⁷

The VFPA has the proven technical capability to undertake large-scale translocation projects and is committed to long-term monitoring that allows for adaptive management and remediation, if required, to ensure transplant success.⁶⁵⁸ Taking into account juvenile and adult Chinook salmon, the Project, with offsetting, is expected to result in a net gain in Chinook salmon productivity. Proposed offsetting will benefit juvenile Chinook, and the indirect effects of the terminal will benefit Chinook rearing overall, leading to a gain in their productivity.⁶⁵⁹ The VFPA is confident in its ability to build successful habitat for juvenile Chinook salmon.⁶⁶⁰

As discussed above and as presented in the Updated Project Commitments, the VFPA agrees with Indigenous groups, regulators, and the public on the importance of Chinook salmon. Going forward, the VFPA has committed to addressing limiting factors for Chinook, with a view to achieving the greatest benefits possible from offsetting, including through innovative and long-term program-based approaches.⁶⁶¹ The VFPA is aware of many aquatic habitat enhancement opportunities that would create precisely the kind of productivity gains that Chinook and other salmon species require for population recovery and growth and is confident in its ability to successfully create effective juvenile salmon habitat. For example, as described above, habitat compensation created by the VFPA for the DP3 Project continues to provide habitat for out-migrating juvenile salmon.⁶⁶²

The VFPA will ensure offsetting measures are successful through the monitoring and management efforts implemented as part of permitting requirements of the *Fisheries Act* Authorization, and the RBT2 Follow-up Program with adaptive management approach.⁶⁶³

4. Conclusion

The VFPA is a recognized leader in offsetting, and is a committed, long-term steward of the Fraser River estuary with a proven track record of successfully building and maintaining offsetting habitat. The VFPA has the resources and expertise to ensure the success of offsetting projects today and for decades to come and, through its commitment to monitoring and adaptive management, is accountable for the success of offsetting.

The VFPA's ecosystem-based approach to offsetting is appropriate and consistent with relevant federal policies. Using this approach, the VFPA developed the offsetting framework with conservatism, innovation, and the best available science. The VFPA is confident in the expected success of the conceptual offsetting measures presented within the offsetting

⁶⁵⁷ CEAR Doc 934, VFPA response to IR11-28, at p. 13.

⁶⁵⁸ CEAR Doc 934, VFPA response to IR7-28, at p. 2.

⁶⁵⁹ CEAR Doc 934, VFPA response to IR5-02.

⁶⁶⁰ CEAR Doc 934, VFPA response to IR7-28.

⁶⁶¹ CEAR Doc 2001, Updated Project Commitments, at p. 8

⁶⁶² CEAR Doc 1186, Deltaport Third Berth Habitat Compensation Monitoring: East Causeway. Year 5 and Summary Post-Construction Report.

⁶⁶³ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C2, C5, C6, C10, C11.

framework, and will work with Indigenous groups and DFO to enhance this framework into a final Offsetting Plan. The final Offsetting Plan will incorporate input and knowledge shared during consultation and collaboration with Indigenous groups; regulatory input and requirements; selection of priority species and priority habitats as identified by Indigenous groups and regulators; and the opportunity to use proactive measures, such as the use of the VFPA's habitat bank.

The final Offsetting Plan will maximize benefits for local communities, address priority issues and concerns, and meet permitting phase requirements, while remaining responsive to the dynamic nature of the Roberts Bank ecosystem.⁶⁶⁴ Once implemented, the Offsetting Plan will maintain and enhance natural productivity of the Roberts Bank ecosystem, while also making a meaningful contribution to the future health and recovery of iconic west coast species—notably Chinook salmon and the endangered SRKW population.

⁶⁶⁴ CEAR Doc 934, VFPA response to IR11-15, at p. 3.

CHAPTER X. MARINE FISH

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2. Overview

The VFPA recognizes the ecological, socio-economic, and cultural importance of marine fish and therefore selected marine fish as a valued component in the environmental assessment. Marine fish are critical components of the Roberts Bank nearshore and estuarine ecosystem, influencing its structure and function, and contributing to overall ecosystem health. Marine fish are important to commercial, recreational, and Aboriginal fisheries either directly or indirectly through food web interactions. Many marine fish species are also of social, economic, and cultural importance to local communities and Indigenous groups that use and rely on the Fraser River estuary.

As a committed, long-term steward of the Fraser River estuary and broader marine environment, the VFPA is committed to long-term monitoring, and to applying adaptive management techniques to ensure that ecosystem and species productivity goals are achieved. With mitigation, including offsetting, the VFPA concluded that residual change in the productivity of marine fish as a result of the Project will not be significant. The VFPA's assessment predicts the Project will not result in a measurable incremental adverse cumulative effect to marine fish.⁶⁶⁵

In accordance with standard environmental assessment procedure, as well as the CEA Agency's Interim Technical Guidance,⁶⁶⁶ the VFPA selected five sub-components of marine fish to represent the biodiversity at Roberts Bank and to structure the assessment: (1) Pacific salmon, (2) reef fish, (3) forage fish, (4) flatfish, and (5) demersal fish.

Within each sub-component, the VFPA selected a number of representative species for thoroughness and to focus the assessment on the species identified as being of high assessment importance, based on input from Indigenous groups, regulatory agencies, stakeholders, and the public. The VFPA selected representative species because they share ecological attributes and similarities in how the Project may affect them, or because the

⁶⁶⁵ CEAR Doc 181, EIS, Volume 3, at s. 13.

⁶⁶⁶ CEAR Doc 314, VFPA response to IR #9.

VFPA expects mitigation will be similarly effective. The representative species also include species or populations that are of conservation concern.⁶⁶⁷

The VFPA is confident in the conclusions of the marine fish assessment as they relied on expert advice, used multiple lines of evidence, and integrated conservatism to address uncertainty in existing conditions. The VFPA relied on input from external scientific experts during the TAG process, during engagement with regulatory agencies, and in conducting the assessment of Project-related effects on marine fish. The VFPA also used multiple lines of evidence to strengthen the robustness of the assessment. Lines of evidence included ITK, published literature, and Project-specific empirical and modelling evidence. The VFPA also drew on their extensive experience at Roberts Bank, including the assessment, construction, and mitigation of the DP3 Project, to develop site-specific evidence as to how the Roberts Bank ecosystem responds to development and to ensure that the environmental assessment of the Project rigorously considered uncertainty in existing conditions, the form and magnitude of effects, and the effectiveness of mitigation.

The VFPA based its assessment on conservative assumptions to address uncertainty in existing conditions. For instance, the VFPA assumed that Pacific sand lance bury in sediments predicted to be suitable in and around the Project footprint, even though the use of habitat in the area for burying has not been documented in the literature and during the VFPA's empirical studies.

The VFPA's assessment demonstrated that, with mitigation, the Project will not result in a significant adverse residual effect on the productivity of marine fish. The VFPA predicts that for Pacific salmon, reef fish, and demersal fish, productivity changes will be negligible, while residual productivity changes for forage fish and flatfish will not be significant.⁶⁶⁸

In summary, the VFPA concluded that with the Project, Roberts Bank will continue to function as a productive estuarine ecosystem supporting diverse communities of marine fish. Fish at Roberts Bank are, and will continue to be, resilient and well-adapted to a naturally dynamic open environment where physical conditions, such as tides, currents, and salinity, will continue to fluctuate daily and seasonally and influence the distribution of marine fish.

The VFPA has committed to a wide range of measures to mitigate the potential effects of the Project on marine fish. Consistent with DFO guidance, the VFPA adopted a hierarchical approach to reducing Project-related effects on marine fish.⁶⁶⁹ First, the VFPA sought to avoid potential effects on marine fish through careful infrastructure location and design. Placement of the terminal in subtidal waters minimizes direct footprint effects on intertidal habitats, such as eelgrass, which will remain available to rearing juvenile salmon and forage fish during Project construction and operation. The VFPA also committed to the inclusion of

⁶⁶⁷ CEAR Doc 934, VFPA response to IR5-15.

⁶⁶⁸ CEAR Doc 181, EIS, Volume 3, at s. 13.8.1.

⁶⁶⁹ CEAR Doc 1341, Letter to the VPA from the Minister of Fisheries and Oceans, dated July 29, 2003.

caisson fish refugia in the berth face as part of the design of the marine terminal.⁶⁷⁰ DFO re-confirmed in its written submission to the Review Panel that the location of the terminal in deep water is a key mitigation measure. DFO stated the following:

“The Proponent’s decision to propose the terminal on a deeper, sub-tidal location instead of on inter-tidal areas closer to shore is the key mitigation measure in reducing the significance of adverse effect on fish habitats. A more shore-ward terminal location would have affected larger areas of more productive fish habitats.”⁶⁷¹

Second, the VFPA sought to reduce or minimize any potential adverse effects that could not be avoided. The VFPA will develop and implement measures to reduce potential effects during construction through a suite of environmental management plans, presented in the Updated Project Commitments.⁶⁷² As part of the Marine Species Management Plan, the VFPA has committed to restricting in-water construction activities above -5 m CD during the juvenile salmon fisheries-sensitive window from March 1 to August 15.⁶⁷³ Other species that may use intertidal and shallow subtidal waters at Roberts Bank, such as eulachon transiting the estuary during their spawning migration in spring, will also benefit from this fisheries-sensitive window. The VFPA’s commitment to prevent Project dredging activities from occurring in waters below -5 m CD during the fisheries-sensitive window for gravid Dungeness crab between October 15 and March 31 will also reduce potential effects to marine fish, such as flatfish and Pacific sand lance that overwinter buried in subtidal sediments.⁶⁷⁴

In addition to adhering to the timing windows, the VFPA will manage Project effects on marine fish through a suite of mitigation that will be encompassed in the Project’s Construction and Operation Environmental Management Plans. For example, the VFPA has committed to using lighting technologies that will shield and divert light away from the marine environment, minimizing effects to marine fish.⁶⁷⁵ Moreover, the VFPA’s water quality compliance monitoring and underwater noise monitoring will ensure that TSS and underwater noise remain below levels that may harm or injure marine fish.⁶⁷⁶

Given the at-risk status and cultural importance of eulachon, the VFPA has committed to pursue the deployment of hydroacoustic technologies outside the crab window to direct dredging activity away from schools of migrating eulachon and manage, in real time, potential dredging-related disturbance to eulachon as part of the Dredging and Sediment Discharge Plan. As part of this commitment, the VFPA will undertake a hydroacoustic pre-

⁶⁷⁰ CEAR Doc 181, EIS, Volume 3, at s. 13.7; CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #8.

⁶⁷¹ CEAR Doc 1630, DFO written submission, at p. 22.

⁶⁷² CEAR Doc 2001, Updated Project Commitments.

⁶⁷³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #53.

⁶⁷⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #49.

⁶⁷⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #24.

⁶⁷⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #30, 37.

construction test/study in the Project area, to aid in reconnaissance, testing, and effectiveness of deploying hydroacoustic technologies (e.g., split-beam echosounder) to detect eulachon.⁶⁷⁷

Through consultation, the VFPA has clearly heard the importance of eulachon and sturgeon to Indigenous groups. The VFPA is committed to working with Indigenous groups to develop and implement these measures through the next phase of the Project. If the Project is approved, the VFPA will fund programs and studies up to \$500,000 that build on recent and ongoing work related to eulachon and sturgeon in the lower Fraser River. The VFPA will work with TFN and Musqueam in advancing these studies and programs.⁶⁷⁸

Finally, the VFPA is proposing offsetting to address potential adverse effects that cannot be avoided, minimized, or reduced.⁶⁷⁹ The VFPA has proposed several offsetting concepts to create high quality onsite intertidal marsh, native eelgrass, sandy gravel beach, mudflat, and subtidal rock reef. Creation of onsite eelgrass and intertidal marsh habitats will enhance juvenile salmon productivity at Roberts Bank by providing additional food sources and refuge from predators. Furthermore, creation of onsite eelgrass and sandy gravel beach will enhance foraging and spawning opportunities for forage fish.

In collaboration with Indigenous groups, the VFPA is committed to pursuing additional offsetting, including offsite opportunities, with a focus on priority habitats and species to achieve the greatest benefits and contribute to the future health and recovery of important west coast species, such as Chinook salmon, that are a valuable food source for SRKW, and culturally important to Indigenous groups.⁶⁸⁰

The VFPA expects that the success and effectiveness of offsetting measures will be monitored as part of permitting requirements of the *Fisheries Act* Authorization, the RBT2 Follow-up Program, and the VFPA's adaptive management approach.⁶⁸¹ The VFPA's offsetting program is described further in Chapter IX of these Closing Remarks.

The Updated Project Commitments contains a full list of the VFPA's proposed mitigation measures in Appendix A, of which 13 measures relate to marine fish.⁶⁸²

Finally, the VFPA is also committed to working collaboratively with TFN, Musqueam, and other Indigenous groups, regulators, and environmental organizations that have been working in the Fraser River estuary, to explore the feasibility of a Follow-up Program element for juvenile salmon to verify assessment predictions using distribution and density as monitoring targets.⁶⁸³ If the VFPA determines such a Follow-up Program is feasible, the element will involve pre- and post-construction density surveys. The VFPA will develop and

⁶⁷⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #45.

⁶⁷⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #52.

⁶⁷⁹ CEAR Doc 934, Preamble to Offsetting-related Information Requests, at p. 2.

⁶⁸⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #41.

⁶⁸¹ CEAR Doc 2001, Updated Project Commitments, at Appendix C.

⁶⁸² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #12, 15, 18, 19, 22, 24, 25, 27, 28, 29, 30, 32, 33, 38, 40, 41.

⁶⁸³ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C9.

implement the element in collaboration and participation with Indigenous groups and DFO. If the VFPA determines that there is insufficient statistical power to detect changes in juvenile salmon density that can be attributed to the Project (e.g., due to high levels of natural spatial and temporal variability), the VFPA will consider alternatives to the Follow-up Program element, such as additional offsetting approaches. Alternatives will be determined collaboratively in consultation with Indigenous groups and DFO.

3. Key issues raised and VFPA response

(a) Juvenile salmon assessment use of multiple lines of evidence

The Review Panel⁶⁸⁴ and DFO⁶⁸⁵ had questions regarding whether the VFPA's Roberts Bank ecosystem model was appropriate to use in the assessment of Project-related effects on juvenile Chinook and chum salmon, given that they are highly migratory, and have a distribution within the local assessment area that is restricted, seasonal, and of short duration. DFO also raised concerns that the outputs of the ecosystem model "are not intended to be used to forecast the responses of any particularly functional group, but to forecast the effect of the Project on the overall productivity of the entire ecosystem."⁶⁸⁶

This line of questioning focuses on one line of evidence and does not take into account the VFPA's integration of the modelled results with other lines of evidence in the assessment of marine fish. The objective of the ecosystem model was not to provide an assessment of Project effects for each functional group at a fine temporal scale. Instead, the ecosystem model forecasted longer term changes in the productive potential of each functional group that may result from terminal and causeway footprints by incorporating ecosystem considerations. Using best practises, the team that developed and applied the ecosystem model appropriately captured the seasonal use of Roberts Bank by migratory species such as juvenile salmon. For example, the model uses annual biomass averages to account for biomass exchanges across study area boundaries due to seasonal migration of salmon.⁶⁸⁷ Unlike adult salmon returning to spawn (which generally transit through the area in a few days, too fine a temporal scale for the ecosystem model to capture effects) juvenile Chinook and chum salmon are resident in the estuary for periods of weeks to several months, and are therefore well simulated within the spatial-temporal structure of the ecosystem model. The ecosystem model provides a useful indication of the relative change over the longer term on each functional group, including juvenile Chinook and chum salmon, with and without the Project, using biomass ratios as an indicator of direct and indirect food web influences.⁶⁸⁸

Furthermore, the ecosystem model was only one of several lines of evidence in the VFPA's assessment of Project effects on juvenile Chinook and chum salmon. Outputs of the

⁶⁸⁴ CEAR Doc 1179, IR Package 11, at p. 18.

⁶⁸⁵ CEAR Doc 1102, DFO response to DFO IR-19, at p. 6.

⁶⁸⁶ CEAR Doc 1102, DFO Response to DFO IR-19, at p.5.

⁶⁸⁷ CEAR Doc 934, VFPA responses to IR3-06 and IR11-20; CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at pp. 1386-1387.

⁶⁸⁸ CEAR Doc 934, VFPA response to IR11-20.

ecosystem model provided a quantitative reference point to begin the effects evaluation and understand the direction and relative magnitude of Project effects to juvenile salmon.⁶⁸⁹ The VFPA relied on experts to interpret the results and to integrate those results with a number of other lines of evidence, including best available, peer-reviewed science, empirical data from the Project's field surveys,⁶⁹⁰ previous environmental assessments at Roberts Bank, and conclusions of the assessment of Project-related changes to intermediate components and other valued components.⁶⁹¹ Based on these multiple lines of evidence, the VFPA determined that, with mitigation, Project-related residual effects on juvenile salmon productivity will be negligible.⁶⁹²

The VFPA's approach to assessing Project effects on juvenile Chinook and chum salmon was precautionary in nature. The ecosystem model forecasted that changes in juvenile salmon productivity from the terminal and causeway footprints would be positive and within the minor category (ranging between 6% and 30%; for juvenile Chinook and chum salmon, the ecosystem model forecasted an increase in productivity of 10% and 9%, respectively, primarily due to forecasted increases in biomass of benthic macrofauna in the wave shadow of the terminal). However, to account for potential effects on juvenile salmon that may result from Project construction and operation that were not captured by the ecosystem model (e.g., direct mortality, altered migratory pathways), the VFPA integrated other lines of evidence into a qualitative assessment of juvenile Chinook and chum salmon. As other lines of evidence suggest that potential Project-related effects on juvenile salmon would be negative, the VFPA determined that prior to mitigation, the Project may result in a minor loss in juvenile salmon productivity.⁶⁸⁸ With mitigation, including offsetting, the VFPA determined that Project-related change in the productivity of juvenile salmon will be negligible.⁶⁹³

DFO has confirmed that the VFPA's "conclusion of minor negative impacts of the Project on the productivity of juvenile Chinook and chum salmon is reasonable based on the data presented, independent of the outcome projected by the ecosystem model"... the VFPA's "analyses of other (non-model) sources of information are appropriate, and the conclusion of minor negative impacts seems justified."⁶⁹⁴

As discussed above, the VFPA is committed to working collaboratively with TFN, Musqueam, and other Indigenous groups, regulators, and environmental organizations working in the Fraser River estuary, to explore the feasibility of a Follow-up Program for juvenile salmon to verify assessment predictions, if such a study can feasibly provide useful information on the

⁶⁸⁹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1549.

⁶⁹⁰ CEAR Doc 388, Appendix AIR10-C, TDR MF-3 Juvenile Salmon Surveys.

⁶⁹¹ CEAR Doc 934, VFPA response to IR11-20; CEAR Doc 1739, VFPA oral presentation, May 22, 2019, at slide 8.

⁶⁹² CEAR Doc 934, VFPA response to IR11-20.

⁶⁹³ CEAR Doc 934, VFPA response to IR11-20.

⁶⁹⁴ CEAR Doc 1423, DFO comments on the sufficiency of information, February 4, 2017, at p. 8; CEAR Doc 1630, DFO written submission, at p. 31.

effects of the Project on the productivity of juvenile salmon, given the underlying levels of natural spatial and temporal variability in the densities of juvenile salmon.⁶⁹⁵

(b) Juvenile salmon migration

A number of participants raised concerns with respect to the potential for the Project to disrupt the migration pathway, orientation, and behaviour of juvenile salmon. Specifically, participants commented that the size and orientation of the proposed terminal would increase the movement barrier created by the initial causeway construction, deflecting juvenile salmon to deeper waters and exposing them to higher salinities with unknown effects on their physiology and survival.⁶⁹⁶

Raincoast Conservation Foundation also commented that ongoing effects of existing infrastructure on the outmigration behaviour of juvenile salmon could be reversed by the decommissioning and removal of the existing causeway and terminal, or alternatively, through breaches and openings to restore ecosystem connectivity and migration pathways of juvenile salmon.⁶⁹⁷

The VFPA is confident that productivity losses that may result from potential disruption to juvenile salmon outmigration can be addressed through mitigation. The VFPA predicted that the Project has the potential to disrupt migration behaviour of juvenile salmon and result in a minor loss of juvenile salmon productivity through two mechanisms of effects: changes in the light environment and changes in habitat availability.⁶⁹⁸ The VFPA's Light Management Plan will shield and divert light away from the marine environment, while the VFPA's Project design and offsetting programs will ensure that productive habitat remains available to marine fish.

The VFPA's literature review indicates that changes in the light environment have the potential to result in delays to outmigrating salmon that may range from a few hours to a few days. For juvenile chum and Chinook that rear at Roberts Bank from a few weeks to a few months, potential infrastructure lighting-related delays would range between <1% and 8% of their residence time at Roberts Bank, resulting in a minor loss in juvenile salmon productivity, pre-mitigation.⁶⁹⁹ As part of the Light Management Plan, the VFPA is committed to deploying lighting technologies that will shield and divert light away from the marine environment and mitigate light-related effects on juvenile salmon outmigration behaviour.⁷⁰⁰

The VFPA also assumed that the Project has the potential to adversely affect movement patterns of juvenile chum and Chinook salmon, based on the underlying assumption that

⁶⁹⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C9.

⁶⁹⁶ CEAR Doc 1605, Ecojustice written submission, at pp. 84, 91-93; CEAR Doc 1630, DFO written submission, at p. 32; CEAR Doc 1678, Musqueam First Nation written submission, at pp. 5-7.

⁶⁹⁷ CEAR Doc 1605, Ecojustice written submission, at pp. 84, 91-93.

⁶⁹⁸ CEAR Doc 181, EIS, Volume 3, at s. 13.6.1.5, 13.6.1.6; CEAR Doc 934, VFPA response to IR5-18.

⁶⁹⁹ CEAR Doc 934, VFPA responses to IR5-18 and IR5-25.

⁷⁰⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #24.

juvenile salmon migrate in a linear fashion, hugging the shoreline as they move. This assumption is conservative as linear movement is one of several behavioural migration strategies exhibited by juvenile salmon to move through estuaries, and these strategies are diverse across salmon species, rearing histories, and habitats, as well as within individual salmon populations. The VFPA's literature review indicates that linear travel is reflective of actively migrating juvenile salmon that move quickly through the estuary, and may not accurately represent the movements of juvenile chum and ocean-type Chinook salmon that pause their outmigration to take up residency in the estuary.⁷⁰¹

The VFPA's 2012-2013 field surveys indicated that juvenile chum associate with shore-tied intertidal habitats more than juvenile Chinook, which exhibit no preference for any particular habitat at Roberts Bank. Juvenile salmon take advantage of tidal exchanges across the flats at Roberts Bank to access food sources and seek refuge from predators in the higher intertidal during flood tides. When the flats are drained during ebb tides, juvenile salmon use open water at subtidal locations where turbid conditions influenced by the Fraser River plume act as refuge from visual predators.⁷⁰² Tidal exchange at Roberts Bank occurs twice daily resulting in salinities that range widely from freshwater (0 practical salinity units (psu)) to marine (28 psu)).⁷⁰³ As part of their physiology, juvenile salmon are able to rapidly acclimate to large salinity fluctuations, as evidenced by juvenile salmon accessing and using intertidal rearing habitats in the inter-causeway area, which is more saline than elsewhere in the estuary.⁷⁰⁴

As described in Chapter III of these Closing Remarks, the VFPA's assessment indicates that installing breaches in the causeway is not technically feasible. In addition to the geomorphic changes that would result from installing a causeway breach(es), the assessment indicates it is unlikely that juvenile salmon would swim through a dark culvert. The VFPA's literature review indicates that juvenile salmon avoid structural shading and tend to move along the light side of a shadow's edge.⁷⁰⁵ Further assessment indicates that installing breaches will not mitigate potential losses in juvenile salmon productivity from potential disruption to juvenile salmon migration.⁷⁰⁶ Finally, the VFPA notes that the majority of the existing causeway is provincial land, and, is therefore outside the VFPA's care and control.

The VFPA also evaluated the feasibility of a 100-m wide flow passage between the existing Westshore Terminals and the proposed RBT2 terminal. In addition to local scour that would be generated in the channel itself and adjacent areas, the VFPA determined that high flow velocities within and at the outlets of the channel could cause entrainment to marine fish

⁷⁰¹ CEAR Doc 934, VFPA response to IR5-18.

⁷⁰² CEAR Doc 388, Appendix AIR10-C; CEAR Doc 934, VFPA response to IR5-18.

⁷⁰³ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 16.

⁷⁰⁴ CEAR Doc 934, VFPA responses to IR5-18, IR12-10. See also CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 16.

⁷⁰⁵ CEAR Doc 934, VFPA response to IR11-13; CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 2039-2043.

⁷⁰⁶ CEAR Doc 181, EIS, Volume 3, at s. 13.7.1.1; CEAR Doc 934, VFPA Response to IR1-13; CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 2039-2043.

into the channel and increased predation risk within shaded sections and at the channel outlet adjacent to the artificial reefs.⁷⁰⁷

To mitigate potential effects to juvenile salmon productivity from potential disruption to juvenile salmon migration, the VFPA has committed to offsetting. Creation of onsite offsetting habitats in the form of native eelgrass transplants and reconstructed tidal marsh will increase food supply and refuge for juvenile salmon, and enhance their productivity.⁷⁰⁸ In collaboration with Indigenous groups, the VFPA is also committed to pursuing additional offsetting, including offsite opportunities, to achieve the greatest benefits and contribute to the future health and recovery of important west coast species, such as Chinook salmon.

The VFPA concludes that, with mitigation, changes in juvenile salmon productivity from potential Project-related disruption to migration behaviour will be negligible.⁷⁰⁹ With the Project, Roberts Bank will continue to function as a naturally dynamic open system where physical conditions, such as tidal exchanges will remain unchanged and will continue to influence the distribution and movement patterns of juvenile salmon. Placement of the terminal in subtidal waters minimizes direct footprint effects on intertidal habitats, such as eelgrass, which will continue to provide food and refuge to juvenile salmon during Project construction and operation. Moreover, the terminal configuration is predicted to create a wave shadow effect immediately north of the terminal where physical conditions are predicted to become conducive to increases in prey (macrofauna) and rearing habitat (native eelgrass) for juvenile salmon.⁷¹⁰

The VFPA is also committed to working collaboratively with TFN, Musqueam, and other Indigenous groups, regulators, and environmental organizations working in the Fraser River estuary, to explore the feasibility of a Follow-up Program for juvenile salmon to verify assessment predictions using distribution and density as monitoring targets.⁷¹¹ If feasible, the VFPA will design this program based on the results of a power analysis and consistent with sampling techniques and methods used during the Project's 2012-2013 field surveys. The VFPA will also evaluate and incorporate into the program, if appropriate, other data sets from the Fraser River estuary, such as those from Raincoast Conservation Foundation, should they become available.⁷¹²

If the VFPA determines that a juvenile salmon Follow-up Program element cannot reasonably attribute detectable change in juvenile salmon density to the Project, the VFPA has committed to seeking alternatives to the Follow-up Program element, including additional offsetting approaches.⁷¹³

⁷⁰⁷ CEAR Doc 181, EIS, Volume 3, at s. 13.7.1.1; CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 2040.

⁷⁰⁸ CEAR Doc 181, EIS, Volume 3, at s. 13.7.6.

⁷⁰⁹ CEAR Doc 181, EIS, Volume 3, at s. 13.8.1.

⁷¹⁰ CEAR Doc 181, EIS, Volume 3, at s. 13.8.1.

⁷¹¹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C9.

⁷¹² CEAR Doc 388, Appendix AIR10-C; CEAR Doc 934, VFPA response to IR12-10; CEAR Doc 1906, Transcript, Volume 18, June 12, 2019, at pp. 4254-4257.

⁷¹³ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C9.

(c) Juvenile Chinook determination of effect significance

Several participants, including DFO,⁷¹⁴ Musqueam,⁷¹⁵ Raincoast Conservation Foundation,⁷¹⁶ and Dr. J.D. Neilson,⁷¹⁷ raised concerns regarding the VFPA's conclusion of a negligible change in juvenile salmon productivity as a result of the Project given that 12 populations of Fraser River Chinook salmon were designated 'At Risk' by the Committee on the Status of Endangered Wildlife in Canada (**COSEWIC**) in November 2018. DFO specifically commented that the VFPA "may have underestimated the significance of effects on fish and fish habitat, specifically effects on Chinook salmon", given the dependence of Chinook stocks on estuarine habitats, their at-risk status, and uncertainty associated with the realisation of predicted indirect benefits of the Project and offsetting.⁷¹⁸

The VFPA is confident that the assessment did not underestimate Project effects on the productivity of Chinook salmon. The VFPA's approach to assessing Project effects on Chinook salmon was precautionary in nature. Because information through genetic analysis on the composition of Chinook stocks rearing at Roberts Bank was not available to the VFPA at the time of the assessment, the VFPA conservatively accounted for both downward trends in the population size and conservation status of stream-type Chinook stocks and longer residence times in the estuary of ocean-type Chinook stocks.⁷¹⁹

Of the 12 stocks of Fraser River Chinook salmon that are designated by COSEWIC as 'At Risk', 11 are stream-type and one is ocean-type. Ocean-type Chinook salmon spend longer in the estuary and are more likely to interact with and be affected by the Project. On the other hand, stream-type Chinook salmon spend one or more years as juveniles in freshwater before migrating to the ocean as smolts. During outmigration, stream-type Chinook smolts move quickly through the estuary before reaching marine waters.⁷²⁰

Following submission of the EIS, the VFPA undertook a genetic analysis that confirmed that juvenile Chinook rearing at Roberts Bank are ocean-type, predominantly from the Harrison ocean fall and South Thompson ocean summer stock aggregates.⁷²¹ The lower Fraser fall Chinook (Harrison) stock has been designated by COSEWIC as 'Threatened,' while the South Thompson and Shuswap River summer ocean-type stocks have been designated by COSEWIC as 'Not at Risk.'⁷²²

The VFPA's review of best available scientific information indicates that there is no apparent correlation in time between noted declines in Fraser River Chinook stocks, which started in the late 1990s, and placement of the existing causeway at Roberts Bank, which occurred in

⁷¹⁴ CEAR Doc 1630, DFO written submission, at p. 32.

⁷¹⁵ CEAR Doc 1678, Musqueam First Nation written submission, at p. 6.

⁷¹⁶ CEAR Doc 1605, Ecojustice written submission, at p. 32.

⁷¹⁷ CEAR Doc 1556, John D. Neilson written submission.

⁷¹⁸ CEAR Doc 1630, DFO written submission, at p. 39.

⁷¹⁹ CEAR Doc 181, EIS, Volume 3, at s. 13.6.3.1, Table 13-1; CEAR Doc 934, VFPA response to IR5-19.

⁷²⁰ CEAR Doc 181, EIS, Volume 3, at s. 13.5.1.2.

⁷²¹ CEAR Doc 934, VFPA response to IR5-19, at Table IR5-19-1.

⁷²² CEAR Doc 1630, DFO written submission, at Appendix 1, Table 4.

1968.⁷²³ Furthermore, conditions of marine and freshwater habitats, including urban and shoreline development, are not identified in the scientific literature as primary drivers of juvenile Chinook and chum salmon productivity. Declines have occurred concurrently in both pristine and developed watersheds all along the northeast Pacific coast, including such declines in the Fraser River. Rather, the literature identifies large scale environmental mechanisms as predominantly responsible for these declines in the productivity of Chinook and chum salmon populations.

Large scale environmental mechanisms include persistent shifts in atmospheric and ocean conditions that influence food supply and affect growth and survival of juvenile salmon populations.⁷²⁴ Although the evidence is that the Project is not a driver of change for salmon productivity, the VFPA recognizes the ecological, commercial, and cultural importance of Chinook. The VFPA has committed to contributing to, supporting, and/or participating in regional and/or multi-stakeholder initiatives that will inform effective management of Chinook salmon populations and enhance their productivity.⁷²⁵

As discussed above, the VFPA is also committed to monitoring the effectiveness of created onsite offsetting habitats to confirm that they are stable, productive, and functioning as intended. In collaboration with TFN, Musqueam, and other Indigenous groups, the VFPA is also committed to pursuing additional offsetting, including offsite opportunities, to achieve the greatest benefits and contribute to the future health and recovery of important west coast species, such as Chinook salmon. Finally, in collaboration with Indigenous groups, regulators, and environmental organizations that have been working in the Fraser River estuary, the VFPA is committed to exploring the feasibility of a Follow-up Program to verify assessment predictions using distribution and density of juvenile salmon as monitoring targets.⁷²⁶

(d) Assessment of eulachon

Several participants, including Musqueam⁷²⁷ and Dr. J.D. Neilson,⁷¹⁷ raised concerns that eulachon was inappropriately assessed using Pacific herring and surf smelt as representative species, given that eulachon are a species of conservation concern and are of high cultural importance to Indigenous groups. Musqueam also raised concerns that the Project footprint has the potential to directly block the migration trajectory of adult eulachon returning to the Main Arm of the Fraser River.⁷²⁸ Additionally, DFO raised concerns regarding the risk of injury and direct mortality during Project construction of eulachon larvae.⁷²⁹

⁷²³ CEAR Doc 934, VFPA response to IR5-19, at Figure IR5-19-1; CEAR Doc 1860, Transcript, Volume 16, June 1, 2019, at pp. 4047-4048.

⁷²⁴ CEAR Doc 934, VFPA response to IR11-20.

⁷²⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #54.

⁷²⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C9.

⁷²⁷ CEAR Doc 1678, Musqueam First Nation written submission.

⁷²⁸ CEAR Doc 1678, Musqueam First Nation written submission, at p. 4.

⁷²⁹ CEAR Doc 1630, DFO written submission, at pp. 34-35.

The VFPA's use of representative species is consistent with the CEA Agency's Interim Technical Guidance.⁷³⁰ The VFPA appropriately assessed eulachon using Pacific herring and surf smelt as representative species. The VFPA selected surf smelt and herring to represent eulachon due to similarities in the mechanisms through which the Project may affect them, as well as in the effectiveness of mitigation measures.⁷³¹ The VFPA also provided a detailed overview of life history requirements and status and management practices for eulachon.⁷³¹

Adult eulachon, as opposed to eulachon eggs, larvae, and juveniles, are more likely to interact with and be affected by the Project. Based on ITK,⁷²⁸ the VFPA understands that adult eulachon transit through the estuary, including Roberts Bank, on their way to spawning grounds in the lower Fraser River. Like surf smelt and Pacific herring, returning adult eulachon have the potential to be affected by the Project, pre-mitigation, through mechanisms such as injury and direct mortality, and changes in the acoustic and light environments.⁷³² Unlike surf smelt and herring, the likelihood of the Project interacting with other life history stages of eulachon is small. Eulachon eggs are deposited in freshwater habitats of the lower Fraser River outside the boundaries of the local assessment area. Upon hatching, eulachon larvae are rapidly flushed out of the lower Fraser River and are carried into the Salish Sea where they rear for a few weeks in marine waters that extend from the southern tip of Texada Island to Race Rocks. Eulachon juveniles migrate through Juan de Fuca Strait to waters off the west coast of Vancouver Island where they rear for about three years.

The VFPA also clarified that, with the Project, the migratory pathway of adult eulachon transiting through the estuary to reach upriver spawning grounds will remain unobstructed. Adult eulachon undertake lengthy migrations from their marine feeding grounds off the west coast of Vancouver Island to their spawning grounds in the lower Fraser River, navigating through inlets and around islands. The new terminal and widened causeway do not create a challenge to migration; adult eulachon, should they encounter the terminal, will swim past it, as they do past the many varied natural and artificial features they encounter as they migrate through marine and freshwater environments.⁷³³

The VFPA is confident that the Project will not adversely affect migration survival of eulachon. Nevertheless, the VFPA has proposed mitigation measures for Pacific herring and surf smelt that will also benefit migrating eulachon. These measures include a fisheries sensitive window for gravid Dungeness crab that has been incorporated into the Project construction schedule, which will also protect migrating eulachon in February and March. Outside this timing window, the VFPA will manage potential effects to eulachon through the implementation of environmental management plans, including water quality compliance

⁷³⁰ CEAR Doc 314, VFPA response to IR #9.

⁷³¹ CEAR Doc 934, VFPA response to IR5-15, at Table IR5-15-A1.

⁷³² CEAR Doc 934, VFPA response to IR5-15, at Table IR5-15-A1.

⁷³³ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1537-1538.

monitoring and underwater noise monitoring that will maintain water quality and underwater noise below levels that may injure fish.⁷³⁴

The VFPA has also committed to developing eulachon-specific mitigation in collaboration with Indigenous groups, given the cultural importance of eulachon. As part of the Dredging and Sediment Discharge Plan, the VFPA has committed to pursuing the deployment of hydroacoustic technologies outside the crab window to direct dredging activity away from schools of migrating eulachon and manage, in real time, potential dredging-related disturbance to eulachon.⁷³⁵

Furthermore, if the Project is approved, the VFPA will fund programs and studies, up to \$500,000, that build on recent and ongoing work related to eulachon and sturgeon in the lower Fraser River. Such programs and studies will be conducted in partnership with TFN and Musqueam.⁷³⁶

(e) Assessment of Pacific sand lance

DFO raised concerns that the VFPA's conclusion of negligible adverse change in Pacific sand lance productivity from Project-related changes in the light environment are inconsistent with uncertainty acknowledged by the VFPA that above water lighting during night periods attracts fish.

The VFPA concluded that, with mitigation, Project effects to forage fish, including Pacific sand lance, from changes in the light environment will be negligible.⁷³⁷ To reach this assessment conclusion, the VFPA relied on multiple lines of evidence, including results of habitat suitability modelling, empirical and scientific literature evidence, as well as the results of the light assessment.⁷³⁸

The VFPA developed a habitat suitability model to determine the distribution and extent of subtidal habitat that may be suitable for Pacific sand lance burying. The VFPA used physical data from Roberts Bank combined with literature information on habitat preferences of Pacific sand lance. The VFPA's habitat suitability modelling identified about 494 hectares of highly suitable habitat and 885 hectares of moderately suitable habitat at Roberts Bank.⁷³⁹

The VFPA conservatively assumed that Pacific sand lance do bury within predicted suitable sediments. The assumption is conservative as the VFPA's literature review and field studies at Roberts Bank yielded no evidence of Pacific sand lance burying within the Project footprint. With the Project in place, 99% (490 hectares) of the highly suitable and 86% (758

⁷³⁴ CEAR Doc 934, VFPA response to IR5-15, at Table IR5-15-A1.

⁷³⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #45.

⁷³⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #52; CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1555-1557.

⁷³⁷ CEAR Doc 181, EIS, Volume 3, at s. 13.6.3.3.

⁷³⁸ CEAR Doc 181, EIS, Volume 2, at s. 9.4.8.2, Table 9.4-9.

⁷³⁹ CEAR Doc 181, EIS, Volume 3, at Appendix 12-A.

hectares) of the moderately suitable substrate will remain available to Pacific sand lance for burying following terminal placement.⁷⁴⁰

Based on results of its light assessment presented in the EIS, the VFPA predicts light levels at the water surface adjacent to the proposed terminal will be 1.621 lux with the Project.⁷⁴¹ This is approximately 60 times below illuminance levels of 100 lux discussed by DFO to cause sand lance to leave the sand and initiate feeding in the water column.⁷⁴² In the Fraser River estuary, where loads of suspended matter are high as a result of river flows, light intensity is reduced by about 90% within 1 m from the surface. Therefore, light conditions on the seabed adjacent to the marine terminal will not change from ambient.⁷⁴³

The VFPA is committed to implementing measures that will further mitigate light-related effects to Pacific sand lance. Specifically, the VFPA will employ mitigation measures that will use lighting technology to shield and divert light away from the marine environment to minimize light trespass.⁷⁴⁴ With mitigation, Project effects to forage fish, including Pacific sand lance, from changes in the light environment will be negligible.

The VFPA is also committed to verifying light effects predictions and mitigation effectiveness.⁷⁴⁵ As part of the Follow-up Program element to verify light trespass and sky glow effects predictions and mitigation effectiveness, the VFPA has committed to ensuring that nighttime terminal lighting does not exceed 100 lux or greater on the adjacent sea bed, within 50 m of the terminal.⁷⁴⁶

(f) Assessment of sturgeon

Musqueam raised concerns that the use of Chinook and chum salmon to represent sturgeon in the assessment may have underestimated Project effects on sturgeon, given that sturgeon are a species of conservation concern and are of high cultural, social, and economic importance to Indigenous groups.⁷⁴⁷ FLNRORD also commented that Project effects on sturgeon and their habitat are likely to be significant and likely to extend beyond the footprint of the Project, citing propeller strikes as the leading possible cause of direct mortality of sturgeon in the Fraser River estuary.⁷⁴⁸

As discussed above, the VFPA's use of representative species is consistent with the CEA Agency's Interim Technical Guidance.⁷⁴⁹ The VFPA appropriately assessed sturgeon using Chinook and chum salmon as representative species. The VFPA selected Chinook and chum salmon to represent sturgeon due to similarities in their anadromous life histories,

⁷⁴⁰ CEAR Doc 181, EIS, Volume 3, s. 13.6.3.3; CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1539-1540.

⁷⁴¹ CEAR Doc 181, EIS, Volume 2, at s. 9.4.8.2, Table 9.4-9.

⁷⁴² CEAR Doc 181, EIS, Volume 2, at s. 9.4, Table 9 in Appendix 9.4-A.

⁷⁴³ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1532.

⁷⁴⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #24.

⁷⁴⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C20.

⁷⁴⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A.

⁷⁴⁷ CEAR Doc 1678, Musqueam First Nation written submission, at p. 8.

⁷⁴⁸ CEAR Doc 1751, FLNRORD oral presentation and written submission.

⁷⁴⁹ CEAR Doc 314, VFPA response to IR #9.

similarities in the mechanisms through which the Project may affect them, as well as in the effectiveness of mitigation measures. The VFPA also provided a detailed overview of life history requirements and status and management practices for sturgeon.⁷⁵⁰

The VFPA is confident in their assessment conclusion that with mitigation, Project-related change in the productivity of sturgeon will be negligible, as represented by Pacific salmon.⁷⁵¹ The VFPA relied on multiple lines of evidence, including ITK, literature evidence on the use by sturgeon of habitats in the Fraser River estuary, including Roberts Bank, and effectiveness of mitigation measures. The VFPA's review of literature indicated that sturgeon perform critical life functions, such as spawning, rearing, and overwintering in the lower Fraser River upstream of the river mouth outside the boundaries of the local assessment area. There is some evidence for the use of marine habitats by larger juvenile and adult individual sturgeon; however, based on a recent acoustic tracking study undertaken in the lower Fraser River, marine excursions are rare, brief, and not far from the river mouth. This literature evidence aligns with information shared by Indigenous groups that suggests sturgeon range throughout the Main Arm of the Fraser River, with concentrations around Canoe Passage and adjacent areas coinciding with the time in spring when eulachon enter the channel.⁷⁵²

The VFPA does not expect that sturgeon will interact with and be affected by propeller strikes of container ships that will be calling at RBT2. Sturgeon are a demersal species that associate with benthic habitats adjacent to the sea bed. Because vessel approach and berthing will occur in deeper waters seaward of the berth face over the delta foreslope, propellers of vessels calling RBT2 will be located well above the sea bed and are unlikely to be encountered by and entrain sturgeon. Lastly, propeller strikes are not listed in DFO's recovery strategy for white sturgeon as one of the threats to the recovery of the species.⁷⁵³

The VFPA has proposed a suite of measures to mitigate Project effects on Chinook and chum salmon, which also apply to and will benefit sturgeon. Specifically, a fisheries-sensitive timing window for juvenile salmon has been embedded in the Project construction schedule whereby no in-water construction activities will occur in the waters shallower than -5 m CD from March 1 to August 15. This timing window will benefit individual adult sturgeon that may venture out in the estuary in spring and summer. Other mitigation measures include the implementation of environmental management plans. For example, water quality compliance monitoring and underwater noise monitoring will maintain water quality and underwater noise below levels that may injure fish.⁷⁵⁴

The VFPA expects that the deployment of hydroacoustic technologies to direct dredging activity away eulachon will also benefit sturgeon, as these hydroacoustic technologies will

⁷⁵⁰ CEAR Doc 934, VFPA response to IR5-15.

⁷⁵¹ CEAR Doc 934, VFPA response to IR5-15, at Table IR5-15-A1.

⁷⁵² CEAR Doc 934, VFPA response to IR5-15.

⁷⁵³ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1716-1717.

⁷⁵⁴ CEAR Doc 934, VFPA response to IR5-15, at Table IR5-15-A1.

also detect sturgeon that may venture out in the Project area to feed on returning eulachon.⁷⁵⁵

Furthermore, if the Project is approved, the VFPA has committed to funding programs and studies, up to \$500,000, that build on recent and ongoing work related to eulachon and sturgeon in the lower Fraser River. Such programs and studies will be conducted in partnership with TFN and Musqueam.⁷⁵⁶

4. Conclusion

The VFPA conducted a comprehensive assessment of the effects of the Project on marine fish at Roberts Bank. The assessment demonstrated conservatism and site specificity while appropriately following federal policy and provincial guidance. The assessment concluded that, with mitigation, the Project will not result in a significant residual adverse or incremental adverse cumulative effect on marine fish. With the Project, Roberts Bank will continue to be a naturally dynamic environment supporting diverse communities of marine fish.

The VFPA has prioritized avoidance and reduction measures to minimize adverse Project effects on marine fish through careful infrastructure location and design, including placement of the terminal in subtidal waters to avoid direct footprint effects on intertidal sensitive fish habitats, as well as implementation of fulsome environmental management plans. In addition, the VFPA has committed to creating onsite offsetting habitats that will enhance marine fish productivity at Roberts Bank by providing additional food sources, refuge from predators, and habitats for spawning.

⁷⁵⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #45 and Appendix D, at Table D1.

⁷⁵⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #52; CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1555-1557.

CHAPTER XI. MARINE INVERTEBRATES

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2. Overview

The VFPA recognizes the ecological, socio-economic, and cultural importance of marine invertebrates, such as crab and bivalve shellfish to Indigenous groups and local communities. Species such as Dungeness crab are not only important in the context of Roberts Bank food web dynamics, but are also the target of valuable commercial, recreational, and Aboriginal fisheries.⁷⁵⁷ Marine invertebrates, as they relate to Indigenous groups' domestic and FSC harvesting, marine harvesting, and recreational crab harvesting, are discussed in Chapters VI, XII, and XX of these Closing Remarks, respectively. This chapter focuses on marine invertebrates from a biological productivity perspective.

The VFPA's assessment of marine invertebrates was comprehensive and conservative.⁷⁵⁸ In accordance with standard environmental assessment procedure, the CEA Agency's Interim Technical Guidance,⁷⁵⁹ and based on input from ITK holders, the VFPA selected four sub-components to represent the marine invertebrates at Roberts Bank: (1) infaunal and epifaunal invertebrate communities, (2) bivalve shellfish, (3) Dungeness crab, and (4) orange sea pens. While there are hundreds of species of marine invertebrates at Roberts Bank,⁷⁶⁰ species were grouped under these sub-component proxies based on similarities in biological and ecological attributes, and similarities in their expected interaction with the Project.⁷⁶¹ The VFPA is confident that this approach resulted in a comprehensive and robust assessment.

⁷⁵⁷ CEAR Doc 181, EIS, Volume 3, at s. 16.

⁷⁵⁸ CEAR Doc 181, EIS, Volume 3, at s. 12.

⁷⁵⁹ CEAR Doc 314, VFPA response to IR #9.

⁷⁶⁰ CEAR Doc 181, EIS, Volume 3, at s. 12, at p. 12-1.

⁷⁶¹ CEAR Doc 181, EIS, Volume 3, at s. 12.

The VFPA employed multiple lines of evidence to undertake the assessment and draw conclusions of potential Project-related effects to marine invertebrates. Lines of evidence used included extensive site-specific data collected over several years, literature reviews, predictive and descriptive modelling, professional guidance, and ITK. Site-specific quantitative data collected through extensive field studies at Roberts Bank was used building on studies dating back several decades.⁷⁶² The assessment also relied on literature, including peer-reviewed journal articles, government- and industry-published literature, and previous environmental assessments conducted at Roberts Bank. Several models were used to conduct the assessment; in addition to the Roberts Bank ecosystem model (see Chapter VIII of these Closing Remarks), four additional marine invertebrate-specific models were developed for the assessment. In accordance with best practices, multiple professionals across a variety of disciplines supported the assessment.

The VFPA also obtained input from a diverse group of experts and leaders through the Productive Capacity TAG and the Biofilm and Shorebirds TAG.⁷⁶³ Specific to marine invertebrates, the TAG was tasked with reviewing some studies pertaining to infaunal and epifaunal invertebrates to discuss known data gaps, review study objectives, and scrutinize methodologies. Study approaches were then adapted to strengthen scientific methods where identified.⁷⁶⁴ In addition, all relevant ITK was incorporated into the effects assessment to inform existing conditions. For example, ITK specifically supported the VFPA's assessment by informing how historical abundance and habitat use of Dungeness crab has changed over time.⁷⁶⁵

The VFPA has committed to a comprehensive suite of mitigation measures to avoid, reduce, and offset potential Project-related effects on marine invertebrates. The Updated Project Commitments presents the full list of the VFPA's proposed mitigation measures, of which 32 measures relate to marine invertebrates.⁷⁶⁶ The VFPA has prioritized avoidance measures through careful infrastructure siting and design. For example, the proposed Project design directly reflects TFN's request to remove the ITP from the Project to mitigate direct loss of important Dungeness crab habitat. Additional avoidance measures are demonstrated through siting the terminal in deeper subtidal waters to avoid sensitive intertidal habitats such as native eelgrass beds.

The VFPA will develop and implement measures to reduce potential effects during construction through a suite of environmental management plans.⁷⁶⁷ Specific to marine invertebrates, the VFPA will develop a Marine Species Management Plan.⁷⁶⁸ Under this plan, the VFPA has committed to restricting Project dredging activities below -5 m CD during the

⁷⁶² CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1730.

⁷⁶³ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-10.

⁷⁶⁴ CEAR Doc 181, EIS, Volume 1, at Appendix 7.4-B.

⁷⁶⁵ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1729.

⁷⁶⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 16, 17, 18, 22, 26, 28, 29, 30, 31, 34, 35, 36, 39, 40, 41, 43, 44, 46, 47, 49, 51, 53.

⁷⁶⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #14.

⁷⁶⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #34.

Dungeness crab fisheries-sensitive window from October 15 and March 31.⁷⁶⁹ DFO developed this timing window specifically for Roberts Bank as a condition of the DP3 Project *Fisheries Act* Authorization. The timing window represents a highly conservative measure in that it extends for a longer period of time than crabs actually brood.⁷⁷⁰ This substantial commitment is an example of the VFPA's dedication to protecting Dungeness crabs. The fisheries-sensitive window will also benefit a broad array of other species such as flatfish and Pacific sand lance.⁷⁷¹

Through consultation with Indigenous groups, in particular through the VFPA-facilitated Indigenous Advisory Forum held in fall 2018 and spring 2019, the VFPA heard concerns regarding physical handling of crabs during the salvaging process and the potential for salvages to attract more crabs into the Project area than could be feasibly salvaged. In response, the VFPA has committed to implementing a baiting away method to lure crabs away from the Project area, rather than implementing the more common trap and salvage approach. The VFPA has further committed to undertaking a pre-construction pilot program, proposed to be planned and implemented in collaboration with TFN and Musqueam, to ensure the baiting away measure will be effective as intended.⁷⁷² The VFPA will develop and implement the processes and procedures, including timing, to salvage and relocate marine species, the baiting away program, and pilot program in collaboration with Indigenous groups, as part of the Marine Species Management Plan.⁷⁷³

The VFPA has also committed to translocating a portion of orange sea pens that would otherwise experience direct loss from the terminal. Prior to the VFPA's work on RBT2, there was no precedent for sea pen transplants in the wild. As such, the VFPA proactively undertook a pilot study to ensure orange sea pen translocation was an ecologically and logistically feasible mitigation measure.⁷⁷⁴ This represents an example of the VFPA's innovative and committed approach to effective mitigation. Based on the results of the pilot study, the VFPA is confident that transplantation is a viable and effective mitigation measure to reduce direct mortality from Project construction activities. DFO has also concurred that this is a feasible mitigation strategy to partially mitigate loss of sea pen productivity.⁷⁷⁵

The VFPA will include the processes and procedures outlining the orange sea pen transplant program in the Marine Species Management Plan.⁷⁷⁶ Although the VFPA is confident that this measure will be effective as intended to partially mitigate direct loss of orange sea pens, the VFPA has committed to verifying the effectiveness of the translocation as well as monitoring for factors that influence the success of the mitigation, including sea pen density, recruitment, and presence of predators, through a Follow-up Program element. The VFPA will develop and undertake this Follow-up Program element in consultation with the Follow-

⁷⁶⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #49.

⁷⁷⁰ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1748.

⁷⁷¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #49.

⁷⁷² CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1750.

⁷⁷³ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1750.

⁷⁷⁴ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-75.

⁷⁷⁵ CEAR Doc 1630, DFO written submission, at p. 39.

⁷⁷⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #34.

up Program Advisory Committee, DFO, TFN and Musqueam, and interested Indigenous groups.⁷⁷⁷

As presented in Chapter IX of these Closing Remarks and EIS Section 17, in addition to implementing proven and effective mitigation measures to minimize Project interactions, the VFPA has proposed several offsetting concepts to create high quality onsite intertidal marsh, sandy gravel beach, mudflat, subtidal rock reefs, and native eelgrass habitats.⁷⁷⁸ The VFPA is confident that the offsetting measures proposed will benefit marine species productivity at Roberts Bank. For example, creation of native eelgrass will support ongoing productivity of heart cockles and other bivalves at Roberts Bank. DFO has also agreed that the proposed creation of offsetting habitat—specifically eelgrass—will be beneficial to crabs.⁷⁷⁹

As an established, long-term steward of the Fraser River estuary and broader marine environment, the VFPA is committed to long-term monitoring and adaptive management to ensure that ecosystem and species productivity goals are achieved and that mitigation measures are effective as intended. In addition to the anticipated monitoring requirements that will be part of the *Fisheries Act* Authorization, the VFPA has committed to several Follow-up Program elements to monitor effectiveness of offsetting habitats and to verify effects predictions.⁷⁸⁰ These Follow-up Program elements will include verification of effects predictions of Project-related changes in marine vegetation productivity and Roberts Bank ecosystem model forecasts,⁷⁸¹ effectiveness monitoring for habitats created as offsetting, including eelgrass,⁷⁸² intertidal marsh,⁷⁸³ sandy gravel beach,⁷⁸⁴ and subtidal rock reef,⁷⁸⁵ verification of effects predictions of continued establishment and use of juvenile crab nursery habitat,⁷⁸⁶ and orange sea pen transplantation effectiveness,⁷⁸⁷ as discussed above.

In addition, through its ongoing consultation with Indigenous groups, the VFPA has committed to exploring enhanced offsetting opportunities and features that will further benefit marine invertebrates. For example, the VFPA has heard Indigenous groups' preference for increased areas of eelgrass, and inclusion of oyster shells to enhance juvenile crab habitat.⁷⁸⁸ The measures currently presented within the offsetting framework provide the foundation for further substantive consultation with Indigenous groups and regulators toward the VFPA's commitment to enhance offsetting with a focus on priority species (such as Dungeness crabs) and priority habitats (such as eelgrass) as part of the Offsetting Plan, as discussed further in Chapter IX.⁷⁸⁹

⁷⁷⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C8.

⁷⁷⁸ CEAR Doc 181, EIS, Volume 3, at s. 17.

⁷⁷⁹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1758.

⁷⁸⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C3, C5, C6, C7, C8, C10, C11, C14.

⁷⁸¹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C3.

⁷⁸² CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C5.

⁷⁸³ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C6.

⁷⁸⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C10.

⁷⁸⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C11.

⁷⁸⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C7.

⁷⁸⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C8.

⁷⁸⁸ CEAR Doc 2001, Updated Project Commitments, at p. 8.

⁷⁸⁹ CEAR Doc 934, VFPA Preamble to Offsetting-related IRs.

While the VFPA concludes the Project will result in a decrease in productivity for three of four marine invertebrate sub-components, the VFPA has proposed a number of measures to avoid, reduce, and offset potential effects; as a result, residual effects are characterized as not significant. Marine invertebrate species at Roberts Bank are widely distributed and common along the northwest Pacific coast, are adaptive and tolerant of environmental fluctuations, and are resilient and able to recover from disturbance. With or without the Project, Roberts Bank will continue to support productive and diverse populations of marine invertebrates. During the technical session on May 22, 2019, DFO agreed that “there are few factors that are limiting to crab production at Roberts Bank, given the long larval duration of Dungeness crab... and the substantial population across the front of the Fraser Delta.”⁷⁹⁰ The proposed mitigation and offsetting measures are proven to effectively support marine invertebrate productivity. During the technical session on May 22, 2019, DFO agreed that “marsh habitat and eelgrass habitats would be beneficial to crabs.”⁷⁹¹ The VFPA is confident in its assessment of potential Project-related effects to marine invertebrates, and in its ability to successfully reduce, offset, and monitor potential losses to marine invertebrate productivity at Roberts Bank such that marine invertebrates continue to thrive with the Project.

3. Key issues raised and VFPA response

(a) Gravid Dungeness Crab Mitigation and Monitoring during Construction

Several submissions on the registry, including those from TFN and DFO, have stressed the importance and vulnerability of the gravid life stage.⁷⁹² The VFPA acknowledges, and agrees with, concerns raised regarding the vulnerability of the gravid life stage of Dungeness crab, and accordingly undertook a conservative approach to the assessment by assuming that gravid crabs are actively using Project footprint areas to brood their eggs, despite limited empirical evidence. Essentially, because detection of gravid crab is difficult to confirm by survey, their presence and use of the terminal footprint has been assumed.

The VFPA then proposed mitigation and offsetting based on this conservative assumption. The VFPA identified two effective mitigation measures—removal of the ITP and implementation of a sensitive timing window—to meaningfully benefit gravid crabs specifically. These are proposed in addition to other measures such as baiting and onsite offsetting that will benefit Dungeness crab more generally. Given these targeted measures, the VFPA is confident that potential Project effects to gravid crabs can, and will, be minimized.

As previously noted, the ITP has been removed from the Project in response to concerns raised by TFN communicating the importance of the area as habitat for gravid crab. This area will not be disturbed by Project activities.

⁷⁹⁰ CEAR Doc 1797, Transcript, May 22, 2019, at p. 1759.

⁷⁹¹ CEAR Doc 1797, Transcript, May 22, 2019, at p. 1758.

⁷⁹² CEAR Doc 1461, TFN written submission, at p. 2; CEAR Doc 1630, DFO written submission, at pp. 28, 29, 42, 164.

Additionally, the VFPA committed to applying DFO's timing window from October 15 to March 31 to protect gravid Dungeness crab from Project activities occurring below -5 m CD during construction.⁷⁹³ This timing window was developed by DFO, specifically for Roberts Bank as a condition of the DP3 *Fisheries Act* Authorization.⁷⁹⁴ This measure represents a substantial commitment towards the protection of gravid females as Project activities occurring below -5 m CD will cease for 5.5 months of the year.

In its submission to the Review Panel, DFO recommended the VFPA monitor the effectiveness of fisheries-sensitive windows to avoid interactions with gravid female Dungeness crabs during Project construction.⁷⁹⁵ DFO also recommended that additional mitigation measures, in addition to timing of work, be considered in the construction mitigation plans in order to ensure harm or mortality is minimized as much as possible.⁷⁹⁶ The Review Panel similarly asked how gravid female crabs can be monitored when they are non-feeding and invulnerable to trap capture, where conditions for visual observation via SCUBA surveys are poor, and buried females are difficult to find.⁷⁹⁷

The VFPA believes that implementation of the timing window removes the necessity for monitoring, which is subject to the limitations identified above. The VFPA is confident that the timing window will effectively avoid the potential for construction-related interactions with gravid crabs because the window extends longer than the period of time that crabs actually brood. As presented in the EIS, crabs brood for 2 to 4 months during late fall and winter, while the timing window will be in effect for 5.5 months.⁷⁹⁸ This builds a 1.5 to 3.5 month 'buffer' into this mitigation measure, which the VFPA believes will sufficiently account for variability in the timing and duration of brooding between years, effectively reducing the potential for injury or mortality.

Because the timing window effectively removes the potential for interaction with the Project, it removes any pathway of effect; as such, the VFPA is confident that follow-up monitoring specifically for gravid Dungeness crab is not warranted.

(b) Mitigation for juvenile Dungeness crab

During the technical session on May 22, 2019, the Review Panel asked about what approaches could be taken to protect juvenile crabs from construction effects.⁷⁹⁹ The VFPA's technical lead on marine invertebrates, Ms. Marina Winterbottom's response outlined several ways the VFPA will ensure juvenile crabs are protected.

Protection is provided by the avoidance measure of siting the terminal in deeper water as this effectively avoids spatial overlap between subtidal terminal construction activities and

⁷⁹³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #49.

⁷⁹⁴ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-25.

⁷⁹⁵ CEAR Doc 1630, DFO written submission, at p. 23.

⁷⁹⁶ CEAR Doc 1630, DFO written submission, at p. 23.

⁷⁹⁷ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1747-1748.

⁷⁹⁸ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-25.

⁷⁹⁹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1745-1746.

intertidal areas where juvenile crab recruit and rear. Further, proposed creation of native eelgrass habitat as part of onsite offsetting will provide additional recruitment and nursery habitat for juvenile crab.

The fisheries timing window proposed for juvenile salmon covers the majority of the juvenile Dungeness crab recruitment window, which occurs June through September; this timing window applies to depths shallower than -5 m CD and extends from March 1 to August 15. Thus, there will be no overlap with intertidal construction activities save for the last six weeks of the recruitment period. Further, intertidal construction will be highly localized along the causeway whereas juvenile recruitment is not concentrated along the causeway but occurs more broadly across the mid- and low tidal flats, which extend laterally for several kilometres.

The VFPA has committed to a number of reduction measures as part of the environmental management plan with the aim to reduce construction-related effects, including the Marine Sediment and Dredging Discharge Plan. This also includes a commitment to monitor the compliance and effectiveness of construction-related mitigation and apply corrective actions if required. The VFPA has also committed to a Follow-up Program to verify that juvenile Dungeness crab nursery habitat—including eelgrass and *Ulva*—continue to establish and be used by juvenile crab.

Overall, given the mitigation proposed combined with commitments to both compliance and follow-up monitoring, the VFPA is confident that the juvenile life stage of Dungeness crab will be adequately protected.

(c) Loss of high-quality Dungeness crab habitat

In its submission to the Review Panel, TFN raised concerns regarding loss of crab habitat due to the terminal footprint, impacts of dredging on crab habitat health, reduced access to crab harvesting opportunities for TFN fishers, and observed changes in crab abundance over time.⁸⁰⁰

As presented in the EIS, the VFPA assessed loss of suitable habitat due to the Project footprint as the main driver of changes in Dungeness crab productivity.⁸⁰¹ Accordingly, the VFPA developed a habitat suitability model to quantify amounts of high, moderate, and low suitability crab habitat affected by the Project, by life stage (juvenile, adult, gravid).⁸⁰² The model predicted that substantial amounts of high and moderate suitability Dungeness crab habitat will remain available to all life stages of Dungeness crab outside of the Project footprint.⁸⁰³ For example, for the adult life stage, results indicate that over 1,800 hectares (93%) of suitable habitat will remain available at Roberts Bank post-construction. Furthermore, subtidal sand habitat predominantly used by adult crabs is abundant in the

⁸⁰⁰ CEAR Doc 1639, TFN written submission, at p. 9.

⁸⁰¹ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-52.

⁸⁰² CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-38.

⁸⁰³ CEAR Doc 181, EIS, Volume 3, at Appendix 12-A, p. 41.

wider Fraser River delta region. Crabs are found on both sides of the existing causeway, in both subtidal and intertidal habitats, indicating infrastructure does not appear to limit movement or access into these areas.

To partially address loss of suitable crab habitat, the VFPA has committed to the creation of offsetting habitats and has proposed several onsite concepts.⁸⁰⁴ For example, native eelgrass creation will provide important habitat for Dungeness crabs, as well as a host of other marine invertebrates, including heart cockles, and infaunal and epifaunal communities.⁸⁰⁵ The onsite offsetting measures presented within the offsetting framework provide the foundation for further substantive consultation with Indigenous groups and regulators toward the development of the Offsetting Plan.⁸⁰⁶ Additionally, the VFPA has committed to enhancing offsetting, based on input from Indigenous groups and DFO.⁸⁰⁷ For example, the VFPA has heard from Indigenous groups regarding the importance of more offsetting for commercially and culturally important species such as crab. In addition to the anticipated monitoring requirements that will be part of the *Fisheries Act* Authorization, the VFPA has committed to several Follow-up Program elements to monitor the effectiveness of offsetting habitats.⁸⁰⁸ The VFPA has deep experience in the creation and long-term maintenance of offsetting sites and is confident that the offsetting measures will benefit marine invertebrate productivity.

(d) Loss of orange sea pen productivity and potential for recolonization

During the May 22, 2019 topic-specific session, the Review Panel enquired about the VFPA's confidence in the potential for orange sea pens to recolonize the Roberts Bank area following construction.⁸⁰⁹

The VFPA predicts an adverse residual effect to orange sea pen productivity that is not significant, resulting from the mechanisms of direct mortality and permanent loss of suitable habitat to the Project footprint.⁸¹⁰ Nevertheless, the VFPA is confident that the population integrity of orange sea pens will be maintained after terminal construction.

Although there will be unavoidable losses of orange sea pen due to the Project footprint, the productivity of remaining orange sea pens, outside of the Project footprint, is considerable. A dense aggregation, measuring over 7.5 hectares and supporting tens of thousands of orange sea pens, currently exists outside of the Project footprint, which is additionally surrounded by a larger (114 hectares) more patchy aggregation.⁸¹¹ The VFPA undertook habitat suitability modelling to predict and quantify suitable orange sea pen habitat area based on environmental preferences.⁸¹² Results show that more than 230 hectares (73%) of

⁸⁰⁴ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1758.

⁸⁰⁵ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-76.

⁸⁰⁶ CEAR Doc 934, VFPA Preamble to Offsetting-related IRs.

⁸⁰⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #40.

⁸⁰⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C5, C6, C11, C14.

⁸⁰⁹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1752.

⁸¹⁰ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-69.

⁸¹¹ CEAR Doc 181, EIS, Volume 3, at s. 12, p. 12-29.

⁸¹² CEAR Doc 181, EIS, Volume 3, at Appendix 12-A.

the existing 318 hectares of suitable habitat at Roberts Bank will continue to be available, post-construction.⁸¹³ The model also predicts that there will be a 3.4 hectare net gain in highly suitable habitat around the edges of the terminal following Project construction; studies have shown that orange sea pens tend to gather around edges of structures as current velocities accelerate around corners offering enhanced prey delivery.⁸¹⁴ Overall, the VFPA is confident population integrity will be maintained based on the considerable amounts of productivity and suitable habitat that will remain with the Project.

Orange sea pens are resilient and have a high capacity for natural recolonization due to aspects of their reproductive and larval biology. For example, orange sea pens are broadcast spawners with 200,000 larvae per reproductive event, and larvae are nutritionally independent, which means potential mortality by starvation is low. Orange sea pens comprise a meta-population, meaning they are not isolated from the other aggregations within the Salish Sea. Connectivity is primarily achieved through the extended pelagic larval phase, lasting from a week to over a month, over which time larvae can travel substantial distances. Larval settlement is largely governed by two main cues: presence of suitable sandy substrate and presence of conspecifics (i.e., other sea pens); as described above, the habitat model indicated that ample suitable habitat will remain available with the Project while the existence of the 7.5 hectare dense aggregation outside the terminal footprint ensures continued presence of conspecifics. Thus, the VFPA is confident that Roberts Bank will continue to offer orange sea pens these important settlement cues in the future, facilitating recolonization. The potential for recolonization is not limited to larval stages, as adults are also capable of movement and able to migrate and colonize new areas.

Considering their biological characteristics along with the known aggregations within and outside of Roberts Bank, the VFPA is confident in its assessment that potential recolonization of habitats at Roberts Bank by orange sea pens following construction will be high.

(e) Orange sea pen transplants

TFN expressed concern that studies to date indicated that orange sea pen transplantation only has a moderate likelihood of success and there are no suitable mitigation alternatives.⁸¹⁵ Similarly, during the May 22, 2019 technical session, the Review Panel enquired about the percentage of the orange sea pen colony that is proposed to be transplanted.⁸¹⁶

The VFPA estimates that the Project will result in direct loss of approximately 55% of the orange sea pen aggregation located within the proposed Project footprint.⁸¹⁷ To partially mitigate this effect, the VFPA has committed to transplanting approximately 10% of the aggregation; this represents a commitment to translocate tens of thousands of individual

⁸¹³ CEAR Doc 181, EIS, Volume 3, at s. 12, p.12-67.

⁸¹⁴ CEAR Doc 181, EIS, Volume 3, at s. 12, pp. 12-67 to 12-68.

⁸¹⁵ CEAR Doc 1639, TFN written submission, at p. 9.

⁸¹⁶ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1752.

⁸¹⁷ CEAR Doc 181, EIS, Section 12, at p. 12-52.

orange sea pens.⁸¹⁸ The pilot program is an example of the innovative and proactive approach taken by the VFPA to reduce productivity losses to orange sea pens. Based on the success of the pilot study,⁸¹⁹ the VFPA is confident that translocation is a viable method for reducing productivity loss to orange sea pens. DFO, in its submission to the Review Panel, concurred that transplantation is a novel approach to mitigate direct mortality of orange sea pens from construction of the terminal, and appears to be a feasible mitigation strategy to reduce mortality of sea pens due to the proposed terminal placement.⁸²⁰

As part of the Follow-up Program, the VFPA has committed to verify the effectiveness of orange sea pen translocation as a reduction mitigation measure.⁸²¹ The key objective of this Follow-up Program element is to confirm presence of transplanted orange sea pens. The VFPA has committed to working with the Follow-up Program Advisory Committee, DFO, and interested Indigenous groups to develop this program, including determining the number and size of transplant sites.

4. Conclusion

The VFPA comprehensively and conservatively assessed the potential Project-related effects to marine invertebrates. The assessment demonstrates that, with mitigation, the Project will not result in a significant residual adverse effect on the productivity of marine invertebrates, and is not expected to result in any incremental adverse cumulative effects to marine invertebrates.⁸²²

Nevertheless, the VFPA has committed to several measures to avoid, mitigate, offset, and monitor potential Project-related effects to marine invertebrates, including adhering to a timing window for construction activities and baiting crabs away from Project areas. The VFPA has also proposed a significant offsetting program to ensure high quality habitat is available to marine invertebrates.

Given the high resiliency of marine invertebrate populations, the continued availability of suitable habitat following construction, and the VFPA's targeted mitigation, offsetting, and Follow-up Program efforts, the VFPA is confident that marine invertebrates will continue to thrive at Roberts Bank with the Project.

⁸¹⁸ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1752.

⁸¹⁹ CEAR Doc 934, VFPA response to IR5-05.

⁸²⁰ CEAR Doc 1630, DFO written submission, at p. 24.

⁸²¹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C8.

⁸²² CEAR Doc 181, EIS, Volume 3, at s. 12.

CHAPTER XII. MARINE COMMERCIAL USE

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
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2. Overview

The VFPA recognizes the economic importance of marine commercial use for local communities and Indigenous groups. The marine commercial use assessment addressed four sub-components reflecting marine commercial uses in the vicinity of the Project. The assessment did not identify adverse Project effects for marine fish harvesting, guided sport fishing, or marine-based tourism. As the VFPA identified a non-significant adverse residual effect to commercial crab harvesting activity, landings, and associated revenues, this chapter focuses on commercial crab harvesting.

The VFPA relied on multiple lines of evidence to characterize existing conditions and predict Project effects on marine commercial use. This included review of literature and analyzing trend data on commercial crab harvest vessel counts, trap hauls, landings, and revenues. The VFPA also conducted interviews with commercial crab harvesters, Indigenous groups actively commercially crab harvesting at Roberts Bank, DFO, and the commercial seafood industry. The VFPA also relied on the results from the marine invertebrates assessment⁸²³ and the assessment of ongoing productivity of commercial, recreational, and Aboriginal fisheries⁸²⁴ to understand potential Project effects on crab productivity and implications to commercial crab harvesting.

The assessment was conservative. The VFPA identified significance criteria, and then determined if there would be a significant adverse residual effect if those criteria were met, regardless of the number of commercial users affected. For commercial crab harvesting, the VFPA determined that the potential residual effect is not significant because the assessment did not meet the significance criteria for two main reasons: crabs are known to move substantial distances to baited traps, which will support the availability of eligible crab outside of the proposed expansion of the navigational closure area (**NCA**) for commercial crab harvesting, and based on DFO fisheries management, crab harvesters can move to open areas within Crab Management Area I (**Area I**) or other crab management areas.⁸²⁵

Although the VFPA predicts the potential Project effect on commercial crab harvesting will not be significant, the VFPA is committed to undertaking annual analysis of commercial crab harvesting activity with the Project and if required, and where identified with DFO, commercial crab harvesters, and Indigenous groups, considering additional measures for implementation with appropriate parties.

The footprint of the proposed marine terminal will remove 116.1 hectares currently available to commercial crab harvesters holding licences for Area I.⁸²⁶ Further, the VFPA is proposing to expand the existing NCA at Roberts Bank (currently 714.7 hectares) to support safe vessel transit and navigation. The size of the proposed NCA expansion is 352.3 hectares during construction, and 231.5 hectares during operation.⁸²⁷ During operation, this

⁸²³ CEAR Doc 181, EIS, Volume 3, at s. 12.

⁸²⁴ CEAR Doc 181, EIS, Volume 3, at s. 16.

⁸²⁵ CEAR Doc 181, EIS, Volume 3, at s. 21, pp. 21-53 through 21-55.

⁸²⁶ CEAR Doc 1872, VFPA response to Undertaking #18, at p. 1.

⁸²⁷ CEAR Doc 1872, VFPA response to Undertaking #18, at p. 1.

represents 0.16% of Area I or, more precisely, 6.5% of sub-area 29-6 and 1.7% of sub-area 29-7.⁸²⁸ The proposed NCA expansion during construction will be in place as long as in-water works are underway, which the VFPA expects to commence during the first month of construction and conclude at month 45 (Year 5). The transition to the proposed NCA expansion for the operation phase is expected to be made shortly after the completion of in-water construction activities.⁸²⁹

The VFPA has jurisdiction to establish the NCA under the *Canada Marine Act*, which gives port authorities jurisdiction to establish traffic control zones to promote safe and efficient navigation or environmental protection.⁸³⁰ The *Port Authorities Operations Regulations* confer a similar jurisdiction.⁸³¹ Under these provisions, the VFPA has the jurisdiction to establish traffic control zones such as the NCA, regulate the use of floats within the area, and prohibit or allow fishing within the area. As with the existing NCA, commercial crab harvesters will be able to traverse through the proposed expanded NCA. The VFPA will support Indigenous crab harvesting for domestic or FSC purposes within the proposed NCA expansion,⁸³² as has been the practice within the existing NCA.⁸³³

The VFPA acknowledges that the Project footprint and the proposed NCA expansion will result in displacement of commercial crab harvesting, which could result in adverse effects to commercial crab harvest landings and revenues, particularly within management sub-area 29-6. Commercial crab harvesters will continue to be able to harvest in open areas outside of the proposed NCA expansion and may harvest in other management areas through license re-selection. As crabs are known to move substantial distances to baited traps, migration of crabs from within the proposed NCA expansion to commercial crab harvesters' baited traps located outside of the proposed NCA expansion will support the availability of eligible crab for commercial harvesting.⁸³⁴

The Updated Project Commitments lists 31 measures that will contribute to mitigation of potential effects to marine commercial use, including 26 measures related to project design, management planning, and consultation and four biophysical mitigation measures specific to supporting crab productivity.⁸³⁵

To address potential effects to commercial crab harvesters, prior to construction, the VFPA will provide commercial crab harvesters, via the Area I Crab Fisherman Association (**AICFA**), and Indigenous groups information on the timing of implementation and spatial

⁸²⁸ CEAR Doc 934, VFPA response to IR7-33. See also CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1794.

⁸²⁹ CEAR Doc 1943, VFPA response to Undertaking #55.

⁸³⁰ *Canada Marine Act*, SC 1998, c 10, at s. 56.

⁸³¹ *Port Authorities Operations Regulations*, SOR/2000-55, at s. 25, 27.

⁸³² Indigenous crab harvesting for domestic or FSC purposes is distinct from the commercial crab harvesting conducted pursuant to commercial licences held by some Indigenous groups or individuals.

⁸³³ CEAR Doc 1872, VFPA response to Undertaking #18, at p. 2.

⁸³⁴ CEAR Doc 181, EIS, Volume, at s. 21, p. 21-53.

⁸³⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3, 10, 12, 13, 14, 15, 16, 17, 18, 21, 22, 25, 26, 28, 29, 30, 31, 32, 34, 36, 38, 40, 41, 44, 46, 47, 49, 51, 57, 62, 66.

area (including configuration) of the NCA expansion.⁸³⁶ The VFPA will invite commercial crab harvesters to an annual meeting during construction and the first five years of operation to provide information on the location, status, and progress of construction work and operational activities to allow harvesters to adapt their activities. As part of this commitment, the VFPA has committed to completing and sharing annual analysis of commercial crab harvesting electronic monitoring and harvest landing data as collected by DFO. Where identified with DFO, commercial crab harvesters, and Indigenous groups, the VFPA will consider additional measures and implement with appropriate parties.

In addition, the VFPA is committed to specific consultation with DFO, TFN, Musqueam, and other Indigenous groups, as appropriate, on the timing of implementation and configuration of the proposed expanded NCA expansion.⁸³⁷

With mitigation, consultation, and engagement, the VFPA expects that residual adverse effects on commercial crab harvesting will not be significant.

3. Key issues raised and VFPA response

- (a) Area I Crab Fisherman Association's proposal for a 'Roberts Bank Navigational Limited Access Fishing Area'

The AICFA have proposed that the VFPA and the AICFA work together to jointly establish a *Roberts Bank Navigational Limited Access Fishing Area I* where commercial crab harvesting could take place within the proposed NCA expansion without floats when vessels are not actively berthing.⁸³⁸

Based on analysis and consultation inputs received from DFO, Transport Canada, and Indigenous groups, it is the VFPA's understanding that such an arrangement is not feasible due to fishery management requirements, competing interests, and safety considerations. As the VFPA explained during the topic-specific session on May 22, 2019, a similar arrangement was in place between 2004 and 2008. The area of the existing NCA was used as a no-float area as opposed to a full closure. The VFPA explained:

"Through that time there was -- the purpose of that no-float zone was obviously to promote safe navigation, but also consider the viability of that area as harvesting ground. There were numerous incidents, very dangerous situations, that led to damages on tugboats and deep sea vessels that were investigated, as I understand it, by DFO and VFPA at those times. So based on the experience throughout those seasons,

⁸³⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #62.

⁸³⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment 73.

⁸³⁸ CEAR Doc 1397, AICFA's comments on the sufficiency of information, at p. 6.

the decision was made at the end of 2008 to implement a full no [sic] -- navigational closure.”⁸³⁹

TFN stated they would be opposed to the AICFA’s proposal as allowing commercial harvesting in the NCA would increase competition for their domestic fishery.⁸⁴⁰

The VFPA has and will continue to consult with DFO, commercial crab harvesters, TFN, Musqueam, and other Indigenous groups on measures to mitigate competitive interactions between commercial and domestic or FSC harvesters due to overlap in harvesting practices within and outside the proposed NCA expansion during construction and operation.⁸⁴¹ The VFPA, further clarified the following:

“Based on that consultation as well as consideration of the economic feasibility of which the Port, through enforcement, would not have sole responsibility for, the VFPA is of the view that opening up the proposed navigational closure area to crab harvesting under commercial licences could potentially affect domestic food, social, ceremonial harvesting based on the information we received from the indigenous groups as well as feedback received from DFO and Transport Canada.”⁸⁴²

The VFPA is committed to continuing consultation with the AICFA to identify and consider other potential mitigation measures.⁸⁴³

(b) Impacts to domestic and FSC Harvesting as a result of the Project footprint and the NCA

In their presentation on May 22, 2019, LGL Limited on behalf of TFN summarized the objectives, methods, and findings of the Dungeness Crab Abundance and Movement at Roberts Bank Study.⁸⁴⁴ The presentation indicated the importance of the existing NCA to the domestic (or FSC) fishery, identifying a 2.8 times greater harvest yield within the existing NCA compared to outside the NCA.

LGL Limited explained that their analysis found that portions of the proposed NCA expansion have limitations due to depth (being either too shallow or too deep) for some existing domestic or FSC harvesters’ gear, and that high-quality habitat and preferred domestic or FSC crab fishing area will be permanently lost with the terminal footprint. Overall, LGL

⁸³⁹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1803.

⁸⁴⁰ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1804.

⁸⁴¹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1802.

⁸⁴² CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1802.

⁸⁴³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #62.

⁸⁴⁴ CEAR Doc 1750, TFN oral presentation, May 22, 2019.

Limited claimed that more domestic or FSC crab fishing area will be lost through terminal placement and NCA expansion than will be gained, and further mitigation is required.⁸⁴⁵

The VFPA acknowledges TFN's concerns and continues to consult with TFN with respect to additional mitigation measures, including providing additional gear required to fish at greater depths and navigation controls that would support harvester safety.⁸⁴⁶

TFN also confirmed that the portions of the expanded NCA within the preferred harvest depth would provide a higher yield of catch—measured in catch per unit effort (**CPUE**)—when compared with the existing NCA. TFN explained:

"Although CPUE for the 2 – 20m depth stratum would almost certainly vary by geographic location, it seems reasonable to assume that CPUE would increase within the area defined as the proposed NCA once commercial fisheries are prohibited. The increase could well be within the ranges seen from Burns et al (2017) inside the current NCA (i.e. an increase of between 1.4 and 3.3, on average for legal size males, depending on the season, Table 2)."⁸⁴⁷

The Review Panel asked the VFPA, DFO, TFN, and Musqueam about the use of floats in the existing NCA. The VFPA provided its understanding that domestic and FSC harvesting within the existing NCA is conducted by placing floats outside of the NCA and traps at the seabed within the NCA.⁸⁴⁸ DFO confirmed this was also their understanding of current practice and reiterated that all gear must be marked with floats on both ends of the crab trap line.⁸⁴⁹ TFN identified the concern that the DFO crab licence regulation requires floats on both ends of crab trap lines, stating the following:

"in the current set up, there is really no legal way that a Tsawwassen or an aboriginal fishermen with across territory could inhabit the area with the current structure. There is not realistic to do horseshoe shapes because everybody would be doing horseshoe back over each other to get back into the float zone. And you are also out of the legal context if you decide to only have only one float in the crab zone and then have no float on the other side. So it's a Catch 22."⁸⁵⁰

Musqueam also identified concerns with the use of floats in the existing NCA:

⁸⁴⁵ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1773-1774.

⁸⁴⁶ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at pp. 1785-1787.

⁸⁴⁷ CEAR Doc 1890, TFN response to Undertaking #17, at p. 2.

⁸⁴⁸ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1778.

⁸⁴⁹ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1776.

⁸⁵⁰ CEAR Doc 1860, Transcript, Volume 16, June 1, 2019, at p. 4037.

“Our guys used to use the float system, but it wasn’t just the area of the transport. We’re having a lot of problems with non-natives that would go and take the gear, so our guys were losing a lot of gear, both by shipping and also human individuals that didn’t agree with our section 35 rights and would deliberately go and grab the buoys and either take them or drag them out to the deep and cut them off.

So a lot of our guys now don’t use the marking of the gear. They’re using the GPS.

And that was some of the issues that we’ve been trying to work with the department [DFO] on finding a solution how we could still exercise our Aboriginal right to fish and also by not marking the gear.”⁸⁵¹

In response to TFN and Musqueam's concerns, the VFPA committed to specific consultation with DFO, TFN, Musqueam, and other Indigenous groups as appropriate on the terms of licencing to use the navigational closure areas for domestic and FSC crab harvesting purposes. The VFPA’s consultation with domestic and FSC crab harvesters will also include the timing of implementation and spatial area of the proposed NCA expansion.⁸⁵²

4. Conclusion

The VFPA is confident that residual adverse Project effects on commercial crab harvesting will be not significant. The VFPA is committed to ongoing engagement with commercial harvesters through the AICFA, and with TFN, Musqueam, other Indigenous groups, and DFO to discuss spatial and temporal aspects of the proposed NCA expansion, and to explore additional mitigation measures. The VFPA will share information on Project construction and operation activities and provide results of commercial crab electronic monitoring and harvest landing data analysis.

The VFPA has also committed to specific consultation with TFN, Musqueam, other Indigenous groups, and DFO on the terms of licencing to use the navigational closure areas for domestic and FSC crab harvesting purposes and to consult on the timing of implementation and spatial area (including configuration) of the proposed NCA expansion.

⁸⁵¹ CEAR Doc 1975, Transcript, Volume 24, June 24, 2019, at p. 4889.

⁸⁵² CEAR Doc 2001, VFPA Updated Project Commitments, Appendix A, Commitment 73.

CHAPTER XIII. MARINE MAMMALS AND UNDERWATER NOISE

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2. Overview

The VFPA recognizes the importance of marine mammals to the Roberts Bank ecosystem, and selected marine mammals as a valued component in the environmental assessment. Marine mammals inhabit the waters in or near Roberts Bank, are key predators in the Strait of Georgia marine ecosystem, are the focus of substantial wildlife viewing and ecotourism, and hold an important cultural value to the public and Indigenous groups.

In accordance with standard environmental assessment procedure, as well as the CEA Agency's Interim Technical Guidance,⁸⁵³ and based on input from ITK holders, the VFPA selected three sub-components of marine mammals to represent the biodiversity within the Project and Project-related marine shipping area: (1) toothed whales, as represented by SRKW; (2) baleen whales, as represented by North Pacific humpback whales; and (3) seals and sea lions, as represented by Steller sea lions.

With mitigation, Project construction and operation are not expected to result in significant adverse residual effects to marine mammals.⁸⁵⁴ Although each sub-component was thoroughly assessed, the VFPA acknowledges that the focus of the public hearing was on potential effects to SRKW. This chapter is therefore primarily focused on SRKW, with the exception of the potential for vessel strike risk to humpback whales.

The VFPA recognizes that SRKW have particular cultural and spiritual significance to Indigenous groups and the public. The VFPA has heard this significance clearly through consultation, and shares the concerns regarding the recovery of this endangered species. The VFPA acknowledges that the proposed Project and marine shipping associated with the Project will occur within federally designated SRKW critical habitat. For the purposes of the EIS assessment, the VFPA defined destruction of critical habitat as resulting if part of the critical habitat is permanently or temporarily degraded, such that its biophysical features would not be available when needed by SRKW for life functions (i.e., foraging, mating, resting, socializing).⁸⁵⁵ The VFPA assessed the following potential threats to SRKW critical habitat as identified within the SRKW recovery strategy: acoustic disturbance, availability of prey, physical disturbance, and environmental (water and sediment quality) contaminants.⁸⁵⁶

As discussed below, the VFPA is involved in several initiatives focused on reducing potential regional shipping-related effects to SRKW, including the ECHO Program and a section 11 *Species at Risk Act* Conservation Agreement with the Government of Canada, along with 13 industry partners.

The current endangered status of SRKW reflects activities such as historic live capture for aquaria, underwater noise from commercial and small vessels, environmental

⁸⁵³ CEAR Doc 314, VFPA response to IR #9.

⁸⁵⁴ CEAR Doc 181, EIS, Volume 3, at s. 14.

⁸⁵⁵ CEAR Doc 181, EIS, Volume 3, at s. 14.1.1.1.

⁸⁵⁶ CEAR Doc 1374, Recovery Strategy for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada, at p. vi.

contamination, and a lack of prey, particularly adult Chinook salmon.⁸⁵⁷ The VFPA thoroughly and conservatively assessed potential effects on SRKW and concluded that the Project and Project-associated marine shipping itself, with mitigation, will not significantly affect the SRKW population, and will not jeopardize the survival or recovery of SRKW.⁸⁵⁸

The VFPA's assessments relied on multiple lines of evidence, including field, desktop, and modelling studies, and input and recommendations from underwater noise and killer whale experts from around the world, through the SRKW TAG.⁸⁵⁹ The SRKW TAG involved 19 international killer whale and underwater noise experts from regulatory agencies such as DFO, academia, and key environmental non-governmental organizations. Based on guidance from the SRKW TAG, the VFPA initiated studies to assess potential Project effects to SRKW life functions and critical habitat features.⁸⁶⁰

The VFPA took a highly conservative approach to assess potential Project-related effects to marine mammals. Conservative assumptions applied to the assessment are demonstrated in the scenarios used for inputs to the underwater noise model.⁸⁶¹ For example, the VFPA assumed 260 Mega-Max class container vessels, escorted by four tugs instead of the typical three tugs, travelling at higher speeds within the Project area, would call at RBT2.⁸⁶² Additionally, the VFPA assessed potential effects of underwater noise on marine mammals assuming winter sound speed profile conditions. This is a conservative assumption because sound carries further in the underwater environment during winter than during summer, due to cooling at the sea surface;⁸⁶³ moreover, SRKW are far more likely to be present within the Salish Sea during the summer months when they spend time foraging on returning Chinook.⁸⁶⁴

SRKW use of the Roberts Bank area is low compared to core areas, particularly Haro Strait and Boundary Pass. The VFPA expects that SRKW will be present at Roberts Bank approximately 4.0% of the year, primarily during summer months.⁸⁶⁵ As presented within Chapter IV of these Closing Remarks, and further in this chapter, recent studies and modelling as part of the 2018 Mercator Report have provided a more accurate depiction of the expected future conditions, with the Project.

The 2018 Mercator Report predicts that the incremental increase of vessels calling at RBT2 would be decreased from 260 (as assessed within the EIS) to 104.⁸⁶⁶ The VFPA predicts that Project-related underwater noise, above expected conditions, will occur only 2% of the year, as associated with the predicted incremental increase of 104 RBT2 vessel calls per year.

⁸⁵⁷ CEAR Doc 181, EIS, Volume 3, at s. 14, p. 14-34.

⁸⁵⁸ CEAR Doc 1800, VFPA response to Undertaking #20, at p. 6.

⁸⁵⁹ CEAR Doc 181, EIS, Volume 3, at s. 14.4. See also CEAR Doc 181, EIS, Volume 1 at Appendices 7.4-A, 7.4-B.

⁸⁶⁰ CEAR Doc 181, EIS, Volume 3, at s. 14.4.1. See also CEAR Doc 934, VFPA response to IR5-29, at Appendix IR5-29-C.

⁸⁶¹ CEAR Doc 181, EIS, Volume 3, at s. 9.8, Appendix 9.8-A.

⁸⁶² CEAR Doc 934, VFPA response to IR5-48, at p.3.

⁸⁶³ CEAR Doc 181, EIS, Volume 2, at s. 9.8, p. 9.8-16.

⁸⁶⁴ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1826; see also CEAR Doc 388, Appendix AIR10-C, TDR MM-1, at p. 13.

⁸⁶⁵ CEAR Doc 388, Appendix AIR10-C, TDR MM-1, at p. 14.

⁸⁶⁶ CEAR Doc 1800, VFPA response to Undertaking #20, at p. 4.

This corresponds to an incremental increase of underwater noise-related disturbance to SRKW of 1.4 hours per whale per year, or 0.016% of the year, above expected conditions, based on the potential for SRKW presence to overlap with the occurrence of Project-related underwater noise during operations.⁸⁶⁷ The VFPA is confident that the 0.016% potential for disturbance attributable to the terminal operation will not materially interfere with the ability of SRKW to carry out their life functions.

The VFPA recognizes that current levels of underwater noise from commercial vessel traffic in the marine shipping area expose SRKW to levels of underwater noise that could result in potential behavioural effects and acoustic masking.⁸⁶⁸ The VFPA therefore assessed potential effects to behaviour and foraging of SRKW in a conservative manner. For instance, the VFPA conservatively over-estimated potential effects to SRKW behaviour and foraging by assuming that SRKW are feeding 100% of the time (i.e., behavioural responses were assumed to result in a complete loss of foraging opportunity⁸⁶⁹) when in reality, they feed 40% to 67% of the time.⁸⁷⁰ Foraging behaviour predictions were also conservatively based on the 'three-dimensional' search hypothesis, which results in the highest percentage of loss of foraging time due to masking.⁸⁷¹ Further, it was assumed that Chinook salmon comprised 100% of SRKW diet, which may not reflect biological reality due to the potential consumption of alternative prey resources.⁸⁷² The DFO CSAS referred to the underwater noise model developed for the assessment as "state-of-the-art" and "well-developed, using best information available as inputs, and its output seems reasonable."⁸⁷³

When compared to existing conditions of the acoustic environment, the VFPA predicted that average underwater noise levels that may result in SRKW behavioural responses during RBT2 terminal operation are comparable to average levels currently measured at Roberts Bank, but individual (non-averaged) underwater noise events would frequently exceed existing levels during operation.⁸⁷⁴ However, as presented within Chapter IV of these Closing Remarks, and further in this chapter, recent studies and modelling as part of the 2018 Mercator Report have provided a more accurate depiction of the expected future conditions, with the Project. As a result, the predictions presented in the EIS represent a highly conservative scenario, which is unlikely to be realized as a result of the Project.⁸⁷⁵

The VFPA has proposed proven, industry-best mitigation measures to avoid and reduce potential adverse effects to marine mammals from underwater noise during construction.⁸⁷⁶ DFO agreed that with the application of appropriate mitigation measures, there is a "good

⁸⁶⁷ CEAR Doc 1800, VFPA response to Undertaking #20, at pp. 6-7.

⁸⁶⁸ CEAR Doc 181, EIS, Volume 3, s. 14, at p. 14-31.

⁸⁶⁹ CEAR Doc 181, EIS, Volume 3, at s. 14, p. 14-69.

⁸⁷⁰ CEAR Doc 1289, DFO comments on the sufficiency of information, at p. 23.

⁸⁷¹ CEAR Doc 181, EIS, Volume 3, at s. 14, Appendix 14-C, p. 10.

⁸⁷² CEAR Doc 181, EIS, Volume 3, at s. 14, Appendix 14-C, p. 21.

⁸⁷³ CEAR Doc 919, DFO technical review of the EIS and MSA: Effects on Marine Mammals, at pp. 8-9.

⁸⁷⁴ CEAR Doc 181, EIS, Volume 3, s. 14, at p. 14-61.

⁸⁷⁵ CEAR Doc 1899, VFPA response to Undertaking #35. See also CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1825.

⁸⁷⁶ CEAR Doc 934, VFPA response to IR5-49, at p. 2. Also see CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #11, 14, 15, 18, 22, 33, 37, 38.

opportunity that there is no residual impact" during construction.⁸⁷⁷ The VFPA will fully detail these mitigation measures for marine mammals in the Construction Environmental Management Plan and several sub-plans, most notably the Marine Mammals and the Underwater Noise Management Plans.⁸⁷⁸

As presented within Chapter X of these Closing Remarks, the VFPA has proposed several mitigation measures to be implemented during construction to address potential effects to salmon, which will benefit SRKW by protecting their primary prey source, Chinook salmon. With regard to potential environmental contaminants, while the VFPA is confident that sediments at Roberts Bank are not contaminated,⁸⁷⁹ the VFPA has committed to employing specific dredging practices to handle the upper 0.5 m of sediments from the tug basin area to avoid discharge of fines in supernatant and reduce any potential for increasing PCBs in the receiving environment.⁸⁸⁰ The VFPA has also committed to ensuring that quarry material is characterized to demonstrate that construction activities, including supernatant discharge, will not result in marine pollution, as defined in the London Protocol and Conventions.⁸⁸¹

The VFPA has committed to monitoring underwater noise levels during terminal operation to verify predictions and to monitor terminal noise levels over time as part of the Follow-up Program. The request for an underwater noise Follow-up Program element was raised by Indigenous groups during the VFPA-facilitated Indigenous Advisory Forum held in spring 2019. The VFPA will develop this Follow-up Program element with input from Indigenous groups, the Follow-up Program Advisory Committee, and DFO.⁸⁸²

In addition, the VFPA has also proposed offsetting concepts that will benefit SRKW by contributing to the future health and recovery of Chinook salmon.⁸⁸³ These concepts are focused on providing additional food sources, refuge from predators, and habitats for spawning.⁸⁸⁴ The VFPA has clearly heard, and agrees with, Indigenous groups' and regulators' support for prioritizing offsetting measures that focus on Chinook salmon. As discussed in Chapter IX of these Closing Remarks, offsetting measures presented in the EIS provide the framework of concepts and objectives that will guide consultation with Indigenous groups and regulators toward developing a final Offsetting Plan.⁸⁸⁵

The VFPA concluded that SRKW are significantly affected under existing conditions, due to past activities and a lack of recovery. Therefore, cumulative effects, including non-significant incremental Project-related effects, are considered significant. However, based on multiple lines of evidence, the VFPA concluded that the predicted incremental effects from the Project would not further affect the health of individuals, would not jeopardize the

⁸⁷⁷ CEAR Doc 1798, Transcript, May 23, 2019, Volume 8, at pp. 1959-1960.

⁸⁷⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #14.

⁸⁷⁹ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1857.

⁸⁸⁰ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 1856-1858. See also CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #47.

⁸⁸¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #46.

⁸⁸² CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C13.

⁸⁸³ CEAR Doc 2001, Updated Project Commitments, at p. 8, and at Appendix A, Commitment #40, 41.

⁸⁸⁴ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, pp. 1829-1830.

⁸⁸⁵ CEAR Doc 181, EIS, Volume 3, at s. 17.

survival or the recovery of the population, and would not measurably contribute to the overall cumulative effects.

The VFPA will explore and evaluate opportunities to contribute to, support, and/or participate in current or future regional and/or multi-stakeholder initiatives that will inform effective management, and enhance productivity of adult salmon populations, and will support management and recovery of SRKW.⁸⁸⁶ Although activities occurring within the marine shipping area are outside of the care and control of the VFPA, the VFPA will continue to support regional initiatives and programs that provide a better understanding, and reduce the effect, of marine shipping activities on marine mammals.⁸⁸⁷ These initiatives, while not directly connected to RBT2, will contribute toward recovery objectives defined in DFO's SRKW Action Plan and the overall recovery of the SRKW population.

3. Key issues and VPFA response

(a) Destruction of critical habitat

The VFPA acknowledges that the Project footprint is located within federally designated SRKW critical habitat. Sections 73 and 74 of *SARA* authorize a competent minister to enter into an agreement or to issue a permit to authorize a person "to engage in an activity affecting a listed wildlife species, any part of its critical habitat or the residences of its individuals." If the competent minister enters into an agreement or issues a permit under section 73 or 74, the prohibitions against destruction of critical habitat found in s. 58 of *SARA* no longer apply.

In the case of SRKW, the competent Minister is the Minister of Fisheries and Oceans Canada, and the determination as to whether to authorize a permit under section section 73 or 74 is a decision of the Minister. In its submission to the Review Panel, DFO stated that based on the imminent threat to their survival and recovery, declining small populations, and cumulative impacts to SRKW critical habitat, it is DFO's opinion that construction and footprint-related impacts associated with the Project will likely require issuance of a *SARA* permit under s. 73 or a *SARA*-compliant *Fisheries Act* Authorization under s. 74 for the destruction of SRKW critical habitat.⁸⁸⁸

The VFPA acknowledges DFO's position that a *SARA* permit or a *SARA*-compliant *Fisheries Act* Authorization would be required, and is committed to working with DFO in this permitting process. The VFPA is confident that the requirements of *SARA* can be met, as outlined below.

Critical habitat is defined under *SARA* as follows:

⁸⁸⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #54, 55.

⁸⁸⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix B.

⁸⁸⁸ CEAR Doc 1630, DFO written submission.

“the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or in an action plan for the species.”⁸⁸⁹

The SRKW critical habitat is defined geographically in the *Critical Habitat of the Killer Whale (Orcinus orca) Northeast Pacific Southern Resident Population Order*⁸⁹⁰ and the *Recovery Strategy for the Northern and Southern Resident Killer Whales (Orcinus orca) in Canada*.⁸⁹¹ The absolute area of physical disturbance from the Project footprint that overlaps with SRKW critical habitat represents 0.02% of the Critical Habitat Order area and 0.01% of all US and Canadian trans-boundary critical habitat.⁸⁹² DFO has acknowledged that the Project terminal footprint represents an ‘insignificant area’ when compared to the overall area of critical habitat.⁸⁹³ Furthermore, as described above, the anticipated overlap with the Project-related incremental increase in underwater noise with SRKW presence is 0.016%.⁸⁹⁴

As noted above, under section 73 of SARA, the Minister may enter into an agreement or issue a permit authorizing activities affecting a listed species or any part of its critical habitat, where affecting the species is incidental to the carrying out of the activity (subsections 73(1) and (2)).

Subsection 73(3) sets out the pre-conditions for entering into an agreement or issuing a permit, as follows:

“Pre-conditions

73(3) The agreement may be entered into, or the permit issued, only if the competent minister is of the opinion that

(a) all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;

(b) all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and

(c) the activity will not jeopardize the survival or recovery of the species.”

⁸⁸⁹ SARA, at s. 2(1).

⁸⁹⁰ SOR/2018-278.

⁸⁹¹ CEAR Doc 1374, Recovery Strategy for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada.

⁸⁹² CEAR Doc 934, VFPA response to IR5-48, at p. 2.

⁸⁹³ CEAR Doc 1289, DFO comments on the sufficiency of information, at p. 23.

⁸⁹⁴ CEAR Doc 1800, VFPA response to Undertaking #20, at p. 8.

Section 74 of *SARA* specifies that an authorization to engage in activities affecting a listed wildlife species or any part of its critical habitat issued by the Minister under another Act of Parliament has the same effect as an agreement or permit under subsection 73(1) if the Minister is of the opinion that the requirements of subsections 73(2) to 6.1 are met. In their presentation to the Review Panel on May 22, 2019 with respect to fish and fish habitat, DFO outlined this process.⁸⁹⁵

The *SARA* registry contains a long list of agreements or permits under s. 73 and 74 of *SARA*, including agreements and permits issued for major projects. The VFPA is confident that the pre-conditions specified in subsection 73(3) of *SARA* can be met and that, in particular, Project activities will not jeopardize the survival or recovery of the species. If the Project is approved, the VFPA will address these issues with DFO and the Minister during the permitting phase of the Project.

(b) Acoustic disturbance

(i) Updated underwater noise projections

In their review of Undertaking #20,⁸⁹⁶ which provided an update on underwater noise predictions based on revised vessel traffic projections set out in the 2018 Mercator Report, the Conservation Groups⁸⁹⁷ raised several concerns related to underwater noise projections and underlying assumptions.⁸⁹⁸

The VFPA is confident that its predictions of Project-associated underwater noise were appropriate and thorough. The VFPA relied on comprehensive and best available data to assess potential effects of the Project on marine mammals. The VFPA relied on multiple lines of evidence, including field studies and models, to predict potential effects from Project-related underwater noise to SRKW. This was the first assessment in Canada to develop specific resident killer whale behavioural effect thresholds and predictions of echolocation masking from underwater noise. As noted above, the DFO CSAS referred to the underwater noise models developed for the assessment as "state-of-the-art" and that the model appeared "well-developed, using best information available as inputs, and its output seems reasonable."⁸⁹⁹

The estimates presented in the EIS were conservative, especially when considered in light of the updated traffic projections set out in the 2018 Mercator Report. In response to a request from Transport Canada,⁹⁰⁰ the VFPA undertook additional noise modelling using actual vessel measurements of average container ship class size expected to call at Roberts Bank, based on data provided by the VFPA-led ECHO Program's Underwater Listening Station.⁹⁰¹

⁸⁹⁵ CEAR Doc 1741, DFO oral presentation, May 22, 2016, at slides 18-21.

⁸⁹⁶ CEAR Doc 1800, VFPA response to Undertaking #20.

⁸⁹⁷ Includes representatives from the Raincoast Conservation Foundation, the Wilderness Committee, the David Suzuki Foundation, and the Georgia Strait Alliance, as represented by Ecojustice.

⁸⁹⁸ CEAR Doc 1965, Ecojustice comments on Undertaking #20.

⁸⁹⁹ CEAR Doc 919, DFO technical review of the EIS and MSA: Effects on Marine Mammals, at pp. 8-9.

⁹⁰⁰ CEAR Doc 1303, Transport Canada comments on the sufficiency of information, at Appendix A, Issue #3.

⁹⁰¹ CEAR Doc 1800, VFPA response to Undertaking #20, at p. 2.

The VFPA used these measurements to estimate the annual incremental contribution of RBT2 terminal operation to cumulative commercial vessel noise within the Strait of Georgia in 2035, when the Project is expected to be fully operational. The results show that the annual incremental contribution of underwater noise from vessels during Project operation is relatively small compared to those already occurring from expected shipping traffic and other natural sources.⁹⁰²

Furthermore, the predictions are precautionary and conservative as they assume SRKW are feeding 100% of the time, experiencing three-dimensional masking, and losing foraging opportunities during 100% of the time during the predicted behavioural and acoustic masking effects.⁹⁰³ The results of the updated modelling have not changed the VFPA's conclusion. Rather, the information presented within the VFPA's response to Undertaking #20 provides additional confidence in the EIS conclusion of no significant residual effects to marine mammals due to the incremental contribution of Project operation.

Based on the findings of the 2018 Mercator Report, and as presented in the VFPA's response to Undertaking #35, the VFPA does not expect an increase in container vessel traffic in the marine shipping area in the future with or without the Project.⁹⁰⁴ As such, the VFPA predicts a reduction in cumulative existing marine shipping noise compared to the levels presented in the EIS. The 2018 Mercator Report provided 2035 as the baseline year (rather than 2012) for future with and without Project comparisons because the number of container vessel calls to the Deltaport terminal changed from 2012 to 2035, unlike assumptions in the EIS that assumed no change to Deltaport calls during this time.⁹⁰⁵ Nevertheless, using a different modelling baseline for various modelling updates does not preclude the VFPA's acknowledgment that the existing condition of SRKW is already significantly affected.

The Conservation Groups expressed concerns that larger ships should be expected to have higher source levels of underwater radiated noise. The effects assessments presented will not change as a result of the trend towards larger vessels. The VFPA has provided further information in Undertaking #36 to support this conclusion.⁹⁰⁶ Based on a description of the characteristics (main engine size, maximum design speed, and cruising speed) for representative container vessels for each size class identified in the 2018 Mercator Report,⁹⁰⁷ the VFPA drew the following conclusions:

- Within each class, newer ships generally have smaller main engines;
- Smaller engines are associated with slower maximum design speeds; and

⁹⁰² CEAR Doc 1800, VFPA response to Undertaking #20, at p. 6.

⁹⁰³ CEAR Doc 181, EIS, Volume 3, at s. 14, p. 14-69.

⁹⁰⁴ CEAR Doc 1362, 2018 Mercator Report, at p. 105. See also CEAR Doc 1899, VFPA response to Undertaking #35, at p. 1.

⁹⁰⁵ CEAR Doc 1362, 2018 Mercator Report, at p. 8.

⁹⁰⁶ CEAR Doc 1900, VFPA response to Undertaking #36.

⁹⁰⁷ CEAR Doc 1362, 2018 Mercator Report, at pp. 94, 96.

- The newer, larger Ultra Large Container Ship and Mega-Max classes generally have similar main engine sizes as Neo-Panamax vessels.⁹⁰⁸

As discussed during the topic-specific session on May 23, 2019, Mr. Alex MacGillivray, an underwater noise expert with JASCO Applied Sciences, confirmed that since sound source levels are not available yet for Mega-Max class vessels, the VFPA used the Ross Power Law to scale measured source levels from smaller vessels, using data obtained through the VFPA-led ECHO Program.⁹⁰⁹ The VFPA accounted for frequency-related differences in the source level by modelling the actual sound propagation. Modelling results indicated that the radii were essentially unchanged. Source levels cannot be simply compared in a single band, as it appears that the Conservation Groups has done. The ECHO Program measurements of Neo-Panamax vessels remain the best available data on underwater noise emissions from large container ships, until measurements of Mega-Max vessels become available.

As explained by Mr. MacGillivray, the Ross Power Law is the most conservative length scaling law for vessel source levels in the literature, and likely results in an overly conservative extrapolation of vessel noise.⁹¹⁰ DFO acknowledged that although there may be some uncertainty with respect to the predictions generated by the Ross Power Law, "for modeling purposes it is probably the best information available at the present time."⁹¹¹ Mr. MacGillivray further explained during the May 23, 2019 topic-specific session that if there is uncertainty in the modelled results, it is because they are overly conservative and the Ross Power Law provides "the most precautionary result."⁹¹²

The VFPA notes that the graph and table presented by the Conservation Groups at pages 10 and 11 of its report appear to represent a blend of 2012 EIS data, predictions set out in in the MSA, and projections within the 2018 Mercator Report.⁹¹³ As a result, the information presented is not accurate. Specifically, the number of container vessel calls expected in 2030 should be 1,560 per year, not the 2,046 that the Conservation Groups has cited. Information presented within Appendix C of the VFPA's response to Undertaking #20 provides a current and accurate comparison of predicted underwater noise of container ship classes.⁹¹⁴

With or without the Project, the VFPA predicts the same number of vessels will transit within the marine shipping area to Port of Vancouver container ship terminals. Should the Project proceed, 104 vessels that would have otherwise called at other Port of Vancouver container terminals will call at RBT2. As such, shipping-related noise in the marine shipping area will not increase in the future with the Project. The assessment presented within the VFPA's response to Undertaking #20 assumes that manoeuvring activities of a Project-associated vessel total 1.75 hours for arrival and departure, and berthing and unberthing. Using the

⁹⁰⁸ CEAR Doc 1900, VFPA response to Undertaking #36.

⁹⁰⁹ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1851.

⁹¹⁰ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 2955-2956.

⁹¹¹ CEAR Doc 959, DFO response to DFO IR-02.

⁹¹² CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3074.

⁹¹³ CEAR Doc 1965, Ecojustice comments on Undertaking #, at pp. 10-11.

⁹¹⁴ CEAR Doc 1800, VFPA response to Undertaking #20.

updated projection of 104 additional container ships transiting to Roberts Bank, and the 1.75 hours each vessel would be within the Project area, the VFPA predicts that additional incremental underwater noise attributable to the Project during terminal operation will occur only 2% of the year. This means that 98% of the time, incremental RBT2 terminal operation is not expected to contribute underwater noise to the acoustic environment.⁹¹⁵

As discussed, SRKW are expected to be present at Roberts Bank approximately 4% of the year, primarily during summer months. The incremental increase of 104 RBT2 vessel calls corresponds to a predicted 0.016% increase (above expected conditions) of disturbance, based on the potential for SRKW to be present at the same time as incremental underwater noise being generated by the Project. The VFPA is confident that the terminal operation will not interfere with SRKW ability to carry out their life functions, nor will it jeopardize SRKW survival or recovery.

(ii) Acoustic disturbance during construction and operation

In its submission to the Review Panel, DFO recommended that the VFPA estimate the effects of acoustic disturbance to SRKW critical habitat associated with construction and operation of the Project, identify areas of high SRKW use, and use model-generated noise maps to estimate the area that will be, at least temporarily, degraded by acoustic disturbance during construction and operation of the Project.⁹¹⁶

As presented in the VFPA's response to IR5-48, underwater noise and the presence of SRKW is dynamic in space and time, and therefore it is not possible to determine an absolute area where SRKW could experience acoustic disturbance.⁹¹⁷ The VFPA used modelling to inform the EIS assessment of predicted underwater noise for in-water construction activities, and presented contour maps of underwater noise and areas of potential behavioural and hearing effects to SRKW in the EIS. The EIS represents a highly conservative scenario, of which the predicted annual average incremental contribution of Project terminal operation to the acoustic environment was 4.8 dB at the proposed terminal (i.e., the Roberts Bank station).⁹¹⁸

Using the more realistic scenario based on the 2018 Mercator Report projections, the VFPA re-assessed and re-modelled the anticipated noise footprint associated with Project terminal operation. The resultant incremental annual average contribution of Project terminal operation to the existing underwater acoustic environment has been reduced to 1.8 dB at the proposed terminal.⁹¹⁹

As discussed above, in response to input received from Indigenous groups, the VFPA has committed to a Follow-up Program element to verify effects predictions on Project-related

⁹¹⁵ CEAR Doc 1800, VFPA response to Undertaking #20, at p. 2. See also CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1859.

⁹¹⁶ CEAR Doc 1630, DFO written submission, at Appendix 7, recommendation 26.

⁹¹⁷ CEAR Doc 934, VFPA response to IR5-48.

⁹¹⁸ CEAR Doc 181, Volume 3, at s. 9.8.7, Appendix 9.8-A.

⁹¹⁹ CEAR Doc 1800, VFPA response to Undertaking #20, at p. 2.

changes to underwater noise during terminal operation.⁹²⁰ The VFPA will design Follow-up Program elements within an adaptive management framework in consultation with the Follow-up Program Advisory Committee, DFO, and Indigenous groups. If the results of the monitoring program indicate a material departure from the prediction, and if evaluation has confirmed that the cause is Project-related, the VFPA will apply adaptive management measures. The VFPA is confident that the incremental contribution of terminal operation will not contribute to the underwater acoustic environment such that SRKW are unable to carry out their life functions, and will not jeopardize the survival or the recovery of the population.

(iii) Context-specific behavioural effects

In its submission to the Review Panel, DFO recommended that a context-specific analysis of acoustic effects to SRKW behaviour be undertaken.⁹²¹ DFO and the Conservation Groups also questioned the VFPA's use of the Population Consequence of Disturbance (PCoD) model in determining the magnitude of potential effects to SRKW.⁹²² The Conservation Groups stated that they favour the use of a population viability analysis (PVA) instead.⁹²³

The VFPA's analysis to assess potential effects on SRKW from underwater noise was highly conservative. As discussed above, the VFPA conservatively assumed that any behavioural response or acoustic masking would lead to a total loss of foraging success.⁹²⁴ The VFPA also conservatively assumed that SRKW are foraging 100% of the time, when in reality, they feed 40% to 67% of the time.⁹²⁵

The VFPA used best available information and data from both US and Canadian sources, as advised by the SRKW TAG.⁹²⁶ Importantly, the development of the killer whale-specific behavioural effects thresholds captured the most important aspects of 'context' by analyzing TAG-recommended datasets using the optimal and 100% specific combination of species (resident killer whales) and noise stressor (larger ship noise).⁹²⁷

The dose-response functions used in the assessment of potential behavioural effects of underwater noise on SRKW was the methodology most supported by the SRKW TAG participants, and is a leading approach used by marine mammal scientists to assess potential effects of underwater noise on at-risk marine mammals.⁹²⁸ As previously mentioned, DFO CSAS stated that the specific behavioural effect thresholds developed for this assessment were a 'superior' approach to previously used thresholds in environmental assessments in Canada.⁹²⁹ DFO CSAS further stated "the severity of killer whale behaviour

⁹²⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C13.

⁹²¹ CEAR Doc 1630, DFO written submission, at Appendix 7, recommendation 21.

⁹²² CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 1872-1873.

⁹²³ CEAR Doc 1605, EcoJustice written submission, at p. 23.

⁹²⁴ CEAR Doc 181, EIS, Volume 3, at s. 14.0, p. 14-67.

⁹²⁵ CEAR Doc 1289, DFO comments on the sufficiency of information, at p. 23.

⁹²⁶ CEAR Doc 181, Volume 2, at Appendix 7.4-A and 7.4-B.

⁹²⁷ CEAR Doc 181, EIS, Volume 3, at s. 14, Appendix 14-C, pp. 8-10.

⁹²⁸ CEAR Doc 181, EIS, Volume 1, at Appendix 7.4-B.

⁹²⁹ CEAA Doc 919, DFO technical review of the EIS and MSA: Effects on Marine Mammals, at p. 9.

responses are based on the Southall et al (2007) severity scores that were developed by international marine mammal experts and are the best available."⁹³⁰

For these reasons, VFPA is confident that 'context' was adequately considered within the assessment. The assessment also used a 'delta' approach, comparing future with existing conditions, and in this way minimizes model assumptions, including 'context'. The 'context' was captured both by conservative assumptions throughout the EIS, but also by developing a built-for-task PCoD model to better understand cumulative effects and specifically using population demographics that reflect the SRKW population itself.

The VFPA's assessment of potential Project-related effects was based on multiple lines of evidence, of which the PCoD model was one aspect. The SRKW TAG recommended the use of population modelling, and in particular the use of the Project-specific PCoD model, as one line of evidence to inform the effects assessment and the development of mitigation measures.⁹³¹ The VFPA was conservative in its application of the PCoD model, and has been transparent in its limitations. The VFPA is confident that its use of the PCoD model was appropriate and contributed to the comprehensiveness of the assessment.

Specifically, the PCoD model incorporated 'state of the art' modelled noise fields from vessels, regional SRKW habitat use data, predicted behavioural effects, and masking of echolocation during feeding.⁹³² The PCoD model also analyzed multiple scenarios over time and presented the difference between existing conditions, conditions with the Project, and conditions with future regional shipping traffic.

The VFPA does not agree that the PVA model would be appropriate in the circumstances. The PCoD model is a matrix population model while the PVA model referred to by the Conservation Groups is an individual-based model. The PVA model does not incorporate multiple temporal scenarios in the same manner as the PCoD model and uses simpler assumptions that inflate potential underwater noise effects. Notably, the SRKW TAG indicated that "PVA models were not considered useful for noise effects assessments."⁹³³

(c) Availability of prey

As presented within Chapter X of these Closing Remarks, several participants including DFO,⁹³⁴ Musqueam,⁹³⁵ and the Raincoast Conservation Foundation,⁹³⁶ raised concerns about potential effects to Chinook salmon, and the related effects regarding the availability of Chinook salmon to SRKW.

⁹³⁰ CEAR Doc 919, DFO technical review of the EIS and MSA: Effects on Marine Mammals, at p. 9.

⁹³¹ CEAR Doc 934, VFPA response to IR5-29, at Appendix IR5-29-C, pp. 20-22.

⁹³² CEAR Doc 181, EIS, Volume 3, at s. 14, Appendix 14-C.

⁹³³ CEAR Doc 934, VFPA response to IR5-29, at Appendix IR5-29-C, pp. 20-22.

⁹³⁴ CEAR Doc 1630, DFO written submission, at p. 32.

⁹³⁵ CEAR Doc 1678, Musqueam First Nation written submission, at p. 6.

⁹³⁶ CEAR Doc 1605, Ecojustice written submission, at p. 32.

The Project is not predicted to result in significant adverse effects to Pacific salmon, including Chinook salmon.⁹³⁷ The VFPA is confident that the assessment appropriately and conservatively estimated Project effects on the productivity of Chinook salmon. As presented above, the VFPA predicts that the incremental underwater noise contribution of Project terminal operation has the potential to interfere with SRKW foraging opportunities of Chinook salmon less than 1.4 hours per whale per year, under the highly conservative assumption that SRKW are foraging 100% of the time. The VFPA is confident in its prediction that in the event that this reduction in foraging opportunity does occur, it will not have a significant adverse effect on SRKW individuals or population recovery.⁹³⁸

The VFPA is committed to habitat offsetting for predicted Project-related effects, as well as enhancing its offsetting program to contribute to the future health and recovery of Chinook salmon, thus contributing to availability of prey for SRKW.⁹³⁹ The VFPA will also work in collaboration with Indigenous groups to pursue additional offsetting, including offsite opportunities, to achieve the greatest benefits for priority species such as Chinook salmon.⁹⁴⁰ Furthermore, the VFPA is committed to monitoring the effectiveness of created onsite offsetting habitats to confirm that they are stable, productive, and functioning as intended.⁹⁴¹ The VFPA is also committed to continuing to explore opportunities to engage in regional initiatives, that will inform effective management of populations of adult Chinook salmon.⁹⁴²

(d) Physical disturbance

(i) Vessel strikes

In its submission to the Review Panel, DFO recommended that ship strike likelihood (lethal and non-lethal) be evaluated based on updated information on the density of humpback whales in the marine shipping area affected by Project-related vessels. DFO also recommended that further measures to reduce ship collision risk, such as reduction in vessel speed be evaluated for possible implementation.⁹⁴³ TFN⁹⁴⁴ and EcoJustice⁹⁴⁵ also raised similar concerns regarding increased potential for Project-related ship strikes with marine mammals.

The VFPA determined that it is not possible to undertake a quantitative strike risk analysis as there is insufficient data relating to humpback whales' presence in the marine shipping area.⁹⁴⁶ DFO agreed with this determination.⁹⁴⁷ Nevertheless, the VFPA completed a

⁹³⁷ CEAR Doc 181, EIS, Volume 3, at s. 13.

⁹³⁸ CEAR Doc 181, EIS, Volume 3, at s. 14.6.1.4.

⁹³⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #41.

⁹⁴⁰ CEAR Doc 1797, Transcript, Volume 7, May 22, 2019, at p. 1496. CEAR Doc 2001, Updated Project Commitments, at p. 8 and at Appendix A, Commitment #41.

⁹⁴¹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C5, C6, C10, C11.

⁹⁴² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment#54, Appendix B.

⁹⁴³ CEAR Doc 1630, DFO written submission, at Appendix 7, recommendations 24, 25.

⁹⁴⁴ CEAR Doc 1639, TFN written submission, at p. 10.

⁹⁴⁵ CEAR Doc 1605, EcoJustice written submission, at pp. 10, 28, 32, 42-58.

⁹⁴⁶ CEAR Doc 181, EIS, Volume 3, at s. 14.2.6.3.

qualitative assessment of the risk of vessel strikes to humpback whales in the marine shipping area using multiple lines of available evidence.⁹⁴⁸ The assessment concluded that incremental effects of vessel strikes from RBT2-associated vessel traffic were not significant, occurring infrequently above and beyond strikes occurring during existing conditions.⁹⁴⁹ However, as stated above, more recent data from the 2018 Mercator Report predicts no increase in number of vessels transiting the marine shipping area, further confirming that the strike risk is unlikely to increase from existing conditions.

In addition, when the Project is anticipated to be fully operational (i.e., 2035), the speed of larger vessel classes transiting the marine shipping area is expected to be the same or lower than those vessels transiting today. This is because newer vessels in each size class generally have smaller main engines than other vessels of the same size class, and, smaller main engines are typically associated with slower maximum design speeds.⁹⁵⁰ The increased vessel size expected to call at Roberts Bank does not change the VFPA's assessment of the potential for vessel strikes with marine mammals.

As discussed further in this chapter, the VFPA has committed to supporting initiatives that focus on the effective management of marine mammals, such as OPP, the Whales Initiative, and the VFPA-led ECHO Program.⁹⁵¹ For example, through the ECHO Program, the VFPA has supported DFO with funding on a project using aerial surveys to evaluate the distribution and habitat of large baleen whales, and evaluating the potential for vessel strikes along shipping lanes off the west coast of Vancouver Island.⁹⁵²

(ii) Accidents or malfunctions

As noted above, in its submission to the Review Panel, the Conservation Groups raised the concern that SRKW critical habitat may be destroyed through an increased risk of an accident and oil spill.⁹⁵³

The VFPA has thoroughly considered and assessed the potential effects of physical disturbance to marine mammals related to an accident or spill. Acknowledging that the characteristics of an actual spill would vary based on conditions of the receiving environment, the volume and characteristics of spilled material, and taking into the consideration the current status of SRKW, the VFPA took a conservative approach in its assessment of potential effects to marine mammals related to accidents and oil spills and concluded that exposure of SRKW to spilled oil could result in a significant adverse effect.⁹⁵⁴

⁹⁴⁷ CEAR Doc 919, DFO technical review of the EIS and MSA: Effects on Marine Mammals, at p.17. See also CEAR Doc 988, DFO response to DFO IR-12.

⁹⁴⁸ CEAR Doc 316, MSA, at s. 8, at pp. 8.2-34 to 8.2-35.

⁹⁴⁹ CEAR Doc 934, VFPA response to IR5-41.

⁹⁵⁰ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 2114.

⁹⁵¹ CEAR Doc 2001, Updated Project Commitments, at Appendix B, at Table B2.

⁹⁵² CEAR Doc 1102, DFO responses to DFO IRs, at p. 20.

⁹⁵³ CEAR Doc 1605, Ecojustice written submission; CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 2065-2066.

⁹⁵⁴ CEAR Doc 181, EIS, Volume 13, at s. 14; CEAR Doc 316, MSA, at s. 10.

Based on the 2018 Mercator Report findings, the number of vessels projected to transit the marine shipping area and call at Roberts Bank has decreased from those presented in the EIS and no increase of container vessel traffic in the marine shipping area related to the Project is expected.⁹⁵⁵ Also, the same vessel size classes are expected to call in the future (2035), with or without the Project. Therefore, potential risks related to accidents or malfunctions, including those that involve a spill, will not increase in the future, with the Project. In the event that an accident or spill occurs during construction, within the Project area, the VFPA would apply the mitigation outlined in the Construction Environmental Management Plan. The Construction Environmental Management Plan will include sub-plans that will outline the specific measures to prevent and manage accidents and/or spills (i.e., the Spill Preparedness and Response Plan and the Waste and Hazardous Materials Management Plan).⁹⁵⁶ Similarly, in the event that an accident or malfunction occurs during operation of the terminal, the VFPA would apply the mitigation outlined in the Operation Environmental Management Plan.

As discussed in Chapter IV of these Closing Remarks, the marine shipping area is outside the VFPA's jurisdiction. In the event of an accident or spill occurring in the marine shipping area, the VFPA is confident that CCG and the WCMRC have robust and comprehensive spill response programs in place. The VFPA has nevertheless committed to supporting and/or participating in several regional and multi-stakeholder initiatives that focus on prevention, response, and mitigation of accidents or malfunctions such as oil spills.⁹⁵⁷

(e) Environmental contaminants

In its submissions to the Review Panel, ECCC recommended that the VFPA present a comprehensive analysis of polychlorinated biphenyl (**PCB**) in dredgeate from the entire tug basin area (both existing and expansion area), and that the analysis should distinguish between upper and lower sediments to inform the water and sediment quality predictions for the supernatant discharge area.⁹⁵⁸ ECCC further recommended that all fill material be characterized (dredgeate and quarry sand) to demonstrate that acceptable supernatant discharge quality can be maintained throughout the Project's construction period. ECCC recommended that the supernatant from the upper layers of the expanded tug basin either not be discharged, or that the VFPA provide further details to demonstrate that these sediments will not exceed the DFO upper threshold (200 pg/g) or increase ambient PCB concentrations in SRKW critical habitat.⁹⁵⁹

As stated by the VFPA during the technical session on May 23, 2019, sediments at Roberts Bank are not contaminated.⁹⁶⁰ The VFPA undertook extensive sediment sampling within the existing tug basin and tug basin expansion areas and employed a site-specific PCB food web bioaccumulation model to assess potential effects of contaminants to SRKW. As discussed

⁹⁵⁵ CEAR Doc 1362, 2018 Mercator Report, at p. 105.

⁹⁵⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #26, 28.

⁹⁵⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix B, Table B2.

⁹⁵⁸ CEAR Doc 1454, ECCC written submission, at p. 3, see also CEAR Doc 1637, ECCC written submission, at p. 10.

⁹⁵⁹ CEAR Doc 1637, ECCC written submission, at p. 54.

⁹⁶⁰ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1857.

above, the VFPA has committed to employing specific dredging practices to handle the upper 0.5m of sediments from the tug basin area to avoid discharge of fines in supernatant and reduce any potential for increasing PCBs in the receiving environment.⁹⁶¹ The VFPA has also committed to ensuring that quarry material is characterized to demonstrate that construction activities will not result in marine pollution.⁹⁶² Based on the findings that sediments in the Project area are not contaminated, along with the conservative approach that the VFPA has committed to special management and characterization of materials, the VFPA is confident in the prediction that resuspension of sediments will not adversely affect SRKW.

(f) Mitigation measures

(i) Marine mammal detection during construction

In its submission to the Review Panel, DFO recommended that construction activities generating underwater noise not be conducted at night or during fog unless alternative technologies are proven effective and can be implemented to improve detection of SRKW during these activities.⁹⁶³

The VFPA undertook a comprehensive and conservative assessment to predict potential underwater noise-related construction activities that have the potential to result in adverse effects to marine mammals.⁹⁶⁴ As presented in the EIS, impact pile-driving is the only Project construction activity that has the potential to produce sound that could cause hearing injury to SRKW.⁹⁶⁵ Although underwater noise levels during construction may at times exceed current existing levels, the VFPA predicts that underwater noise levels during Project construction will be comparable to levels currently measured at Roberts Bank.⁹⁶⁶

The VFPA has committed to developing and implementing a Marine Mammal Management Plan and an Underwater Noise Management Plan as part of the Construction Environmental Management Plan.⁹⁶⁷ These plans will outline measures to monitor and mitigate potential effects to marine mammals related to Project construction activities, including the roles and responsibilities for Marine Mammal Observers. These plans will describe measures such as monitoring to ensure construction activities are within appropriate underwater noise levels, and establishing and maintaining a buffer zone wherein certain construction activities will cease in the event that a marine mammal is present.⁹⁶⁸

Mitigation measures to be implemented under the Marine Mammal Management Plan are industry-best standards that have been successful in mitigating potential effects to marine

⁹⁶¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #47.

⁹⁶² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #46.

⁹⁶³ CEAR Doc 1630, DFO written submission, at Appendix 7, recommendation 22.

⁹⁶⁴ CEAR Doc 181, EIS, Volume 3, at s. 14.

⁹⁶⁵ CEAR Doc 181, EIS, Volume 3, at s. 14, at p. 14-58.

⁹⁶⁶ CEAR Doc 181, EIS, Volume 3, at s. 14, at p. 14-60.

⁹⁶⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #33, 37.

⁹⁶⁸ CEAR Doc 2001, Updated Project Commitments. Also see CEAR Doc 934, VFPA responses to IR5-48, IR5-49.

mammals from underwater noise worldwide.⁹⁶⁹ The VFPA is confident that the monitoring efforts undertaken by trained Marine Mammal Observers will effectively detect SRKW during nighttime, foggy, or low visibility conditions. DFO agreed with the VFPA that, during construction, with the use of appropriate mitigation measures, "there is a good opportunity that there is no residual impact, understanding that not all mitigation measures completely remove all risk."⁹⁷⁰ In addition to the application of proven mitigation measures, the VFPA has committed to monitoring developments in the emerging technologies (e.g., RADAR, active sonar, and thermal infrared) that could potentially be used during periods of darkness or poor visibility, if feasible.⁹⁷¹

Although the VFPA is confident that monitoring efforts will be effective in detecting marine mammals even during lowered visibility conditions, the VFPA agrees with DFO that marine mammal observation is more effective during daylight hours, under better visibility. To be conservative, the VFPA has committed to limiting pile driving (both impact and vibratory) to only occur during daylight hours.⁹⁷² The VFPA expects this commitment will effectively avoid the potential for spatial overlap with a marine mammal and pile-driving activities.

With mitigation, Project construction is not expected to result in adverse residual underwater noise-related effects to marine mammals, including SRKW. The VFPA is confident that with mitigation, Project construction will not contribute to the underwater acoustic environment such that SRKW are unable to carry out their life functions.⁹⁷³

(ii) Operation phase mitigation

In its submission to the Review Panel, and as presented during the May 23, 2019, topic-specific session, the Conservation Groups stated that the only mitigation measure proposed by the VFPA to reduce predicted effects of the Project on marine mammals during operation is to provide public education to raise awareness to potentially avoid strikes between whales and vessels.⁹⁷⁴

The Conservation Groups' statement is incorrect. As presented in the VFPA's response to Undertaking #16, *CEAA 2012* states that mitigation measures may include "measures for the elimination, reduction or control of the adverse environmental effects of a designated project."⁹⁷⁵ The VFPA has appropriately proposed measures that are within its care and control. These include 18 measures to mitigate potential effects to marine mammals during Project operation.⁹⁷⁶ Of particular importance is the VFPA's proposed offsetting measures

⁹⁶⁹ CEAR Doc 934, VFPA response to IR5-49, at p. 2.

⁹⁷⁰ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 1959-1960.

⁹⁷¹ CEAR Doc 934, VFPA response to IR5-49. See also CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #33.

⁹⁷² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #33.

⁹⁷³ CEAR Doc 934, VFPA response to IR5-48, at p. 3.

⁹⁷⁴ CEAR Doc 1605, EcoJustice written submission. See also CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 2077.

⁹⁷⁵ CEAR Doc 1799, VFPA response to Undertaking #16.

⁹⁷⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3, 10, 13, 15, 16, 17, 18, 22, 24, 26, 28, 29, 40, 41, 46, 47, 55, 56.

that will ensure there is no loss of productivity for Chinook salmon, SRKW's preferred prey, as discussed above.

The VFPA believes education and awareness supports the broader suite of mitigation measures that will eliminate, reduce, or control effects. For example, one mitigation measure proposed for terminal operation is the distribution of *The Mariner's Guide to Whales, Dolphins and Porpoises of Western Canada* to marine pilots working within VFPA jurisdiction.⁹⁷⁷ This is intended to reduce strike risk to cetaceans, raising awareness of marine mammals that utilize Roberts Bank and the surrounding areas to encourage marine pilots to modify behaviour, thereby reducing the potential interactions between whales and vessels.

Raising awareness and education is an effective method of controlling the adverse environment effects of a designated project during operation. For example, the VFPA's proposed Environmental Training Plan will describe objectives and identify the mechanisms to keep Project personnel (including sub-contractors) informed about key environmental considerations relevant to Project operation.⁹⁷⁸ Mr. Lewis-Manning, President of the Chamber of Shipping, spoke of the importance of this education, such as the ECHO Program for educating the shipping industry, particularly with respect to SARA issues:

"If we were sitting here four years ago, I don't think there would have been an ocean carrier that would have known what the *Species at Risk Act* is. I now sit as the marine representative on the national species at risk committee. We are working at a strategic level on policy advising the federal government on policy, both for aquatic and terrestrial species. I am not an expert, but we as an industry have learned an incredible amount, largely through the ECHO Program and the leadership the Port has provided."⁹⁷⁹

The VFPA has appropriately proposed mitigation measures that are expected to effectively address potential effects to marine mammals during construction and operation through offsetting efforts and mitigation measures. The VFPA will continue to explore and evaluate opportunities to contribute to, support, and/or participate in regional and/or multi-stakeholder initiatives that will inform effective management and recovery of SRKW. The VFPA believes that contribution to regional efforts is an appropriate and proactive approach to supporting efforts focused on addressing the cumulative effect to SRKW.

(g) Regional initiatives

In its submission to the Review Panel, DFO stated that continued evaluation of options such as vessel slow down and lateral displacement within the context of the overall Project-

⁹⁷⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix B.

⁹⁷⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #22.

⁹⁷⁹ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 3086.

related vessel noise is required to determine the effectiveness of these measures. DFO also recommended that efforts to address increased marine shipping noise, such as those provided through the current ECHO Program, should be continued and analysis should be undertaken to reduce underwater noise.⁹⁸⁰

During the hearing, the Conservation Groups suggested that there is a requirement under s. 79 of *SARA*, for the Review Panel to impose “mitigation measures” as those are defined under *CEAA 2012*, to address impacts to species at risk.⁹⁸¹ In fact, s. 79 of *SARA* is not so prescriptive as to require “mitigation measures” (as those are defined under *CEAA 2012*) to address impacts to species at risk for projects undergoing environmental assessment. Instead, s. 79(2) addresses the requirement to ensure that “measures” are taken to avoid or lessen any effects on the listed species and its critical habitat, stating also that such measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. Nowhere in s. 79 is the term “mitigation” used in the context of such measures. Instead, the term “measures” in s. 79 has its ordinary meaning, and means a suitable action to achieve an end. In the case of SRKW, measures under s. 79(2) can include regional initiatives being undertaken to address threats to SRKW, where those programs are consistent with the recovery strategy and action plan.

The VFPA agrees with the importance of regional initiatives to address underwater noise and will continue to explore and evaluate additional opportunities to contribute to, support, and/or participate in regional and/or multi-stakeholder initiatives that will inform effective management and recovery of SRKW.⁹⁸² This includes initiatives to address underwater noise related to increased marine shipping, such as the VFPA-led ECHO Program. Regional initiatives, while not mitigation measures for the Project, will contribute to the reduction of cumulative effects resulting from marine shipping and other activities, and will contribute toward recovery of the SRKW population.

For example, the VFPA initiated the ECHO Program in 2014 to better understand and manage the effects of shipping activities on at-risk whales throughout the southern coast of BC. In particular, the ECHO Program has prioritized the focus of its work on reducing acoustic disturbance to SRKW. The ECHO Program advances its efforts in three ways: by providing a forum at which stakeholders can share information and discuss solutions; by establishing collaborative partnerships and funding arrangements to advance research studies and trials; and by implementing a range of threat reduction initiatives through VFPA incentives and implementation of large-scale voluntary operational noise reduction measures.⁹⁸³ Through its work, the ECHO Program partly supports 19% of the recovery measures outlined in the DFO Action Plan for SRKW.⁹⁸⁴

⁹⁸⁰ CEAR Doc 1630, DFO written submission, at Appendix 7, recommendations 23, 27.

⁹⁸¹ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 2011.

⁹⁸² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #55; see also Appendix B.

⁹⁸³ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 2973.

⁹⁸⁴ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at p. 2974.

The ECHO Program has undertaken two large-scale vessel slow down trials in Haro Strait in 2017 and 2018. These programs had 61% and 87% participation rate, respectively, and resulted in reductions in ambient noise of 1.7 dB in 2017 and 1.5 dB in 2018 in key SRKW foraging habitat.⁹⁸⁵ The ECHO Program, along with Program partners, also implemented a lateral displacement trial in Juan de Fuca Strait to increase the distance of large commercial vessels from killer whale foraging areas and thereby reduce acoustic disturbance in those foraging areas. The trial had over 80% participation and preliminary acoustic results indicate that it achieved a statistically significant noise reduction.⁹⁸⁶

DFO has acknowledged that the VFPA has been very proactive in its involvement and funding of research and studies into how to either prevent or mitigate for negative impacts associated with marine shipping.⁹⁸⁷

4. Government initiatives

(a) Ocean Protection Plan

This section addresses a number of the Government of Canada's OPP initiatives that are directly relevant to marine mammals and underwater noise. In particular, the second pillar of the OPP relates to preservation and restoration of marine ecosystems and habitats. The Government of Canada has proposed the following initiatives under that pillar:

- Cumulative Effects of Marine Shipping (Transport Canada);
- Coastal Environmental Baseline Program (DFO);
- Whale Collision and Avoidance Initiative (DFO);
- Marine Environmental Quality Initiative (DFO and Transport Canada);
- Coastal Restoration Fund (DFO);
- Marine Mammal Response and Marine Protected Areas Surveillance and Enforcement (DFO); and
- A Comprehensive Strategy for Vessels of Concern Program (CCG and Transport Canada).⁹⁸⁸

These initiatives were discussed extensively in Transport Canada's presentation during the public hearing⁹⁸⁹ as well as Transport Canada's written submissions to the Review Panel on April 15, 2019.⁹⁹⁰

The coastal environmental baseline programs and cumulative effects initiatives are collectively designed to enhance knowledge of Canada's marine ecosystems. These initiatives go beyond the boundaries of any particular project or proponent. Among other things, the cumulative effects initiative will develop a National Cumulative Effects

⁹⁸⁵ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 2980-2981, 3017.

⁹⁸⁶ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 2983-2984.

⁹⁸⁷ CEAR Doc 934, VFPA response to IR4-05.

⁹⁸⁸ CEAR Doc 1618, Transport Canada written submission, at pp. 33-41

⁹⁸⁹ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3111-3157.

⁹⁹⁰ CEAR Doc 1618, Transport Canada written submission.

Assessment Framework for Marine Shipping, and will identify potential tools and strategies that can be applied to mitigate the effects of existing and future vessel movements. Transport Canada has acknowledged the VFPA's contribution to this initiative.⁹⁹¹

The OPP also includes development of technologies to detect the presence of whales in near real-time in Canadian waters, which could help alert mariners to the presence of whales and thereby reduce the risk of vessel strikes. The Government of Canada has allocated \$9.1 million over five years to develop and test this technology. Currently, DFO is testing and evaluating a 'Whale Tracking Network' in the Salish Sea, which uses approximately 25 cabled hydrophones to detect whales by listening to their vocal sounds.⁹⁹²

(b) Whales Initiative

As part of the OPP, the Government of Canada announced the Whales Initiative in June 2018. The Whales Initiative includes \$164.7 million over five years, to be shared by ECCC, DFO, and Transport Canada, to preserve and restore marine ecosystems for Canada's endangered whale populations. The Whales Initiative addresses threats to SRKW, including contaminants, prey availability, acoustic and physical disturbance, vessel strikes, and entanglements. In October 2018, the Government of Canada announced an additional \$61.5 million in funding for new initiatives to protect SRKW, including identifying and protecting new areas of critical habitat, new measures to protect and recover Chinook stocks, and developing voluntary measures such as expanded vessel slowdowns.

As discussed by Transport Canada and DFO during the public hearing, the federal government established five SRKW technical working groups as part of the Whales Initiative. These technical working groups were tasked to provide recommendations to the relevant departments on immediate recovery measures and to provide recommendations and key priorities for longer-term recovery actions to help support the survival and recovery of SRKW.⁹⁹³ With respect to the SRKW technical working group on general vessel noise, Corey Jackson for DFO stated:

"The [general vessel noise technical working group] is listed as Transport Canada, but it was actually substantively led by the ECHO Program and the vessel operators committee. So they played a leadership role given their expertise in that existing process, providing advice and recommendations on commercial vessel noise."⁹⁹⁴

The Whales Initiative also includes the following measures for 2019 to support SRKW:

- Voluntary turn-off of echo sounders when not in use;

⁹⁹¹ CEAR Doc 1618, Transport Canada written submission, at pp. 34-35.

⁹⁹² CEAR Doc 1618, Transport Canada written submission, at pp. 36-37.

⁹⁹³ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1941.

⁹⁹⁴ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at p. 1942.

- Mandatory 400 m maximum approach distance for killer whales for all vessels (200 m for commercial whale-watching vessels approaching non-SRKW killer whales);
- Voluntary vessel slowdowns within 1 km of SRKW;
- Mandatory prohibitions of vessels entering Enhanced Management Areas;
- Expanded slowdown areas in Haro Strait and Boundary Pass on a trial basis;
- Lateral displacement of inshore vessel traffic away from key foraging areas in Juan de Fuca Strait;
- Area-based fishery closures for recreational and commercial salmon in portions of Juan de Fuca Strait and Gulf Islands; and
- Voluntary fishery avoidance zone throughout the remainder of the Enhanced Management Areas, including the mouth of the Fraser River.⁹⁹⁵

(c) Minister declines to issue emergency order

On May 24, 2018, the Minister of Fisheries and Oceans and the Minister of Environment and Climate Change announced that they had formed the opinion that SRKW face imminent threats to their survival and recovery. Having done so, the Ministers recommended under subsection 80(2) of *SARA* that the Governor in Council make an emergency order for the protection of SRKW. On November 14, 2018, the Governor in Council declined to issue the emergency order pursuant to section 80 of *SARA*. The Governor in Council based this decision on a number of measures that have been taken, continue to be taken, and will be taken by the Government of Canada and other organizations to address the three imminent threats to the survival and recovery of SRKW (availability of prey, physical and acoustic disturbance, and environmental contaminants).⁹⁹⁶

The VFPA has led or contributed to several measures identified by the Governor in Council through its participation in regional initiatives.⁹⁹⁷ While regional initiatives are not to be considered mitigation measures for the Project as defined under *CEAA 2012*, they must be taken into account when considering whether to issue a permit under *SARA*.⁹⁹⁸ Measures for which the VFPA has had direct involvement or contribution, include the following:

- Habitat restoration to increase Chinook salmon productivity;
- Voluntary slow-downs of commercial vessels in Haro Strait and Boundary Pass;
- Voluntary trial lateral displacement of commercial vessels within the shipping lanes in Juan de Fuca Strait away from foraging areas;
- Conservation agreements or memoranda of understanding with key stakeholder groups on vessel noise mitigation measures to formalize and expand on voluntary measures; and

⁹⁹⁵ CEAR Doc 1798, Transcript, Volume 8, May 23, 2019, at pp. 1944-1953. See also CEAR Doc 1742, DFO and Transport Canada oral presentation, at slides 8-10. See also CEAR Doc 1618, Transport Canada written submission, at p. 48.

⁹⁹⁶ CEAR Doc 1827, Exhibit 26 from the VFPA.

⁹⁹⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix B.

⁹⁹⁸ 'Mitigation measures' are defined in *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." The measures noted above are not specific to a particular designated project and accordingly, are not mitigation measures.

Deployment of hydrophones to acquire underwater noise baseline data to help develop noise reduction targets.⁹⁹⁹

(d) Conservation Agreement

The VFPA is also a signatory to the May 10, 2019 Conservation Agreement made pursuant to section 11 of *SARA* to support SRKW recovery (the **Conservation Agreement**).¹⁰⁰⁰ The Conservation Agreement is the first of its kind, and formalizes the role of various government and industry stakeholders to work collaboratively over a five-year term. The purpose of the Conservation Agreement is as follows:

“to reduce the acoustic and physical disturbance to SRKW by large Commercial Vessels in Pacific Canadian waters, in particular those vessels that call at the Port of Vancouver, or otherwise operate in SRKW critical habitat, through the continuation of existing voluntary efforts and the commitment to develop and implement new voluntary threat reduction measures to support the recovery of the SRKW.”¹⁰⁰¹

The Conservation Agreement references a number of specific commitments focused on ongoing regional and international engagement and collaboration, data collection and research, and initiatives to reduce acoustic and physical disturbance. In particular, the Conservation Agreement formalizes all signatories' participation in the ECHO Program and formalizes the ECHO Program's role in "advancing research and educational outreach to better understand how large commercial vessels contribute to threats to SRKW and their critical habitats."¹⁰⁰²

The Conservation Agreement includes a five-year timeline, with the possibility to renew. This is similar to the five-year timeline for a number of initiatives in the OPP. The VFPA supports the statement of Kelly Larkin, Pacific Regional Project Manager for the Enhanced Maritime Situational Awareness Initiative under Transport Canada:

“The Oceans Protection Plan as we discussed earlier is a five year initiative. In essence, it’s kind of managing the transitions from the existing organization and regime to the new organization or regime. Many of the OPP projects, some of them have sunset clauses because you make a regulatory change and then the project is done because you have a new regulation in place. Some of the other initiatives, perhaps like proactive vessel management, you’ll have a period of transition and then it will become part of the steady state organization.

⁹⁹⁹ CEAR Doc 1827, Exhibit 26 from the VFPA, at p. 6.

¹⁰⁰⁰ CEAR Doc 1785, Exhibit 14 from the VFPA.

¹⁰⁰¹ CEAR Doc 1785, Exhibit 14 from the VFPA, at s. 2.1.

¹⁰⁰² CEAR Doc 1785, Exhibit 14 from the VFPA, at s. 2.2.

And it will be adopted by the existing programs so that the changes that were managed over the period of the OPP, become part of the normal business. And so those relationships that were developed during the period of that transition, also need to continue to be nurtured once OPP has concluded.”¹⁰⁰³

The VFPA places great value on the relationships it has formed with other stakeholders through its leadership in the ECHO Program, and its participation in Whales Initiative and OPP initiatives. The VFPA looks forward to supporting these initiatives in the future, and developing further regional initiatives to better understand and reduce the adverse effects on SRKW in the Salish Sea.

5. Conclusion

As presented within this chapter, the VFPA shares the concern for the endangered SRKW population, and understands and recognizes the ecological, commercial, and cultural importance of adult salmon, especially Chinook salmon, as a key food source for SRKW. The VFPA has presented a comprehensive assessment of potential Project-related effects to marine mammals. The VFPA's assessment relied on best available and innovative science, and conservative assumptions, in recognition of the importance of SRKW. The VFPA has also addressed concerns raised by regulators, Indigenous groups, and stakeholders throughout the environmental assessment of the Project.

The VFPA has further committed to a number of mitigation measures, offsetting, and regional and government initiatives that will address potential impacts on SRKW and assist with the recovery of the species. The VFPA is confident in its prediction that the Project will not result in significant adverse effects to marine mammals, including SRKW.

¹⁰⁰³ CEAR Doc 1821, Transcript, Volume 12, May 28, 2019, at pp. 3258-3259.

CHAPTER XIV. MARINE VEGETATION AND WETLANDS

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2. Overview

The VFPA recognizes the importance of the environmental functions provided by wetlands, which benefit fish, wildlife, and Indigenous and non-Indigenous communities. The VFPA is a long-term steward responsible for protecting wetlands under the *Federal Policy on Wetland Conservation*¹⁰⁰⁴ and is committed to wetland sustainability, through collaborative regional initiatives, leadership in wetland research, and proactive wetland enhancement projects. For example, in collaboration with the BC Spartina Working Group, the VFPA has successfully managed the spread of invasive English cordgrass to the point that it is now trending down in the Lower Mainland. Additionally, the VFPA initiates and invests in projects that restore wetland habitat and function in the Fraser River estuary, such as through collaboration with FLNRORD and ECCC to research possible causes for marsh recession at Sturgeon Bank. The VFPA is part of an established network of scientists, academics, research institutions,

¹⁰⁰⁴ Environment Canada, *The Federal Policy on Wetland Conservation*. (Ottawa, Environment Canada, 1991).

conservation groups, Indigenous groups, and government agencies that work together to research wetland habitat, dynamics, and restoration.¹⁰⁰⁵

The EIS included a comprehensive assessment of marine vegetation comprised of the following five sub-components: intertidal marsh, macroalgae, biomat, biofilm, and eelgrass.¹⁰⁰⁶ Additionally in the EIS, the VFPA evaluated potential Project-related changes to the physical environment and associated coastal processes that may directly and/or indirectly affect marine vegetation.¹⁰⁰⁷

In addition to the assessments presented in the EIS, the VFPA conducted a robust wetland functions assessment (**WFA**).¹⁰⁰⁸ The VFPA's assessment appropriately identified and classified wetlands according to the federal Canadian Wetland Classification System (**CWCS**) and the provincial Wetlands of British Columbia Identification Guide.¹⁰⁰⁹

The WFA employed a systematic, standardized methodology to characterize and assess the hydrological, biogeochemical, and ecological function of each wetland using 12 criteria commonly found in guidance and best practice materials. The WFA provides further characterization and assessment of the wetlands and eelgrass habitat that the VFPA assessed in the EIS.

The VFPA relied on multiple information sources to evaluate both direct and indirect effects of the Project and draw its assessment conclusions for marine vegetation and wetland function. The VFPA collected and analyzed extensive site-specific data over several years of field studies, along with numerous models developed specifically for Roberts Bank, including a coastal geomorphology hydrodynamic model and the Roberts Bank ecosystem model. The EIS assessed wetlands over a large spatial boundary that fully encompassed areas of potential direct or indirect interaction with the Project.¹⁰¹⁰ In addition, the VFPA actively sought and incorporated ITK of wetland plant use into the assessment.

In accordance with best practices, numerous professionals from a variety of disciplines supported the assessment. The VFPA obtained input from a diverse group of 22 experts and leaders through the Productive Capacity TAG.¹⁰¹¹ The Productive Capacity TAG advised on the selection of key issues and indicators, focal species, assessment methodologies, and evaluation criteria. Specifically related to vegetation and wetlands, the Productive Capacity TAG provided advice on suitable methods for assessing and reporting changes to productivity that are scientifically defensible, in line with the regulatory process, and relevant to the Project. Finally, Dr. Nicole Wright, a professional wetland scientist registered with the Society of Wetland Scientists, provided an independent peer review of the WFA.

¹⁰⁰⁵ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at pp. 2120-2121.

¹⁰⁰⁶ CEAR Doc 181, EIS, Volume 3, at s. 11. The biofilm sub-component is discussed in greater detail in Chapter XV of these Closing Remarks.

¹⁰⁰⁷ CEAR Doc 181, EIS, Volume 2, at s. 9.5.

¹⁰⁰⁸ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A.

¹⁰⁰⁹ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A.

¹⁰¹⁰ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, Figure 3.

¹⁰¹¹ CEAR Doc 181, EIS, Volume 1, at Appendices 7.4-A, 7.4-B.

The VFPA's assessment demonstrated that the Project will not result in significant adverse residual effects to marine vegetation productivity nor wetland function. In some cases, conditions are expected to improve with the Project. For example, the VFPA predicts a reduction in habitat connectivity due to direct loss of intertidal marsh along the causeway. However, the VFPA's proposed intertidal marsh creation along the expanded causeway to restore this function, transforming it from low quality fringing to higher quality functioning marsh, thus enhancing both primary and secondary production. With mitigation, wetland function will be maintained, and in some cases, will improve.¹⁰¹² Thus, the VFPA is confident that the *Federal Wetland Policy* goal of no net loss to wetland function will be met.

The VFPA has prioritized avoidance of adverse Project interactions with wetlands through careful infrastructure location and design. The placement of the terminal in subtidal waters will effectively minimize encroachment on productive intertidal wetland habitats, and result in the majority of wetland habitat at Roberts Bank remaining unaffected by the Project footprint. For example, over 99% of the sandflat and mudflat at Roberts Bank will not be affected. In addition, the VFPA has minimized the planned widening of the causeway in the high intertidal zone, effectively reducing direct impacts to biofilm-promoting mudflat habitat.

The VFPA will also develop and implement measures to reduce potential effects during construction through a suite of environmental management plans, as described in EIS and in the Updated Project Commitments.¹⁰¹³ Specific to wetlands, the VFPA has committed to developing a Wetland Management Plan and a Marine Terrestrial Invasive Species Management Plan.¹⁰¹⁴ Regarding invasive species, the VFPA will remain a committed contributor to the control and eradication of English cordgrass (*Spartina anglica*) by working with and funding applicable parties (e.g., BC Spartina Working Group) to help manage English cordgrass at Roberts Bank.¹⁰¹⁵ The VFPA will continue to work with the Province's English cordgrass management program, prior to and during construction, under the guidance of the Marine Terrestrial Invasive Species Management Plan. Further, the VFPA is committed to monitoring and managing English cordgrass, as well as other invasive species, within its created offset habitats.¹⁰¹⁶

In addition to implementing proven and effective mitigation measures to minimize Project interactions, the VFPA has committed to offsetting. As presented within the offsetting framework¹⁰¹⁷ and in Chapter IX of these Closing Remarks, the VFPA has proposed several offsetting concepts to create high quality onsite intertidal marsh, sandy gravel beach, mudflat, and native eelgrass habitats. The VFPA has decades of experience and deep expertise in constructing and maintaining wetland habitats, and is committed to the long-term care of created sites through effectiveness monitoring and adaptive management.

¹⁰¹² CEAR Doc 1772, VFPA oral presentation, May 24, 2019, at slides 12, 13.

¹⁰¹³ CEAR Doc 181, EIS, Volume 5, at s. 33; CEAR Doc 2001, Updated Project Commitments.

¹⁰¹⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #39 and #35.

¹⁰¹⁵ CEAR Doc 314, VFPA response to IR #3.

¹⁰¹⁶ CEAR Doc 314, VFPA response to IR #3.

¹⁰¹⁷ CEAR Doc 181, EIS, Volume 3, at s. 17.

During the public hearing, Dr. Sean Boyd, a research scientist with ECCC, was complimentary of the VFPA's experience and expertise in habitat enhancement:

"I think the Port's been pretty darn good at -- in their habitat enhancement and they gave a couple of good examples of how successful they are. And I think they're pretty good at it."¹⁰¹⁸

The VFPA has proposed the creation of onsite intertidal marsh habitat.¹⁰¹⁹ This offsetting measure will replace the poor quality fringing marsh, which has opportunistically colonized the area along the existing causeway and that is characterized by low function and low productivity, with higher functioning intertidal marsh in a physical environment that is specifically designed to support this ecosystem.¹⁰²⁰

The VFPA has proposed the creation of onsite sandy gravel beach habitat.¹⁰²¹ While distinct from sandflat wetlands, this offset will nevertheless ensure that productive intertidal sand habitat is created.

The VFPA has proposed creation of onsite mudflat habitat, within a suitable accessible location for foraging shorebirds.¹⁰²² The VFPA has extensive experience in developing mudflats—a key growth medium for biofilm. Onsite mudflat offsetting habitats will specifically address and improve on aspects of function to promote biofilm colonization, such as locating sites at appropriate elevations and using appropriate grain sizes. As presented in Chapter XV of these Closing Remarks, the VFPA has committed to the development of a biofilm construction manual that will describe techniques and methods for developing and maintaining this highly productive offsetting habitat type.¹⁰²³ The manual will to serve as a valuable resource for the VFPA and other marine developers and offsetting practitioners active in the Fraser River estuary.

The VFPA has proposed the creation of onsite native eelgrass habitat.¹⁰²⁴ Eelgrass habitats are linked to hydrological and biogeochemical wetland functional criteria. For example, the increased biomass will enable more carbon to be stored and sequestered within plant tissues.¹⁰²⁵ The onsite offsetting measures presented to date provide the framework for further substantive consultation with Indigenous groups and regulators toward the goal of enhancing proposed offsetting within a final Offsetting Plan.¹⁰²⁶

The VFPA is confident that implementation of the Offsetting Plan will maintain and enhance natural productivity of marine vegetation and wetlands within the Roberts Bank ecosystem. The VFPA is dedicated to maintaining productivity at Roberts Bank for the long-term, and

¹⁰¹⁸ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2183.

¹⁰¹⁹ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, p. 95.

¹⁰²⁰ CEAR Doc 181, EIS, Volume 3, at Appendix 17-B.

¹⁰²¹ CEAR Doc 934, VFPA response to IR7-26.

¹⁰²² CEAR Doc 934, VFPA response to IR7-26.

¹⁰²³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #43.

¹⁰²⁴ CEAR Doc 934, VFPA response to IR7-26.

¹⁰²⁵ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2134.

¹⁰²⁶ CEAR Doc 934, VFPA Preamble to Offsetting-related IRs.

supporting the broader marine environment. The VFPA is committed to follow-up monitoring, and to applying techniques to achieve ecosystem and species productivity goals. The VFPA expects that the success and effectiveness of offsetting measures will be monitored as part of permitting requirements of the *Fisheries Act*, and as required as part of the RBT2 Follow-up Program and adaptive management approach to ensure that the created habitats are functioning as intended.¹⁰²⁷

3. Key issues raised and VFPA response

a) Shallow subtidal sandflats

In its submission to the Review Panel, ECCC stated that the VFPA did not adequately assess subtidal habitat within the WFA. Specifically, ECCC “finds that shallow subtidal zone is a wetland based on the Canada Wetland Classification System.”¹⁰²⁸

The VFPA disagrees that the shallow subtidal zone is a wetland and, accordingly, did not include areas below the 0 m CD contour in the WFA; however, the VFPA has fully assessed all intertidal and subtidal habitats with the potential to interact with the Project and has proposed mitigation and offsetting accordingly.¹⁰²⁹ Further, the VFPA fully considered potential changes to both intertidal and subtidal landforms due to the Project.¹⁰³⁰

The VFPA conservatively and appropriately followed federal policies and provincial and federal guidance on wetland classification and applied it to Roberts Bank using site-specific data. The VFPA is confident that the spatial boundaries of the WFA were inclusive of all shallow water wetland at Roberts Bank as defined by the CWCS as well as the provincial Wetlands of British Columbia Identification Guide.¹⁰³¹

The *Federal Policy on Wetland Conservation* defines a wetland as follows:

“Land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation, and various kinds of biological activity which are adapted to a wet environment. Wetlands include bogs, fens, marshes, swamps and shallow waters (usually 2 m deep or less) as defined in the Canadian Wetland Classification System (CWCS).”¹⁰³²

ECCC’s recommendation that the VFPA assess wetlands to -2 m CD is not supported by the CWCS or other policy guidelines primarily because the CWCS defines shallow water wetlands by water depth, which is distinct from seabed elevation.¹⁰³³ Specifically, shallow water

¹⁰²⁷ CEAR Doc 934, VFPA Preamble to Offsetting-related IRs.

¹⁰²⁸ CEAR Doc 1637, ECCC written submission, at p. 47.

¹⁰²⁹ CEAR Doc 181, EIS, Volume 3, at s. 11.

¹⁰³⁰ CEAR Doc 181, EIS, Volume 2, at s. 9.5.

¹⁰³¹ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2129.

¹⁰³² CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, p. 2.

¹⁰³³ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2128.

wetlands are defined by a water depth of 2 m or less during normal mean tide water level, a commonly referenced tide condition. In the VFPA's presentation on May 24, 2019, a schematic profile was provided of the tide flats at Roberts Bank illustrating the relationship between elevation and water depth during mean tide.¹⁰³⁴ When ocean levels over Roberts Bank are at mean tide, a water depth of 2 m intersects with the tidal flat at elevation +1.1 m CD, defining the seaward boundary of the shallow water wetland under the applicable guideline.¹⁰³⁵

In contrast, seabed located at elevation -2 m CD would have a water depth of over 5 m at normal mean tide. It is the VFPA's position that this subtidal area suggested by ECCC as a wetland is not in fact a wetland under the CWCS, which very clearly stipulates a water depth of 2 m or less during normal mean tide water level. Instead, the boundary suggested by ECCC is not a wetland but, rather, ocean; seaward of 0 m CD the tidal flats transition to the delta foreslope, a steep permanently wetted area characterized by exposure to higher wave energy and faster tidal currents.

To be conservative, the VFPA extended the assessment boundary for the WFA further seaward from +1.1 m CD to the 0 m CD contour, expanding the area that was assessed beyond that stipulated under the CWCS. This was based on the Wetlands of British Columbia Identification Guide, which defines estuarine wetlands as occurring in the intertidal zone, between 0 m CD and the highest high tide.¹⁰³⁶ Water depths during a mean tide at 0 m elevation are approximately 3 m at the seaward assessment boundary rather than the 2 m depth referenced in the CWCS guidelines. The VFPA is confident that it has appropriately identified and assessed wetlands according to these definitions.¹⁰³⁷

In summary, the VFPA applied appropriate and conservative methodology to fully assess marine vegetation and wetlands within the assessment area and remains confident that all wetland habitats at Roberts Bank were adequately characterized and assessed.

b) Recession versus accretion of intertidal marshes

ECCC stated that it does not support the VFPA's statement that marshes on Sturgeon Bank and Roberts Bank have expanded.¹⁰³⁸

During the May 24, 2019 topic-specific session, Ms. Marina Winterbottom, the VFPA's technical lead on marine vegetation, clarified that the VFPA has not claimed that marshes are expanding at Sturgeon Bank; not only does the VFPA acknowledge recent trends of

¹⁰³⁴ CEAR Doc 1772, VFPA oral presentation, May 24, 2019, at slide 8.

¹⁰³⁵ CEAR Doc 1772, VFPA oral presentation, May 24, 2019.

¹⁰³⁶ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, p. 2.

¹⁰³⁷ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, p. 2.

¹⁰³⁸ CEAR Doc 1637, ECCC written submission, at p. 49; CEAR Doc 1766, ECCC oral presentation, May 24, 2019, at slide 29.

marsh recession at Sturgeon Bank, but it continues to actively partner with ECCC and FLNRORD to investigate and study this issue.¹⁰³⁹

Regarding marsh trends across the Fraser River delta over time, content presented within both the EIS and WFA reflects extensive literature review; because marshes are dynamic ecosystems, trends relating to expansion or recession depend on the specific location and timeframe under consideration. Thus, the VFPA's assessment refers to research that documents an overall long-term trend (i.e., 1930s to 2004) of expansion for intertidal marshes in the Project area, and across the Fraser River delta (presented in the EIS¹⁰⁴⁰), while at the same time acknowledging that ECCC has documented marsh recession over relatively shorter timeframe for areas of Sturgeon Bank.¹⁰⁴¹

It is important to note that marsh expansion appeared to peak in the early 2000s, so the 1989 baseline year selected by ECCC and FLNRORD references a time that was close to the maximum extent of marsh ever recorded across the 70-year time series, and does not account for the previous 60 years of expansion. The ECCC measurements of relatively recent marsh recession are not necessarily incompatible with the research referenced by the VFPA and should be interpreted in the context of the longer-term trends.

In any case, the conclusions regarding Project-related change to marsh function and productivity are independent of long- or short-term trends. Net gains in both intertidal marsh function and productivity are predicted with the Project. The VFPA has also proposed to create 15 hectares of onsite intertidal marsh habitat.¹⁰⁴² As such, the VFPA is confident that indirect gains from the Project combined with proposed offsetting will positively contribute to marsh habitat regionally. Further, as part of the Project, the VFPA has committed to developing and implementing a Wetland Management Plan as part of the Project's Construction Environmental Management Plan.¹⁰⁴³ This plan will describe the required mitigation measures and environmental management approach to be followed when conducting works and activities in and around defined wetlands and associated sensitive sites, to avoid, reduce, and control effects to wetlands. Additionally, as part of the RBT2 Follow-up Program, the VFPA will undertake monitoring to confirm that created habitats are successful and functioning as intended.¹⁰⁴⁴

c) Indirect effects and offsetting

In its submission to the Review Panel, ECCC recommended that the VFPA's proposed like-for-like wetland habitat compensation needs to address indirect loss of sand and mudflat

¹⁰³⁹ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2121.

¹⁰⁴⁰ CEAR Doc 181, EIS, Volume 2, at s. 9.5, Figure 9.5-12. See also Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, p. 21.

¹⁰⁴¹ CEAR Doc 1480, ECCC, The bulrush marshes of the Fraser River Delta have undergone significant changes between 1989 & 2011 (DRAFT).

¹⁰⁴² CEAR Doc 181, EIS, Volume 3, at s. 11, 17.

¹⁰⁴³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #39.

¹⁰⁴⁴ CEAR Doc 934, VFPA Preamble to Offsetting-related IRs. Also see Updated Project Commitments, at Appendix C, Tables C5, C6, and C10.

habitat types in favour of intertidal marsh, which cannot be completed without a quantitative assessment of indirect effects.¹⁰⁴⁵

The VFPA undertook a robust and comprehensive assessment of potential direct and indirect effects to wetlands. The WFA used the systematic rating of 12 criteria associated with hydrological, biogeochemical, and ecological wetland functions.¹⁰⁴⁶ The WFA also incorporated an interdisciplinary science-based approach to describe and assess wetland function and to fully consider direct and indirect effects to wetland function. The VFPA clearly identified and quantitatively and qualitatively described potential indirect effects resulting from change in geomorphic processes and water quality.¹⁰⁴⁷

The VFPA also accounted for potential indirect effects to wetland function within the WFA based on hydrodynamic modelling, ecosystem modelling, field studies and data analysis, and professional judgment. The VFPA assessed indirect effects as having an overall positive influence on wetland function. Project placement in subtidal waters will reduce wave exposure and tidal current velocities, creating overall calmer conditions across the tidal flats. Increased quiescence facilitates growth of vegetation, including intertidal marsh and eelgrass, which in turn is linked to a number of functional criteria including, for example, carbon sequestration and flora productivity.

In addition, the WFA accounted for wetlands included within the Roberts Bank Wildlife Management Area and concluded that there is no direct footprint overlap with that area. Indirect changes that are expected to occur with the Project are positive or neutral across all wetland types, including those within the Roberts Bank Wildlife Management Area.¹⁰⁴⁸

The VFPA is confident in its assessment conclusions and is committed to offsetting direct loss of wetlands as part of the final Offsetting Plan. ECCC representatives participating in the public hearing acknowledged the VFPA's experience and success in creating and enhancing marine vegetation and wetland habitat.¹⁰⁴⁹ Dr. Boyd indicated confidence in the offsetting measures proposed.¹⁰⁵⁰ ECCC also indicated that, with offsetting, the general risk to marine vegetation and wetlands could be managed.¹⁰⁵¹

Respecting experience with offsetting, Mr. Jason Quigley, a consultant to the VFPA on the Project, spoke of his appointment in the late 1990s to lead a national evaluation of DFO's performance in achieving its no net loss policy. He made a clear distinction between proponents with limited resources and experience compared to the extensive resources and experience of the VFPA. He stated the following:

¹⁰⁴⁵ CEAR Doc 1454, ECCC comments on the sufficiency of information, at p. 38.

¹⁰⁴⁶ CEAR Doc 1772, VFPA oral presentation, May 24, 2019, at slides 9, 12, 13. See also CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, s. 5.

¹⁰⁴⁷ CEAR Doc 181, EIS, Volume 2, at s. 9.5.

¹⁰⁴⁸ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2141.

¹⁰⁴⁹ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at pp. 2185-2186.

¹⁰⁵⁰ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2190.

¹⁰⁵¹ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2219.

"...it bears repeating that the Port of Vancouver is unlike most proponents. It's a long-term steward of the Fraser River estuary with extensive resources, expertise and experience to build, monitor and adaptively manage compensation projects to ensure they are successful. As the Panel heard from DFO earlier this week, the Port of Vancouver is considered a leader in aquatic habitat offsetting, with a proven track record."¹⁰⁵²

ECCC agreed that it would work with partner agencies, such as DFO, and engage with the VFPA on discussions with respect to offsetting, keeping in mind the regulatory authority of DFO under the *Fisheries Act*.¹⁰⁵³

d) Cumulative effects assessment

In its submission to the Review Panel, ECCC recommended that the VFPA undertake a wetlands cumulative effects assessment.¹⁰⁵⁴

As part of the WFA, the VFPA concluded that there would be no adverse residual loss of wetland function; thus, a cumulative effect assessment was neither applicable nor warranted. The VFPA nevertheless considered effects through a cumulative lens by accounting for past and current projects and activities in the evaluation and characterization of existing conditions.¹⁰⁵⁵ Further assessment of changes in the marine environment due to past and present projects and activities is presented in Appendix AIR13-A while a total cumulative effects assessment for marine vegetation is presented in Schedule 13-1 of AIR #13.¹⁰⁵⁶

4. Conclusion

The VFPA has provided a comprehensive assessment of marine vegetation and wetlands at Roberts Bank. The assessment shows conservatism and site specificity while appropriately following federal policy and provincial guidance. Careful environmentally-driven design, including siting the terminal in subtidal waters and minimizing the causeway footprint in the upper intertidal zone, will largely avoid direct overlap with wetland habitats. The VFPA will implement reduction measures, including environmental management plans, such as the construction Wetland Management Plan, that will directly control Project effects on wetland function. In addition, the VFPA has proposed several onsite offsetting concepts for wetland habitats to mitigate Project effects.

The VFPA has decades of experience and deep expertise in designing, constructing, and maintaining offsetting habitats. The VFPA's track record for successfully offsetting the effects of port development on marine ecosystems comprises the most expansive,

¹⁰⁵² CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at p. 2394.

¹⁰⁵³ CEAR Doc 1807, Transcript, Volume 9, May 24, 2019, at pp. 2239-2240.

¹⁰⁵⁴ CEAR Doc 1637, ECCC written submission, at p. 48.

¹⁰⁵⁵ CEAR Doc 934, VFPA response to IR11-21, at Appendix IR11-21-A, s. 4.2.

¹⁰⁵⁶ CEAR Doc 314, VFPA's response to AIR #13, at Appendix AIR13-A.

successful, and long-term program for enhancing aquatic habitat in the history of BC. The VFPA expects that the proposed offsetting measures will enhance and maintain the natural productivity of marine vegetation and wetlands within the Roberts Bank ecosystem.

CHAPTER XV. SHOREBIRDS AND BIOFILM

1. VFPA evidence

Documents Relevant to Topic		CEAR Doc #
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2.	TAG Direction and Advice Tables (EIS Appendix 7.4-B)	181
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5.	TDR MVB-1 – Intertidal Marsh, Foreshore Habitat and Invertebrates, Eelgrass, Ulva, and Biomat Survey Results	388
6.	Shorebird and Biofilm Dynamics during Northward Migration (November 2017)	1110
7.	Investigation of Selective Feeding of Biofilm Communities by Shorebirds during Northward Migration (July 2017)	1110
8.	Biofilm Dynamics during 2017 Northward Migration (June 2018)	1215
9.	Biofilm Dynamics during 2018 Northward Migration (January 2019) (this study provides a multi-year analyses of 2016, 2017 and 2018 data)	1385
10.	Shorebird and Biofilm Dynamics during Northward Migration (November 2017)	1110
11.	TDR TW-2 – Upland Water birds Study	388
12.	Roberts Bank Terminal 2 – Technical Data Report – Biofilm Physical Factors	1181
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3.	IR8-01 – Marine Vegetation – Biomass Estimates, Salinity: Additional Information	934
4.	IR8-02 – Marine Vegetation – Biomass Estimates, Salinity: Statistics	934
5.	IR8-04 – Marine Vegetation – Biofilm	934
6.	IR9-02 – Coastal Birds or Marine Birds – Artificial Light	934
7.	IR9-05 – Coastal Birds – Residual Effects	934
8.	IR11-13 – Project Effects – Direct Habitat Loss	934
9.	IR11-21 – Marine Vegetation – Effects Assessment for Wetlands	934
10.	IR12-09 – Biofilm – Salinity Measurements	934
11.	Updated Project Commitments	2001
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2.	Undertaking #28 - Origin of Salinity Figures	1891
3.	Undertaking #34 - Salinity Modelling Results Verification	1893

2. Overview

The VFPA has recognized the importance of shorebirds and biofilm since the early stages of Project planning. The VFPA selected coastal birds as a valued component in the environmental assessment in part due to the conservation and ecological importance of the local assessment area for shorebirds and biofilm. Shorebirds are also of social and cultural importance to local communities and Indigenous groups.

Prior to submitting the EIS, the VFPA consulted with regulatory agencies, including ECCC, and scientific experts with respect to potential Project interactions with shorebirds and biofilm. These consultations informed the VFPA's extensive field studies supporting the assessment of shorebirds and biofilm.

Following submission of the EIS, and at the request of ECCC, the VFPA completed three additional years of studies to further expand the state of knowledge surrounding biofilm at Roberts Bank. Ultimately, these studies have provided the VFPA with an extensive body of work that further support the initial conclusions of the EIS regarding potential effects of the Project. The VFPA predicted that with mitigation, the Project would result in a negligible residual effect on shorebird populations, which considers the ability of the biofilm community in the local assessment area to support shorebirds.

The VFPA assessed effects of the Project on shorebirds using a representative species approach in accordance with standard environmental assessment procedure. The VFPA selected the western sandpiper (**WESA**) as the representative species for shorebirds.¹⁰⁵⁷

¹⁰⁵⁷ CEAR Doc 181, EIS, Volume 3, at s. 15.1, Table 15-1.

WESA are the most abundant shorebird within the local assessment area and the Fraser River estuary during northward migration, which occurs annually between mid-April and mid-May. WESA consume a variety of prey containing carbohydrates and fats (fatty acids) to fuel their migration at sites ranging from Peru to Alaska, en route to their breeding sites. Biofilm, one of the most important food sources for WESA at Roberts Bank, is a thin (approximately two millimetre thick), energy dense layer of organic material found on and just below the surface of some freshwater, marine, and estuarine sediments.

The VFPA's determination of negligible adverse residual effects to WESA is based on several key findings developed over the course of six years of study, including more than 20 site-specific biofilm and shorebird studies, literature synthesis, extensive modelling, and consultation with world experts, including ECCC scientists. These key findings are summarized below.

A large surplus of prey (i.e., biofilm and invertebrates) is currently available to shorebirds and will continue to exist with the Project in place. Specifically, the VFPA's Shorebird Foraging Opportunity Model (**SFOM**) determined that biofilm within the local assessment area is, and will be, capable of supporting more than 1 million shorebirds in a single day.¹⁰⁵⁸ The median seasonal peak count over the previous 23 years within the LAA is 125,000 WESA indicating a large surplus of foraging capacity is typically present during northward migration.¹⁰⁵⁹ In addition to biofilm, studies have shown that invertebrate prey contribute 32% to 62% of WESA diet, indicating there is substantially more shorebird foraging capacity beyond the surplus determined from the SFOM biofilm capacity analyses.¹⁰⁶⁰ A separate analysis, as part of the SFOM, documented excess foraging capacity within the meiofauna and macrofauna invertebrate communities at Roberts Bank. Excess capacity across multiple food sources is just one of several aspects of conservatism applied in the EIS that give the VFPA confidence that migrating shorebirds will continue to have enough prey at Roberts Bank with the Project in place.

The VFPA's effects determinations are also supported by evidence that Project-related changes in salinity are unlikely to adversely affect biofilm and shorebirds. The VFPA's assessment documented nutritionally equivalent (e.g., fatty acids, including omega-3 polyunsaturated fatty acids (**PUFA**), and carbohydrates) and abundant biofilm in freshwater and marine dominated environments across the local assessment area during the three years of additional biofilm study. Thus, biofilm at Roberts Bank thrives and is abundant under variable salinity conditions.¹⁰⁶¹ VFPA studies documenting shorebird foraging distribution in the local assessment area provide clear and consistent evidence that WESA feed intensively on biofilm across the salinity gradient, demonstrating that WESA are adapted to the variable estuarine environment at Roberts Bank.¹⁰⁶² Furthermore, the anticipated changes in salinity with the Project in place will be small compared to natural

¹⁰⁵⁸ CEAR Doc 181, EIS, Volume 3, at s.15.

¹⁰⁵⁹ CEAR Doc 181, EIS, Volume 3, at s. 15, Appendix 15-B.

¹⁰⁶⁰ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 8.

¹⁰⁶¹ CEAR Doc 934, VFPA response to IR8-04, at Appendix IR8-04-A; CEAR Doc 1215, Biofilm Dynamics during 2017 Northward Migration; CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹⁰⁶² CEAR Doc 388, VFPA response to AIR #10, at Appendix AIR10-C, TDR CB-1.

variation currently experienced due to tidal fluctuations and highly variable freshwater inputs from the adjacent Fraser River. Specifically, almost every part of Roberts Bank is exposed to a broad range of salinity during the twice daily tidal exchanges in addition to daily desiccation, variation between spring¹⁰⁶³ and neap tides,¹⁰⁶⁴ and inter-annual variation in discharge volumes of the Fraser River.¹⁰⁶⁵

In summary, the evidence collected during the VFPA's extensive studies demonstrates that WESA forage intensively under variable salinity conditions at Roberts Bank, high quality biofilm is present under freshwater and marine conditions, and there is, and will be, a surplus of food (including biofilm and fatty acids) for WESA and other shorebirds with the Project in place.

The VFPA has identified a wide range of measures to mitigate the potential effects of the Project on shorebirds and biofilm, many of which are already incorporated into the Project design. First, the VFPA sought to avoid potential effects through careful infrastructure location and design. Placement of the terminal in subtidal waters minimizes direct footprint effects on intertidal habitats, which will remain available to foraging shorebirds during Project construction and operation. Second, where effects could not be avoided entirely, the VFPA sought to reduce or minimize impacts of infrastructure (e.g., minimizing increases in the causeway footprint). Finally, the VFPA sought to offset potential adverse effects that could not be avoided, reduced, or controlled through the creation of onsite biofilm habitat accessible to shorebirds. The VFPA has a long history of successful coastal habitat restoration, rehabilitation, and creation. The VFPA has committed to 45 mitigation measures relating to coastal birds, including shorebirds and biofilm, which are detailed in the Updated Project Commitments.¹⁰⁶⁶

The VFPA has also committed to implementing two scientifically rigorous Follow-up Program elements dedicated to verifying effects predictions related to the shorebird assessment. Specifically, the VFPA has committed to working with Indigenous groups, regulators, and environmental organizations to 1) evaluate the effects prediction of WESA prey availability, specifically biofilm and benthic invertebrates;¹⁰⁶⁷ and 2) evaluate salinity predictions with the Project in place.¹⁰⁶⁸ The Follow-up Program will be designed within an adaptive management approach. The VFPA has committed to apply the necessary adaptive management techniques to ensure that the Roberts Bank ecosystem continues to provide highly productive shorebird foraging habitat, including biofilm, with the Project in place. If evidence from the Follow-up Program elements indicate unforeseen adverse Project-related effects to WESA prey, the VFPA will implement proven mitigation measures to offset those

¹⁰⁶³ Spring tides are those which have the greatest difference between high and low water.

¹⁰⁶⁴ Neap tides are those which have least difference between high and low water.

¹⁰⁶⁵ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slides 10, 16.

¹⁰⁶⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 36, 37, 38, 39, 40, 41, 43, 44, 46, 47, 49, 50, 53, 57, 58, 59, 60, 61; at Appendix C, Tables C3, C4, C15, C18, C19.

¹⁰⁶⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C14.

¹⁰⁶⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix C, at Table C15.

effects.¹⁰⁶⁹ Measures to offset include a commitment to consult with ECCC to plan and select the best location for the creation of mudflat habitat to support biofilm at other sites in the region (e.g., Westham Island, Sturgeon Bank).¹⁰⁷⁰

The VFPA has committed to developing a manual describing methods and techniques to construct biofilm habitat. The manual will be developed in consultation with international experts, and shared with interested Indigenous groups, and will identify and document best practices for developing biofilm habitat.¹⁰⁷¹

To summarize, the VFPA's assessment predicts a negligible non-measurable residual effect to WESA and other shorebird populations. The VFPA is confident in this assessment given the conservatism built into the assessment and the multiple lines of evidence indicating that shorebirds forage on abundant and resilient biofilm that thrive across a broad range of salinity conditions.

3. Key issues raised and VFPA response

(a) WESA northward migration and relative importance of Roberts Bank

The Review Panel inquired regarding the importance of Roberts Bank to the global WESA population and its relative importance to other migratory stopover sites and flyways.

The VFPA acknowledged that the Pacific flyway, which includes Roberts Bank, supports the majority of northward migratory WESA, particularly in the more northern latitudes of the flyway.¹⁰⁷² Based on the best available data collected and analysed by ECCC, 14% to 21% of the WESA population stops over at Roberts Bank in a typical year (Drever et al. 2014).¹⁰⁷³ As such, most (79% to 86%) WESA do not stop over at Roberts Bank in a given year and more than half skip over the Fraser River estuary entirely during a typical northward migration. ECCC presented an estimate of 42% to 64% of the global WESA population using Roberts Bank during their northward migration but acknowledged that the estimate was derived from surveys in 1994 only, when the highest numbers of WESA on record were observed (a population estimate of 1.8 million, compared to the 23-year median population estimate of 600,000 stopping over at Roberts Bank).¹⁰⁷⁴ Regardless, stopover data indicate that while Roberts Bank is a very important site for migrating WESA it is not obligatory.¹⁰⁷⁵ The VFPA agrees that the local assessment area is a site of high international significance for WESA and is committed to ensuring that the ecological and conservation value for shorebirds and biofilm is preserved with the Project in place.

¹⁰⁶⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #43

¹⁰⁷⁰ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at p. 2886; CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #43.

¹⁰⁷¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #43.

¹⁰⁷² CEAR Doc 1886, ECCC response to Undertaking #30.

¹⁰⁷³ As cited in CEAR Doc 1887, Undertaking #31: From ECCC - Numbers of Western Sandpipers at Roberts Bank, at p. 1.

¹⁰⁷⁴ CEAR Doc 1887, ECCC response to Undertaking #31, at p. 1.

¹⁰⁷⁵ CEAR Doc 388, VFPA response to AIR #10, at Appendix AIR10-C, TDR CB-1.

(b) Foraging Capacity and availability of fatty acids with the Project in place shorebird foraging opportunity model estimates of biofilm capacity

A key component of the VFPA's effects determinations for shorebirds was the assessment of the anticipated food supply that will be available to shorebirds with the Project in place. ECCC raised concerns that the Project could result in a shortfall of food supply for migratory WESA. In Undertaking #29, ECCC relies on an M.Sc. thesis by Canham to suggest that "capacity modelling by the Proponent could be substantially underestimating the probability of a shortfall in biofilm food supply."¹⁰⁷⁶ The basis for this suggestion is that even though WESA numbers were low during Canham's two years of study, reductions (18% and 10%) in the amount of biofilm were observed. By extension, ECCC reasons that the impact of grazing would be higher in years with higher numbers of WESA and suggests that there would be insufficient biofilm in a year with more typical (i.e., higher) numbers of birds.

The VFPA is confident that the SFOM provides a conservative estimate of shorebird foraging capacity at Roberts Bank. The SFOM assumed that shorebird grazing could reduce chlorophyll *a* density by up to 50%, much more than the 18% and 10% measured in 2016 and 2017 by Canham. The SFOM suggests that a 50% threshold would be reached at the level of approximately 1.3 million shorebirds foraging on biofilm on the same day with the Project in place. The SFOM explicitly accounted for the higher grazing in years with higher numbers, but typical (i.e., normal) single-day peak numbers are closer to 150,000 WESA and have only exceeded 1 million birds once in 26 years of surveys since 1991.¹⁰⁷⁷

Further, Canham measured the rate of biofilm growth and found that this is approximately an order of magnitude greater than assumed in the capacity modelling. This implies a much higher biofilm regeneration capacity than assumed in the EIS assessment. Canham found that the concentration of biofilm (chlorophyll *a*) rose 4.1 mg/m²/hour during tidal emersion periods, with total accumulation of biofilm matching that removed by WESA during grazing visits. As a result, Canham suggests that most recovery from grazing can occur within a single day, while the SFOM assumed that complete biofilm recovery from a 50% reduction would take nearly 12 days.¹⁰⁷⁸ Thus, Canham's findings support the VFPA's assertion that the assumptions built into the SFOM (e.g., biofilm regeneration rate, exclusion of invertebrates from capacity modelling) are conservative and the model does not underestimate the probability of a shortfall in biofilm food supply.

(i) Availability of omega-3 fatty acids with the Project in place

Dr. Patricia Baird, on behalf of the Kahiltna Research Group, and ECCC have raised the concern that certain fats may be particularly important for migratory shorebirds and that Project-related changes to the intertidal environment could affect their availability at Roberts Bank.¹⁰⁷⁹ ECCC relies on an M.Sc. thesis by Young to provide support for the

¹⁰⁷⁶ CEAR Doc 1947, ECCC response to Undertaking #29, at p. 5.

¹⁰⁷⁷ CEAR Doc 181, EIS, Volume 3, at s. 15, Appendix 15-B.

¹⁰⁷⁸ CEAR Doc 181, EIS, Volume 3, at s. 15, Appendix 15-B, Appendix A, Figure 47.

¹⁰⁷⁹ CEAR Doc 1604, Patricia Baird written submission; CEAR Doc 1947, ECCC response to Undertaking #29.

'natural doping' hypothesis that PUFAs increase flight performance in migratory birds.¹⁰⁸⁰ ECCC goes on to state "indications are that migratory shorebirds have a limited capacity to produce n-3 PUFA from precursors endogenously,^[1081] and must access them directly either from diatoms in biofilm or indirectly from invertebrate prey that have consumed biofilm."

The VFPA notes that research on the role of PUFAs in the diet of birds is advancing rapidly. In contrast to the research referred to by ECCC and Dr. Baird, a number of studies have examined this issue and concluded that PUFA are not crucial for migrating birds.¹⁰⁸² In the context of the effects assessment, uncertainty on the importance of PUFA is largely irrelevant because three years of shorebird and biofilm studies that the VFPA conducted subsequent to submission of the EIS indicate omega-3 (n-3) fatty acids are abundant in the local assessment area and will remain abundant with the Project in place. These extensive studies provide consistent evidence that the levels of PUFAs and other fatty acids will not materially change with the development and operation of the RBT2 terminal. Consistently high PUFA densities in biofilm have been documented in both freshwater-dominated areas and marine/brackish areas across a range of salinity conditions and freshet sizes, including omega-3 (n-3) fatty acids that ECCC specifically mentions in its submissions.¹⁰⁸³

Given the large variation in abiotic conditions (including salinity) under which the VFPA has documented productive estuarine biofilm, the weight of evidence points to the conclusion that biofilm will continue to be abundant and productive with the Project in place.

(ii) Potential differences in biofilm under varying salinity conditions

ECCC raised the concern that potential Project-related changes in salinity could impact the biofilm community and, consequently, the amount of fatty acids produced by biofilm and available to shorebirds. ECCC stated "salinity influences biofilm community composition, and freshwater-influenced diatoms tend to have lower abundances of critical fatty acids and may lack the trigger for fatty acid productions" and presented two figures from VFPA studies to support this assertion.¹⁰⁸⁴ Specifically, ECCC references figures that display the abundance of diatom¹⁰⁸⁵ genera and the total fatty acid abundance at biofilm sampling stations. ECCC asserts that these figures demonstrate stations with lower fatty acid levels (e.g., stations X and J) have higher proportions of the freshwater dominated diatom genus *Achnanthydium* based on count abundance.¹⁰⁸⁶

¹⁰⁸⁰ CEAR Doc 1947, ECCC response to Undertaking #29, at p. 5.

¹⁰⁸¹ Originating from within an organism.

¹⁰⁸² CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at Appendix A, p.1

¹⁰⁸³ CEAR Doc 934, VFPA response to IR8-04, at Appendix IR8-04-A; CEAR Doc 1215, Biofilm Dynamics during 2017 Northward Migration; CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹⁰⁸⁴ CEAR Doc 1775, ECCC oral presentation, May 27, 2019, at slide 12, citing CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at Figures 3-22, 3-6A.

¹⁰⁸⁵ A type of single celled algae of which biofilm is primarily comprised.

¹⁰⁸⁶ CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at Figure 3-22.

As discussed above and in the VFPA's submission,¹⁰⁸⁷ there is little scientific evidence supporting the claim that diatoms in freshwater environments have lower abundances of what ECCC asserts are critical fatty acids. What has been well documented is that fatty acid levels are positively correlated with biofilm abundance (as measured by chlorophyll *a* density)¹⁰⁸⁸ with consistently high fatty acid levels found in both freshwater and marine dominated areas within the local assessment area. For example, in all three years of additional biofilm study, the highest fatty acid levels (including omega-3 PUFAs) were consistently found in locations containing the most abundant biofilm communities, regardless of the associated salinity regime.¹⁰⁸⁹

Furthermore, the VFPA views the interpretation of figures referenced by ECCC as misleading, as the number of diatoms (i.e., count abundance) ignores the size of diatoms in each of the genera. While *Achnantheidium* can be very numerous in biofilm, it is a relatively small type of diatom and tends to make up a small proportion of biovolume relative to other genera (compare Figures 3-22 and 3-24 of the VFPA's 2018 biofilm study).¹⁰⁹⁰ A more biologically meaningful comparison incorporates biovolume of diatoms at stations (Figure 3-24 of the VFPA's 2018 biofilm study), which are similar between freshwater and marine dominated sampling stations.¹⁰⁹¹ Therefore, higher abundance of *Achnantheidium* has an unimportant effect on the biologically meaningful composition of biofilm (i.e., biovolume or mass). Thus, the assertion that freshwater biofilm produces lower levels of fatty acids is unsubstantiated.

(c) Study design and statistical analysis for shorebirds and biofilm

Dr. Peter Beninger, on behalf of BC Nature, raised concerns regarding the study design and statistical methods applied within VFPA's Biofilm Dynamics during 2018 biofilm study.¹⁰⁹² In his presentation and submission, Dr. Beninger suggests that the 2018 biofilm study had insufficient prior understanding to properly account for temporal and spatial variability in mudflat ecosystems and has based predictions on flawed statistical methods.¹⁰⁹³

The VFPA respectfully disagrees with the criticisms regarding study design and methods of statistical analysis submitted and presented by Dr. Beninger.

Dr. Beninger's commentary does not take into consideration the VFPA's 2012 and 2013 studies, which provided data on spatial and temporal variation, including hundreds of data points at multiple spatial scales.¹⁰⁹⁴ Additionally, a hyperspectral scan in July 2012 provided

¹⁰⁸⁷ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at pp. 7-8.

¹⁰⁸⁸ CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at Table 3-7, Figure 3-10.

¹⁰⁸⁹ CEAR Doc 934, VFPA response to IR8-04, at Appendix IR8-04-A, Figure 3-6, Table 3-5, Appendix C; CEAR Doc 1215, Biofilm Dynamics during 2017 Northward Migration, at Figure 3-9, Table 3-5, Appendix C; CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at Figure 3-7, Appendix D.

¹⁰⁹⁰ CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹⁰⁹¹ CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹⁰⁹² CEAR Doc 1575, Peter G. Beninger (BC Nature) written submission; CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹⁰⁹³ CEAR Doc 1740, Peter G. Beninger (BC Nature) oral presentation, May 27, 2019.

¹⁰⁹⁴ CEAR Doc 181, EIS, Volume 3, at s. 11.4.1, Table 11-4.

a complete snap-shot of the distribution and density of biofilm across Roberts Bank.¹⁰⁹⁵ Data that the VFPA collected during these studies informed the 2018 study design, which focused on better documenting natural temporal variation and response of biofilm to different salinity regimes found across the local assessment area (i.e., the salinity gradient). The VFPA did not choose spatial sampling locations to document the complete distribution of biofilm, but to better understand biofilm's response to natural variations in salinity. The VFPA is not aware of any other studies on intertidal biofilm that have completed more comprehensive sampling and analyses than the body of work developed under the VFPA shorebird and biofilm study programs.

The VFPA has also reviewed and considered Dr. Beninger's concerns regarding the inclusion of frequentist hypothesis tests in some sections of the 2018 report. The VFPA is confident that the concerns raised by Dr. Beninger were properly considered and accounted for. Specifically, the VFPA relied minimally on hypothesis tests, and when the VFPA applied these methods, the VFPA interpreted significance testing carefully and reported in context. The VFPA's studies used a variety of analytic techniques from descriptive statistics and visualizations to information theoretics and model averaging.¹⁰⁹⁶ While the VFPA agrees with Dr. Beninger's general concern over the misapplication of statistics, the VFPA's study analyses and conclusions were not misguided by significance levels. Thus, the VFPA remains confident in the approach (study design and methods of statistical analysis) and the conclusions of the 2018 biofilm dynamics report as well as the determinations of negligible adverse residual effects to WESA.

(d) Predicted changes in salinity with the Project in place

As stated above, ECCC has raised the concern that potential Project-related changes in salinity could impact the biofilm community and, consequently, the amount of fatty acids produced by biofilm and available to foraging shorebirds. ECCC suggests that salinity in the upper intertidal area will be lowered by one standard deviation, amounting to a shift towards freshwater of approximately 34% relative to existing conditions. ECCC also notes that the range in salinity over the intertidal area during the Fraser River freshet would be reduced by as much as 10 practical salinity units (psu), representing a substantial reduction in the variability of salinity. Finally, ECCC raised concerns regarding potential impacts from compression of the range in salinity that would be experienced at Roberts Bank, as shown in the video in the VFPA's oral presentation to the Review Panel.¹⁰⁹⁷

The VFPA remains confident in its prediction that anticipated changes in salinity with the Project in place will be small compared to natural variation currently experienced due to tidal fluctuations and highly variable freshwater inputs from the Fraser River. The VFPA's extensive scientific work has shown that the Project will result in a redistribution of

¹⁰⁹⁵ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 11; CEAR Doc 181, EIS, Volume 3, at Figure 11-7.

¹⁰⁹⁶ CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹⁰⁹⁷ CEAR Doc 1947, ECCC response to Undertaking #29; CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 16.

freshwater over Roberts Bank, shifting (depending on which measure of salinity is chosen) the range and average by small amounts (2-6 psu over a tidal cycle) at some but not all locations. At all locations in the local assessment area, the variability in salinity will have the same frequency, and the reductions in range are expected to be subtle at most locations across Roberts Bank and similarly variable through time and space as experienced under current conditions.¹⁰⁹⁸

ECCC's assertion that the Project will result in a 34% shift in salinity towards freshwater, is based on a misinterpretation of the data contained in EIS Table 11-19.¹⁰⁹⁹ The table provides the standard deviation of all modelled values of salinity within the upper intertidal area. This is a measure of spatial variation, specifically variation in the 50th percentile salinity across the area in question. It does not describe variation in salinity experienced over time and, therefore, cannot be used to argue that 'average' salinity will shift.

ECCC's statement that the Project will result in reductions in overall range as large as 10 is also due to a misinterpretation of the data, specifically one of the panels in Figure IR2-02-9.¹¹⁰⁰ This figure shows the change in maximum salinity resulting from the Project, based on numerical model predictions. Maximum salinity in the context of Figure IR2-02-9 is a composite of the highest salinity reached at each individual node in the numerical model during the freshet season, a value that is rarely achieved. A reduction in this value indicates that the single most extreme value during the three-month simulation would be lower, but this does not adequately capture change in the overall range. A better description of the reduction in the range of salinity experienced in the upper intertidal area during the freshet period is the panel of Figure IR2-02-9, which shows the change in the 95% upper confidence limit is 2 to 4 psu across most of the upper intertidal zone, and up to 6 psu only in the area adjacent to the causeway.¹¹⁰¹

ECCC expressed concern regarding the magnitude of the compression of the range in salinity that would be experienced at Roberts Banks, as shown in the video presented by the VFPA in their oral presentation.¹¹⁰² While it is true that the Project is predicted to lower the upper end of the range of salinity by several psu at Station C in the second half of the 15-day simulation, the reductions at Station H and Station Y are much more subtle.¹¹⁰³ Furthermore, the overall range in salinity experienced at the three reference stations is quite small during the first seven days, corresponding to a neap tide, and remains relatively small on the sub-dominant tide swing even during the latter half of the animation. The highest salinity values are generally in the low to mid-20s psu and these highest values are present primarily during the neap tide cycle.¹¹⁰⁴

¹⁰⁹⁸ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at pp. 1-3; CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 16.

¹⁰⁹⁹ CEAR Doc 1891, VFPA response to Undertaking #28.

¹¹⁰⁰ CEAR Doc 934, VFPA response to IR2-02.

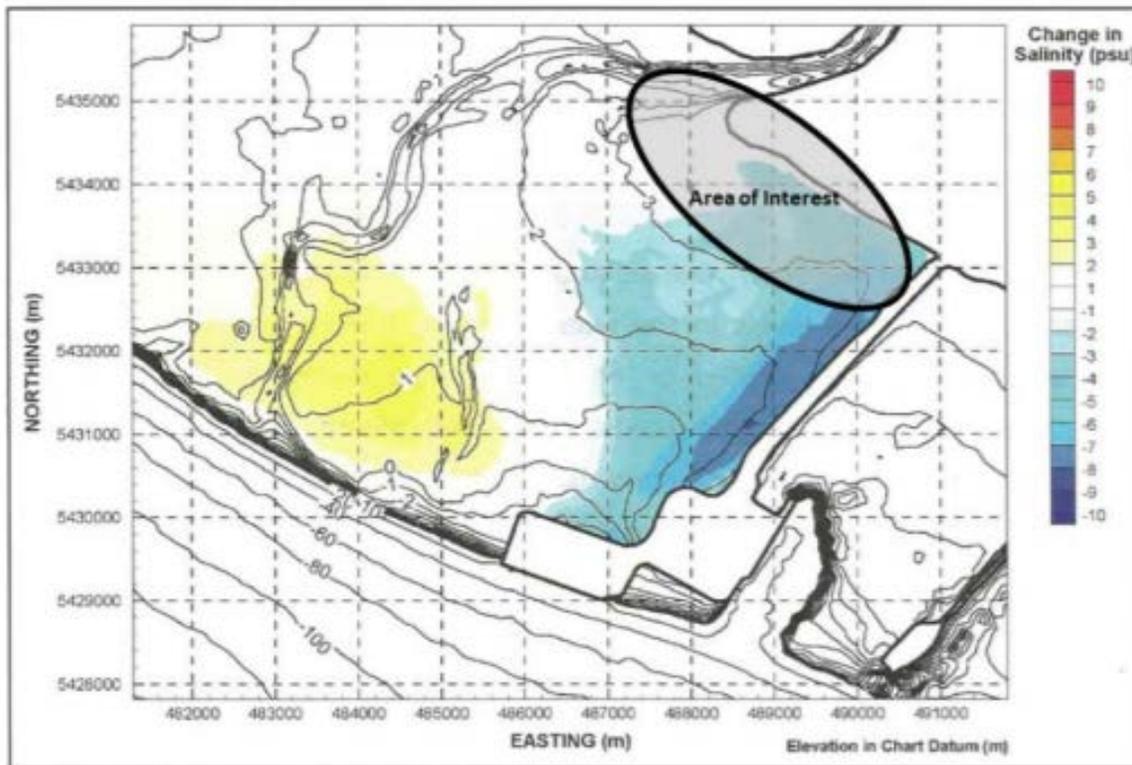
¹¹⁰¹ CEAR Doc 934, VFPA response to IR2-02.

¹¹⁰² CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 16.

¹¹⁰³ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 16.

¹¹⁰⁴ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 16.

In DFO IR-20, the Review Panel requested that DFO provide advice on the reliability of the proponent's salinity change predictions, with particular reference to the Area of Interest shown on the map below, which is modified from Figure 9.7-9 of the EIS.



Modified from Figure 9.7-9 of the EIS

In its response to the IR, DFO stated that the modelled pattern of salinity change associated with expansion of the marine terminal shown in Figure 9.7-9 is plausible and that the general pattern of salinity change predicted by the model is reasonable.¹¹⁰⁵

During the topic-specific session on May 27, 2019, the Review Panel made reference to the above figure, which shows predicted changes in salinity over the intertidal zone. The area in the vicinity of Brunswick Point is predicted to see the smallest salinity change. This is an area that is dominated by freshwater, contains high density biofilm and concentrated WESA foraging. The Review Panel referred to euryhaline, meaning animals that live in estuaries and can withstand salinity variations. The Panel asked each of DFO and ECCC whether the magnitude of change in salinity would be considered to be biologically significant.¹¹⁰⁶

¹¹⁰⁵ CEAR Doc 1221, Fisheries and Ocean's Response to the Roberts Bank Terminal 2 Project Review Panel's May 17, 2018 letter.

¹¹⁰⁶ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. pp. 2681-2688.

Neither the representatives for DFO or for ECCC indicated that the changes would be biologically significant.¹¹⁰⁷

The Review Panel also asked the VFPA's experts whether the magnitude of salinity change, post-Project, is great enough to be biologically significant:

"MEMBER LEVY: Thank you for that input. I'd like now to ask the proponent the same question. The proponent is gathered a huge amount of salinity data over the years. And based on what you've found, is the magnitude of change, post project, is it great enough to be biologically significant?

DR. LAURIA: Thank you for that question, Dr. Levy.

I'd like to go back to a word that you used in your initial question and that was euryhaline, and I think that's a key understanding of the biofilm community at Roberts Bank. The diatoms that are there are pennate diatoms that live in an estuary and they go from 0 to maximum saline conditions all the time.

They are adapted into that environment. And the data that we've collected post EIS shows very clearly that the biofilm community, when they're exposed to both low salinities at Canoe Passage and higher salinities across the intertidal, it's not having an impact on the nutritional value when measured as fatty acid. To your question of biological significant, we believe based on the information that we have and the three years post-EIS, that the change predicted from the project will not be biologically significant to the biofilm."¹¹⁰⁸

In summary, ECCC's assertions regarding changes to salinity are exaggerated as a result of misreading of figures and reports provided by the VFPA. While some redistribution of freshwater over Roberts Bank will occur, the Project will not change any of the fundamental physical processes (tidal currents, waves, sediment transport) that support biofilm in the upper intertidal area of the local assessment area and most locations across Roberts Bank will experience similarly variable salinities as experienced under current conditions.

(e) Evidence of a 'salinity trigger' at Roberts Bank

In their April 15, 2019 written submission to the Review Panel, for the first time, ECCC hypothesize that a 'salinity trigger' (i.e., oscillations in the salinity experienced on the

¹¹⁰⁷ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. pp. 2683-2687.

¹¹⁰⁸ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 2687-2688.

mudflats) could be responsible for the production of fatty acids within biofilm at Roberts Bank, and that this trigger could be impacted by the Project.¹¹⁰⁹

The VFPA has reviewed the evidence put forward in ECCC's undertaking on the 'salinity trigger' hypothesis. Examination of the research referenced by ECCC reveals that the hypothesis remains unfounded. In summary, the studies cited by ECCC:

- Do not test the influence salinity on fatty acid production;
- Found that salinity stress decreased fatty acids;
- Test the effects of salinity at constant levels rather than oscillations in salinity; or
- Only found salinity stress affected fatty acid production when observed in combination with other environmental factors (e.g., light).

Furthermore, on close inspection, selected results from the VFPA studies that ECCC present as evidence for the salinity trigger do not support this hypothesis when viewed in the context of the larger body of work. A detailed evaluation of the research referenced to support ECCC's hypothesis is provided below.

- (i) Evidence of a 'salinity trigger' from peer-reviewed literature newly referenced in Undertaking #29¹¹¹⁰

Nine of the twelve papers cited to support the 'salinity trigger' hypothesis are laboratory experiments testing research hypotheses and three are review papers of the biotechnology literature. The objective of the research referred to in the cited papers is to identify optimal growing conditions for maximum fatty acid production largely for the biofuel industry. None of these studies examined conditions of natural systems, asking, for example, whether or how changes in salinity provide the hypothesized 'trigger'. The VFPA questions the extrapolation of results from these laboratory studies to arrive at a definite conclusion of a 'salinity trigger' in the natural system of Roberts Bank.

In Undertaking #29, ECCC states "changes in salinity, in either direction, cause lipid accumulation in a variety of algae cells, including diatoms" and refers to several papers to support this claim.¹¹¹¹ Two of the experimental studies cited in Undertaking #29 (Cheng et al. 2014b and Hu and Gao 2006) cannot be used to support ECCC's claim because the first did not test the effects of salinity on fatty acid production (the experiment tested oxygen as a stressor) and the second found the opposite effect, decreased fatty acid accumulation with salinity stress. A third study cited in Undertaking #29 (Cheng et al. 2014a) irradiated the microalgae before salinity stress testing, therefore testing conditions that do not occur in nature.

In the remaining six experimental studies, the salinity stress applied (amount of sodium chloride and length of exposure) was different in each case. Exposure times were typically

¹¹⁰⁹ CEAR Doc 1637, ECCC written submission, at pp. 65-70; CEAR Doc 1947, ECCC response to Undertaking #29.

¹¹¹⁰ CEAR Doc 1947, ECCC response to Undertaking #29.

¹¹¹¹ CEAR Doc 1947, ECCC response to Undertaking #29, p. 2.

several days to weeks at a given constant salinity. None tested the effects of salinity oscillations. As stated above, the objective of this research was to identify the optimal growing conditions for maximum fatty acid production for biotechnology purposes, rather than replicating conditions of natural systems. Several of the studies demonstrate that the highest lipid productivity was obtained in combination with some other environmental stressor (i.e., nitrogen, light) (Takagi and Yoshida 2006, Pal et al. 2011, Bartley et al. 2013, Xia et al. 2014, BenMoussa-Dahmen et al. 2016), indicating that salinity may not have been the most important factor driving fatty acid production.

The three review papers all identify the importance of additional stressors besides salinity (i.e., nitrogen, temperature, and light—factors that are not expected to change with the Project) in influencing microalgae growth and lipid yield. None of the review papers state that changes in salinity drive fatty acid accumulation. Instead, they present the state of knowledge of the optimal conditions required to maximize fatty acid production in different species in different experiments.

It is problematic to use the data from biotechnology laboratory studies to draw conclusions about the situation across Roberts Bank. In the natural estuarine environment, microalgal species do not reside at the same salinity conditions or under constant (other) environmental conditions continuously. They are exposed to a range of salinities over relatively short periods of tide cycles, not all of which are within their optimal growth rate range of species. None of the studies examined the fluctuations or oscillations in salinity repeatedly invoked by ECCC as the mechanism triggering fatty acid production.

In summary, these papers suggest that each species of microalgae is adapted to different salinity conditions and environmental stressors. These stressors can work synergistically to both increase and decrease fatty acid production in microalgae. The twelve papers cited by ECCC in Undertaking #29 do not provide evidence to support the hypothesis that changes in salinity alone, in either direction, are required to cause lipid accumulation in a variety of algae cells.

During the topic-specific session on May 27, 2019, the Review Panel asked the VFPA's expert panel to comment on the phenomenon variously called salinity shock or salinity oscillations. Dr. Mary Lou Lauria responded as follows:

"DR. LAURIA: Thank you for that question, Dr. Steyn. Mary Lou Lauria.

So first of all, I'd just like to address directly the term "salinity oscillation" and the suggestion that it's creating or initiating the fatty acid production.

In the literature that we've reviewed and in the data that we have collected at Roberts Bank, including, post EIS, three years' worth of data, there is no evidence to show that there is

a salinity oscillation which creates or initiates the fatty acid production in the biofilm community at Roberts Bank.

What we've also found in the post EIS three years from 2016, '17 and '18, we have shown that there is fatty acids in the biofilm at Roberts Bank across the salinity gradient, so in the areas which are predominantly fresh water and in the areas which have a more saline influence, the fatty acid is across the intertidal area and is not related to the salinity."¹¹¹²

The Review Panel asked the VFPA's expert consultants about the intellectual history of the question of the salinity oscillation or salinity trigger and the response was as follows:

"DR. LAURIA: Thank you, Dr. Steyn for your question.

There is no scientific theory that we have seen in any of the published -- peer reviewed published papers that we have reviewed to suggest that there is a salinity trigger or a salinity oscillation which initiates fatty acid production in biofilm.

The only thing that we can talk to is what has been shown in laboratory studies. And in all of the laboratory studies that we have reviewed, there is in no way evidence to suggest that salinity is triggering the fatty acids. In many cases, it's a number of other environmental factors that have been recorded.

And we've detailed our response to this in CEAA document 1705."¹¹¹³

The Review Panel also asked the ECCC representatives to explain their understanding of the term 'salinity trigger.'

The ECCC representatives indicated that the topic was not addressed at the recent International Ornithological Congress because it is an emerging issue and the analysis that has resulted in the ECCC position on it was not completed until after the International Ornithological Congress was concluded.¹¹¹⁴

In summary, to support their hypothesis of a 'salinity trigger', ECCC cite studies from the biotechnology literature that the VFPA argues are not applicable to the natural environment of Roberts Bank. The studies and reviews cited by ECCC were aimed at finding conditions to maximize industrial-level production of fatty acids for human nutrition and the biofuel industry; the conditions that biofilm was subjected to in the laboratory bear no resemblance

¹¹¹² CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 2659-2660.

¹¹¹³ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at p. 2663.

¹¹¹⁴ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 2695-2698.

to the natural conditions that prevail in the local assessment area. None of the studies examined the fluctuations or oscillations in salinity repeatedly invoked by ECCC as the mechanism triggering fatty acid production.

(ii) Evidence of a 'salinity trigger' from the Schnurr Paper and the Schwenk Paper

ECCC relies on two scientific papers in particular for its 'salinity trigger' hypothesis: *Seasonal changes in fatty acid composition of estuarine intertidal biofilm: Implications for western sandpiper migration* by Schnurr et al (2019) (the **Schnurr Paper**);¹¹¹⁵ and *Lipid content in 19 brackish and marine microalgae: influence of growth phase, salinity and temperature* by Schwenk et al. (2013) (the **Schwenk Paper**).¹¹¹⁶

These papers do not support ECCC's hypothesis. None of the summarized results within the Schnurr Paper provide empirical evidence that supports the existence of a 'salinity trigger'. The Schnurr Paper did not perform an experimental design that tests the effect of salinity on fatty acid production in microphytobenthos. The only mention of salinity in the Schnurr Paper comes in the discussion section, which addresses their findings that revealed fatty acids in spring are three to seven times higher than in winter. This finding replicates VFPA study results from 2012 and 2013 demonstrating seasonal differences in biofilm.¹¹¹⁷ The Schnurr paper and VFPA studies demonstrate that fatty acid levels are greater in the spring, with highest productivity associated with improved growing conditions due to increased light and temperature, and the change in tidal emersion (from nighttime to daytime) that occurs after the spring equinox providing longer periods of time for diatoms within the biofilm community to photosynthesize. The one reference provided within the Schnurr Paper on the subject of the influence of salinity on lipid production in diatoms is as follows:

"This [Fraser River] freshet is accompanied by rapid changes in salinity and water chemistry, which may have also contributed to the observed fatty acid accumulation response in spring. Changes in salinity can affect metabolism of silicon and enhance lipid production in oleaginous marine diatoms (Adams and Bugbee 2014)."¹¹¹⁸ [Emphasis added]

The VFPA notes that the Adams and Bugbee study referred to in the Schnurr Paper did find that changing sodium chloride levels affected lipid production, but like other studies discussed in section 2 of ECCC's response to Undertaking #29¹¹¹⁹ and in VFPA's May 8, 2019 submission,¹¹²⁰ the effect of salinity stress in combination with another stress (in this case silicon) induced the highest lipid productivity.

ECCC acknowledge the Schwenk Paper did not discuss oscillations in salinity, stating:

¹¹¹⁵ Submitted along with CEAR Doc 1775.

¹¹¹⁶ CEAR Doc 1841, Exhibit 28 presented by the VFPA.

¹¹¹⁷ CEAR Doc 181, EIS, Volume 3, at s. 11.5.5.5, at p. 11-38.

¹¹¹⁸ CEAR Doc 1775, Schnurr Paper, at p. 27.

¹¹¹⁹ CEAR Doc 1947, ECCC response to Undertaking #29, at p. 2.

¹¹²⁰ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission.

“Schwenk et al. (2013) do not discuss oscillations in salinity, nor would they have been expected to, given cultures were grown at constant salinity.”¹¹²¹

What the Schwenk Paper presents and discusses is the influence of environmental factors (e.g., growth stage, nitrogen, temperature, salinity) on fatty acids, finding that numerous factors influenced fatty acid abundance, stating:

“Plotting changes in lipids against changes in cell nitrogen revealed a significant dependency between decrease in cell nitrogen and increase in lipids across all tested species.”

“This result indicates that the cultivation temperature leads to structural differences in lipid profiles of both cultivation groups. In contrast, salinity does not seem to significantly affect the lipid structure.” [Emphasis added],

“These results were further confirmed with a permutational multivariate ANOVA (PERMANOVA) test: the results in Table 3 show that temperature and growth phase affect the lipid profiles, but salinity does not have such a role in this data set.” [Emphasis added], and

“...whereas high temperature and low salinity had also a minor increasing effect on total lipids (Table 2).” [Emphasis added].

The Schwenk Paper summarises their findings by stating:

“several studies have shown that each algal species has an optimal salinity level for growth and lipid production (Chaffin et al. 2012; Fuentes-Grunewald et al. 2012). Depending on the physiological state, this level might be different for different microalgal species.” [Emphasis added].

In conclusion, none of the research conducted or cited within the Schnurr Paper provides evidence of a ‘salinity trigger.’ The Schnurr Paper did not examine the role of salinity in fatty acid production. The Adams and Bugbee study cited in the Schnurr Paper found synergistic effects of optimized silicon and salinity conditions to produce high fatty acids. The Schwenk Paper did not find a significant relationship between salinity and fatty acid composition but did find significant relationships between nitrogen and lipid content, and temperature on lipid profiles. In conclusion, salinity has not been effectively isolated as a mutually independent environmental stressor and there is no evidence of a ‘salinity trigger’ at Roberts Bank.

¹¹²¹ CEAR Doc 1947, ECCC response to Undertaking #29, at p. 7.

(iii) Evidence of a 'salinity trigger' from VFPA studies

Another line of evidence that ECCC references to support the 'salinity trigger' hypothesis is the VFPA biofilm studies. The VFPA figures referenced by ECCC and associated data do not support the assertion of a 'salinity trigger' as the larger body of results does not provide support for the hypothesis. For example, three years of additional study consistently document the following:

- 1) A positive relationship between fatty acid and carbohydrate abundance exists (indicating that changes in carbohydrate and total fatty acid levels generally reflect changes in biofilm productivity).¹¹²²
- 2) High fatty acid abundances occur in both freshwater and marine-dominated locations across Roberts Bank, with little inter-annual variation despite varying environmental conditions.¹¹²³ For instance, the Fraser River freshet peaked in late-April in 2016, early-June in 2017, and mid-May in 2018, and the recurrence interval of these floods was approximately the annual average flood, a 2-5 year flood, and a 5-10 year flood, respectively.
- 3) The statistical modelling results support multiple environmental factors (not just salinity) affecting biofilm (including fatty acid) productivity,¹¹²⁴ which is not surprising given the environmental complexity of the estuarine environment to which biofilm is adapted.
- 4) The fatty acids about which ECCC expressed concern, and also discussed by Dr. Patricia Baird in her presentation,¹¹²⁵ were consistently documented at all sites, during all sampling events, across a variety of freshet and salinity conditions, not just during periods of extreme fluctuations in salinity.¹¹²⁶

The VFPA's position is that ECCC's description of the changes in salinity on Roberts Bank that will result from the Project as 'an overall regime shift' is a strong mischaracterization. As set out above (Section 3.(d)), support for the claim that average salinity will drop by a full standard deviation is based on misinterpretation of the data. The VFPA's extensive scientific work has shown that the Project will result in a redistribution of freshwater over the Bank resulting in only minor changes to salinity ranges.

The 2016-2018 biofilm dynamics study program demonstrate the biofilm community is adapted to the variable estuarine salinity environment. The many measures of fatty acid levels made across the Roberts Bank documented spatial variation (e.g., lower abundance at sandy, high water energy locations), but little temporal variation, despite the very strong

¹¹²² CEAR Doc 934, VFPA response to IR8-04, at Appendix IR8-04-A, Figure 3-11; CEAR Doc 1215, Biofilm Dynamics during 2017 Northward Migration, at Figure 3-14; CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at Figure 3-10.

¹¹²³ CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at Figures 3-12, 3-17.

¹¹²⁴ CEAR Doc 181, EIS, Volume 3, at s. 15, Appendix 15-B, pp. 27-28; CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at pp. 54-58.

¹¹²⁵ CEAR Doc 1776, Patricia Baird oral presentation, May 27, 2019.

¹¹²⁶ CEAR Doc 934, VFPA response to IR8-04, at Appendix IR8-04-A, Appendix C; CEAR Doc 1215, Biofilm Dynamics during 2017 Northward Migration, at Appendix C; CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration, at Appendix D.

inter-annual variability in Fraser River outflow. These facts indicate a rather stable fatty acid supply, and do not support the existence of a 'salinity trigger'.

(f) Feasibility of engineering biofilm habitat for shorebirds

In its written submission, ECCC states that “[l]arge-scale re-creation of mudflats with biofilm of a type that supports shorebirds is without precedent, and ECCC is of the view that currently there is no way to create high quality biofilm habitat.”¹¹²⁷

In a meeting held on November 6, 2014, ECCC brought to the VFPA’s attention the work of Dr. Tomohiro Kuwae on creating biofilm habitat in Japan. In response, the VFPA invited Dr. Kuwae to a workshop in Vancouver to gain a better understanding of the conditions required to create biofilm habitat.

There is substantial literature on the restoration, rehabilitation, and creation of coastal habitats, which include site-specific accounts and review papers. The science of restoring coastal habitats has been developed globally for over four decades and several studies have addressed the site and design requirements for restoring tidal wetland habitat and biofilm.¹¹²⁸ Researchers at the Intertidal Flat Experimental Facility in Yokosuka, Japan, have conducted *in situ* and *ex situ* biofilm restoration for years demonstrating the feasibility of creating biofilm habitat under controlled laboratory conditions and in natural settings.¹¹²⁹ Further examples of engineering intertidal biofilm have shown that “biofilm has been successfully grown under laboratory conditions and there is evidence that diatoms will colonize and grow within suitable and engineered habitat.”¹¹³⁰

Evidence of biofilm within human engineered habitat is available from the South Bay Salt Pond Restoration Project in the San Francisco area. Following restoration efforts, biofilm was detected in satellite images on the surface of the mudflats, demonstrating that biofilm can develop within engineered wetlands when conditions are suitable. Biofilm distribution in the South Bay Salt Pond Restoration Project was mapped using remotely sensed data to assess the capacity of the newly restored tidal wetlands to support a diverse community. Using mapped biofilm assemblages, biofilm energy densities, and shorebird consumption rates of biofilm, they estimated the carrying capacity to be approximately 201,000 shorebirds per day, documenting that features promoting biofilm establishment and restoration can be successfully engineered as part of large-scale restoration projects.¹¹³¹

In 2008, the Point Reyes National Seashore reintroduced tidal waters into 223 hectares of historic tidal wetlands, which was previously dyked for pasture lands after nearly six decades of isolation from tidal action. The dyke was breached at the primary point of

¹¹²⁷ CEAR Doc 1673, ECCC written submission, at p. 34.

¹¹²⁸ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at pp. 11-13.

¹¹²⁹ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at p. 11.

¹¹³⁰ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at p. 11.

¹¹³¹ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at pp. 11-12.

freshwater inflow for Tomales Bay, a nearly 30 km² estuary. Although microphytobenthos and biofilm growth was not measured in the Tomales Bay project, observational evidence indicates that biofilm may have been inadvertently created and that it was responsible for the rapid re-establishment of *Calidris* spp. observed at the site.¹¹³²

Finally, based on a multi-year research and restoration program, several researchers detail factors promoting high quality biofilm habitat suitable for shorebird foraging that should be engineered into biofilm restoration projects. They include inclusion of a gentle bottom slope and wide intertidal zone, inclusion of freshwater inflow, recommendations of maximum water depth, designing the site to enhance mudflat microtopography to provide tide pools, and engineering the site to provide muddy/silty habitat in the upper intertidal to promote biofilm growth and sandier sediments in lower intertidal areas to promote the establishment of a diverse benthic invertebrate community fed on by shorebirds.¹¹³³

The VFPA has a history of creating numerous habitats that increase ecological productivity within marine and estuarine environments. As described above, there is evidence that biofilm habitat can be successfully created under laboratory conditions, can grow within engineered intertidal habitats, and has regenerative and colonizing capacity at Roberts Bank. Thus, the VFPA is confident that biofilm habitat can be engineered and is committed to consulting with experts and developing a knowledge base for this purpose. As stated in the overview, the biofilm manual will be developed in consultation with international experts, and shared with interested Indigenous groups, and will identify and document best practices for developing biofilm habitat. Thus, in the unlikely event that biofilm habitat is compromised due to Project related effects, the VFPA is confident that it can be created elsewhere.

4. General response to ECCC on shorebirds and biofilm

The VFPA submits that ECCC has not been scientifically objective in its review of the VFPA studies and assessments.

As noted during the public hearing, the VFPA has engaged with the CWS branch of ECCC since 2011 with respect to the potential effects of the Project on biofilm and WESA. The VFPA has consistently recognized the importance and evolving science surrounding biofilm as an important prey source for migrating shorebirds at Roberts Bank and has actively engaged ECCC throughout the process. Knowledge gained over the last six years of studies provide confidence in the conclusion that the Project will not adversely affect biofilm or the ability of biofilm to support shorebirds.

Over this period, the VFPA has experienced a lack of consistency in ECCC's approach to the assessment of the effects of the Project on biofilm and WESA. The following sets out a brief

¹¹³² CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at pp. 12-13.

¹¹³³ CEAR Doc 1705, VFPA response to biofilm and shorebirds component of ECCC's written submission, at p. 13.

history of the VFPA's engagement with CWS (ECCC) on the issue of biofilm and shorebirds, and how the VFPA has effectively and appropriately addressed concerns raised.

In late 2011 and in the spring of 2012, prior to initiating field programs, the VFPA's coastal birds, biofilm, and marine invertebrate biologists met with CWS staff to discuss the Project and solicit feedback on the planned study program. In line with prior biofilm research, the VFPA proposed measuring Chlorophyll *a* abundance in the top 2 mm of intertidal sediments. This was endorsed by CWS as the appropriate method.¹¹³⁴

The VFPA then went on to initiate field studies in April 2012, and met regularly with CWS prior to the submission of the EIS for the purpose of reviewing study results and soliciting further feedback. This included meetings associated with the Shorebird and Biofilm TAG, a 12-member group of experts on shorebird, biofilm, and marine invertebrate ecology, and included Dr. Mark Drever of CWS, Andrew Robinson of CWS (as an observer), Dr. Ron Ydenberg of SFU, and Dr. Tomohiro Kuwae, among others.¹¹³⁵

The Shorebird and Biofilm TAG held four, eight-hour sessions to discuss the Project, existing scientific knowledge, and results from 2012 studies and to solicit feedback to direct 2013 studies and identify information gaps. In total, the VFPA met with CWS on 10 different occasions prior to submitting the EIS (December 2011, April 2012, November 2012 (TAG), January 2013 (TAG), March 2013 (TAG, 2 days), July 2013, March 2014, June 2014, and November 2014), and on three occasions after submission of the EIS.¹¹³⁶

The Shorebird and Biofilm TAG identified that fatty acids in biofilm was an area to be investigated, and this recommendation was incorporated into the 2013 biofilm study program. An additional outcome of the TAG was the recommendation to develop the SFOM to assess the potential changes brought about by the Project and how those changes would affect migrating and overwintering shorebirds.¹¹³⁷

In February 2016, following submission of the EIS, the VFPA and CWS met to discuss the concerns of CWS with respect to fatty acids. Following this meeting, the parties agreed to a collaborative program to better understand the role of fatty acids in shorebird diet during the 2016 spring migration period. As noted at the public hearing, the parties entered into a data sharing agreement for this purpose, on the understanding that each party would conduct their own study. The VFPA went on to collect data for the 2016, 2017, and 2018 WESA northward migration seasons.¹¹³⁸

In its letter to the Review Panel dated October 11, 2016, ECCC provided its comments on the information in the EIS. In that letter, ECCC indicated that more science-based information was required to provide definitive advice on effects to shorebirds, in particular WESA. ECCC outlined the following concerns relating to the VFPA's assessment of biofilm:

¹¹³⁴ CEAR Doc 181, EIS, Volume 1, at s. 7.4, Appendix 7.4-A.

¹¹³⁵ CEAR Doc 181, EIS, Volume 1, at s. 7.4.

¹¹³⁶ CEAR Doc 181, EIS, Volume 1, at s. 7.1.1.4.

¹¹³⁷ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 2715-2716, 2888.

¹¹³⁸ CEAR Doc 181, EIS, Volume 1, at s. 7.1.1.4.

- A concern that the VFPA had not assessed the production of fatty acids from lipid-producing diatoms, or the implications of changes in physical and water quality parameters to the community structure, productivity, and distribution of biofilm-producing diatoms;
- A concern that there is a high degree of uncertainty in the predicted change of total available biomass to biofilm community structure; and
- A concern that the implications of a predicted decrease in marine-influenced biofilm biomass where foraging is most intense is unclear.¹¹³⁹

In addition, in a letter dated October 14, 2016, ECCC provided additional comments in relation to the EIS and MSA. That document included the following concerns:

“Scientific research conducted on Roberts Bank over the last 15 years shows that biofilm constitutes the major food source for Western Sandpipers during their spring migration through the Fraser River delta. A Western Sandpiper may consume 190g of biofilm per day (7 times its body weight). Estimates from foraging rate, energy content and metabolism data indicate that biofilm, on average, accounts for $\geq 45\%$ of the diet and up to 50% of their daily energy budget. While biofilm occurs over all intertidal flats of the delta, field observations indicate that areas grazed by shorebirds are specific to fine-grained sediments of upper intertidal areas with an estuarine influence, with the mudflat off Brunswick Point, Roberts Bank, experiencing the most intensive grazing. Biofilm in coarser-grained sediment of the mid-and lower-intertidal areas is inaccessible to the shorebird.

Data from the Roberts Bank stopover site suggest that Western Sandpipers depend upon lipid rich diatom patches blooming in upper intertidal biofilm. The key diatom species on Roberts Bank may be estuarine in nature; however, the precise salinity range within which the implicated species can survive and bloom has yet to be determined. The physical and/or chemical factors that drive these diatoms to bloom at Roberts Bank are also unknown. Salinity appears to play a primary role, and nutrients, temperature, and light, are also likely important factors influencing the timing and extent of lipid production.”¹¹⁴⁰

¹¹³⁹ CEAR Doc 574, ECCC comments.

¹¹⁴⁰ CEAR Doc 581, ECCC comments.

On April 5, 2017, in light of the October 2016 submissions, the Review Panel asked ECCC additional questions regarding shorebirds and biofilm.¹¹⁴¹ Specifically, in ECCC IR-02, the Review Panel made the following comments:

"In its submission to the Review Panel on the sufficiency and technical merit of the EIS and Marine Shipping Addendum (CEAR Doc #581), ECCC concluded that:

- there is insufficient information in the EIS to evaluate the potential for significant adverse impacts to energy and lipid-rich biofilm;
- there is insufficient, science-based information to support the Proponent's finding that the Project would not negatively impact biofilm and migratory shorebirds, in particular the Western Sandpiper; and
- without additional information, a high level of uncertainty remains regarding the potential effects on Western Sandpipers and possibly other shorebirds and, as such, there presently exists an unqualified potential for significant adverse effects on these species.

ECCC presented its advice on some of the key information gaps in biofilm-shorebird ecology at Roberts Bank and provided four questions that it felt would need to be addressed to fill those gaps:

1. What are the key diatom species that Western Sandpipers require to meet their PUFA/HUFA needs during spring migration?
2. What are the key, limiting abiotic and biotic factors influencing the occurrence, distribution, and productivity of this particular diatom community? How do these factors vary across the Fraser River delta? Is Roberts Bank unique?
3. Would these key factors be affected by the Project? If so, how and to what extent?
4. What are the predicted population/species level consequences if the Project causes these key diatom species to become depleted or to disappear altogether?

ECCC did not advise, however, how these key information gaps may be addressed.¹¹⁴²

¹¹⁴¹ CEAR Doc 950, Review Panel IRs to ECCC.

¹¹⁴² CEAR Doc 950, Review Panel IRs to ECCC, at Attachment, p. 1-2.

Following those comments, the Review Panel asked ECCC the following questions:

“Regarding the ECCC statement that there is insufficient, science-based information to support the Proponent’s finding that the Project would not negatively impact biofilm and migratory shorebirds, in particular the Western Sandpiper:

- clarify whether ECCC is referring to the information provided by the Proponent to date or to information available from all sources including ECCC’s ongoing studies.
- provide specific and detailed advice on how the key information gaps in biofilm-shorebird ecology at Roberts Bank, as identified by ECCC, could be filled. Include advice on the appropriate application of existing information that is not currently part of the environmental assessment record for the Project.
- if new studies must be undertaken to address gaps, outline the spatial and temporal boundaries and other required parameters for such studies. Highlight what work could be undertaken in the timeframe of the environmental assessment of the Project and how the results of this work could be applied to address uncertainty in the biofilm and shorebirds assessments.”¹¹⁴³

The Review Panel therefore provided ECCC with the opportunity to comment on how information gaps in the assessment could be resolved such that its concerns would be addressed.

On April 27, 2017, ECCC responded to this information request. This response included the following statement:

“In summary, ECCC has identified a key data gap in the understanding the distribution of critical EFA-producing diatom species. An assessment of the abiotic tolerances of these species in relation to salinity and other key factors could be undertaken to address this information gap.

Studies to identify key determinants of the micro phytobenthic (diatom) community, i.e. in relation to diatom assemblages comprising biofilm (possibly due to an insufficient sample size) could be undertaken to fill this information gap.

¹¹⁴³ CEAR Doc 950, Review Panel IRs to ECCC, at Attachment, p. 1-2.

Using the information available from the EIS [specifically the geomorphological features of Roberts Bank (Brunswick Point, Canoe Passage, and Intercauseway Area)] to predict the distribution of biofilm-producing diatoms, as well as how these distributions could potentially change with the Project could be undertaken to address this information gap. Additional studies to collect geomorphological data across the Fraser River delta could determine if the Brunswick Point study area is regionally unique.”¹¹⁴⁴

ECCC concluded its response by stating:

“ECCC’s view is that many of the key information gaps identified above could be addressed with the new studies in a minimum of a 3 year timeframe.”¹¹⁴⁵

In response to these comments and ECCC’s identified data gaps, the VFPA undertook additional studies in 2016, 2017, and 2018, focusing on biofilm dynamics, including its taxonomic and energetic composition, its relationship with environmental variables, and the composition of biofilm consumed by WESA.¹¹⁴⁶

The VFPA shared its data from the 2016 study year with CWS, in accordance with the parties’ data sharing agreement.¹¹⁴⁷ The VFPA received diatom taxonomy data from CWS, but never received their biofilm fatty acid data.¹¹⁴⁸

The additional assessment work conducted by the VFPA indicated that unlike the distinction made in the EIS between freshwater and marine biofilm, a more functional description is that there is one estuarine biofilm community at Roberts Bank, and that it is exposed to variable salinities. The studies demonstrated that estuarine biofilm is abundant across the salinity gradient, is present throughout the Fraser River estuary, and is adapted to extremely variable conditions, including salinity.

These additional three years of study also demonstrated that consistently high fatty acid abundances were documented across the salinity gradient, from freshwater dominated stations by Canoe Passage, to stations with larger marine influence near the causeway.

As concluded in the *Biofilm Dynamics 2018 During the Northward Migration Report*,¹¹⁴⁹ the annual taxonomic community analyses confirmed that there is no distinct freshwater and marine biofilm, but only one estuarine biofilm community. In addition, various fatty acids

¹¹⁴⁴ CEAR Doc 960, ECCC response to Review Panel IRs, at p. 6.

¹¹⁴⁵ CEAR Doc 960, ECCC response to Review Panel IRs, at p. 8.

¹¹⁴⁶ CEAR Doc 934, VFPA response to IR8-04, Appendices IR8-04-A, IR8-04-B; CEAR Doc 1215, Biofilm Dynamics during 2017 Northward Migration; and CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹¹⁴⁷ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, p. 2716.

¹¹⁴⁸ CEAR Doc 934, VFPA response to IR8-04, Appendices IR8-04-A, IR8-04-B; CEAR Doc 1215, Biofilm Dynamics during 2017 Northward Migration; and CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

¹¹⁴⁹ CEAR Doc 1385, Biofilm Dynamics during 2018 Northward Migration.

(PUFAs, monounsaturated fatty acids, and saturated fatty acids) are found in similar proportions across the salinity gradient, and thus, fatty acids within biofilm are available to WESA across the salinity gradient.

On November 19, 2018, ECCC provided comments to the Review Panel on the VFPA's responses to Review Panel IRs. ECCC cautiously noted the following:

"Based on DFO's response to Panel DFO IR#20 the Proponent's two biofilm reports and previous scientific studies referenced above, ECCC is of the view that some degree of decrease in the quality and quantity of biofilm (i.e. a key food source for migrating Western Sandpiper) on Roberts Bank can be expected."¹¹⁵⁰

Despite the additional work conducted by the VFPA to close information gaps ECCC had identified and the conclusions reached in this additional assessment, CWS posited a new hypothesis in its April 15, 2019 written submission to the Review Panel. In that document, for the first time, CWS posited that fatty acid production in biofilm was 'triggered' or 'shocked' by a change in salinity. The VFPA has set out a fulsome response to the salinity trigger hypothesis in section 3, above.

Despite ECCC's participation in the TAG, numerous meetings with the VFPA, and identification of additional assessment work that needed to be done to close information gaps (which was undertaken by the VFPA), at no time did ECCC indicate to the VFPA this concern regarding a salinity trigger. In fact, this new hypothesis regarding a pathway for the Project's effects on biofilm was introduced one month prior to the public hearing.

It is also important to carefully examine and consider ECCC's evidence with respect to the salinity trigger. Despite indicating a confidence in the existence of a 'salinity trigger' in their written submission and some statements made at the public hearing, ECCC also made certain statements that suggested less confidence and a degree of uncertainty in its hypothesis due to a lack of supporting information. This included the following statements:

- "Freshwater influenced diatoms tend to have lower abundances of critical fatty acids and may lack the trigger for fatty acid production."¹¹⁵¹
- "We have heard this morning from the proponent that biofilm at Roberts Bank is not limiting for western sandpiper. Our view is that it may be limiting and calculations used to infer capacity were made [using untried] methodologies, arbitrary scaling factors and untested assumptions."¹¹⁵²
- "We would point out that our submission did include reference to experimental evidence around the salinity trigger. It's not from the traditional literature."¹¹⁵³

¹¹⁵⁰ CEAR Doc 1346, ECCC comments on the sufficiency of information, at p. 22.

¹¹⁵¹ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 2675-2676.

¹¹⁵² CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at pp. 2678-2679.

¹¹⁵³ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at p. 2697.

- “I’d just like to reiterate that the biological significance of even a small change in salinity is unknown, especially respecting the switch between the diatom growth and the diatom stationary phase.”¹¹⁵⁴

ECCC acknowledged that evidence for the trigger mechanism comes from experimental evidence from laboratory studies where Omega 3 and Omega 6s were manufactured for biodiesel production or nutritional value. As mentioned above, none of the studies were designed to test for a salinity trigger mechanism nor is there a reference to a ‘salinity trigger’ in any of the evidence submitted by ECCC. The concept of a salinity trigger only exists in ECCC’s submission to the Review Panel.

Finally, although it was not asked to do so, ECCC took the opportunity to use its response to Undertaking #29 to bolster all of the questions asked of it at the public hearing.¹¹⁵⁵ This was inappropriate. The purpose of the public hearing was to test the evidence and to hear ECCC’s responses to questions as they were posed. As outlined in the Review Panel’s Public Hearing Procedures:

“3.1 The objective of the Public hearing is to provide the Panel with the opportunity to gather and test the relevant information, and to enable it to conduct a thorough review of the potential environmental effects of the Project and marine shipping associated with the Project.”
[Emphasis added]

ECCC’s statements in Undertaking #29 bolstering the original questions they were asked during the public hearing cannot be tested, as there is no opportunity for the VFPA or the Review Panel to question ECCC on its responses. This approach to re-answering all of the questions through the undertaking as opposed to providing a complete answer in the public hearing suggests that ECCC was either not able, or not comfortable, in answering questions at the hearing. Accordingly, it would be appropriate to provide less weight to the ECCC’s evidence in Undertaking #29 to the extent that the answers provided were beyond what was requested by the Review Panel.

As outlined in the preceding paragraphs, it is the VFPA’s position that CWS’ history of engagement with the VFPA on the biofilm issue has been inconsistent. CWS has not been scientifically objective in its review of the VFPA studies and assessments, and has not acted professionally with respect to its assessment of the biofilm issue, only introducing its theory of a salinity ‘trigger’ just prior to the public hearings, despite ongoing engagement with the VFPA.

While environmental assessment is designed as a planning tool, the VFPA undertook a much higher than usual degree of assessment with respect to the Project’s potential effects on biofilm and WESA to better understand those potential effects. This work has advanced the

¹¹⁵⁴ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at p. 2712.

¹¹⁵⁵ CEAR Doc 1947, ECCC response to Undertaking #29, at p. 5.

science and understanding of biofilm, particularly in the Roberts Bank area. Further, this work was undertaken in consultation with CWS, and in response to its concerns.

It is in this context of the history outlined above that the VFPA asks that the Review Panel treat the evidence of CWS, that there would be a “species-level risk” to WESA as a result of the Project due to impacts to biofilm, with a high degree of caution and skepticism. Due to ECCC’s demonstrated lack of consistency on this issue, it would be inappropriate to rely fully on ECCC’s conclusions.

As mentioned earlier, the VFPA is committed to ensuring that the ecological and conservation value for shorebirds and biofilm is preserved with the Project in place. The VFPA has proposed a robust suite of mitigation measures, including the development of a biofilm manual to describe methods and techniques to create biofilm habitat and the creation of onsite mudflat habitat supporting biofilm available to foraging shorebirds. The VFPA’s view is that this suite of measures is appropriate to address the uncertainty that exists with respect to the effects predictions on biofilm and WESA. Taking into account the length of time over which the VFPA has undertaken studies with respect to this issue, and the comprehensiveness of the assessment work undertaken, the VFPA is confident in its predictions of potential effects on biofilm and WESA. Nevertheless, the VFPA has also committed to a robust Follow-up Program developed within an adaptive management approach, which will include program elements dedicated to verifying the effects predictions of WESA prey availability, specifically biofilm and benthic invertebrate and to evaluate model predictions of salinity changes in the intertidal water column,.

The VFPA remains committed to a positive working relationship with ECCC, if the Project receives approval, and will continue to engage ECCC to advise and engage them on the Project’s mitigation measures and Follow-up Program.

5. Conclusion

The VFPA recognizes the local assessment area as an internationally important migratory stopover and wintering site for shorebirds along the Pacific Flyway and considers itself a long-term steward with a responsibility for ensuring its continued health. The Project has been designed to minimize effects to shorebirds and biofilm.

The proposed terminal will be placed outside of intertidal areas where migratory WESA forage; direct impacts to shorebirds and biofilm habitat will be minimal (affecting less than 1% of biofilm in the local assessment area¹¹⁵⁶) and indirect effects to tidal currents will be minimized. The primary potential effect to shorebirds from the Project results from changes in water column salinity levels due to differing circulation patterns with the Project in place that could potentially affect one of their key prey source, biofilm. Extensive coastal geomorphic modelling predicts the Project will not change any of the fundamental physical processes (tidal currents, waves, sediment transport) that support biofilm in the upper intertidal area of the local assessment area. With the Project in place, there will be no

¹¹⁵⁶ CEAR Doc 934, IR9-05 – Coastal Birds – Residual Effects, Table IR9-05-A1

change to the residence time of water, no retention of water over the tidal flats, and no damping of tidal oscillations. The net result can best be described as a redistribution of freshwater over Roberts Bank, shifting (depending on which measure of salinity is chosen) the range and average by small amounts (2-6 psu over a tidal cycle) at some but not all locations.

Multiple years of site-specific studies have demonstrated that biofilm is highly adapted to the dynamic estuarine environment within the local assessment area. Abundant, nutritionally equivalent (i.e., fatty acid rich) biofilm has consistently been documented in both freshwater and marine dominated areas under a variety of environmental, weather, and freshet conditions. The Project is not anticipated to alter this regime.

As a long-term steward of the Fraser River estuary, the VFPA is committed to ensuring that the Roberts Bank ecosystem continues to provide highly productive shorebird foraging habitat, including biofilm with the Project in place. Understanding the concern for shorebirds and biofilm, and in addition to key mitigation measures to avoid, reduce, and offset impacts, the VFPA has committed to working with Indigenous groups, regulators, and environmental organizations to develop and implement scientifically rigorous Follow-up Program elements to 1) evaluate the effects prediction of WESA prey availability, specifically biofilm and benthic invertebrates¹¹⁵⁷ and 2) evaluate salinity predictions with the Project in place.¹¹⁵⁸ As part of the adaptive management approach, in the unlikely event that monitoring documents adverse Project-related effects to WESA prey, proven mitigation measures, including offsite biofilm habitat creation/enhancement, can be implemented to offset effects. The VFPA has a long history of successful coastal habitat restoration, rehabilitation, and creation and is confident in the success of such a measure.

In summary, all lines of evidence, including extensive site-specific studies, modelling, literature review, and regular engagement with subject matter experts indicate the Project will not adversely affect shorebird populations, including WESA, or their prey (i.e., biofilm and benthic invertebrates). It is therefore with confidence that the VFPA expects the local assessment area will continue to support shorebird populations in similar abundance, density, and diversity with the Project in place as under existing conditions.

¹¹⁵⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C14.

¹¹⁵⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C15.

CHAPTER XVI. COASTAL BIRDS

1. VFPA evidence

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2. Overview

Roberts Bank, located within the Fraser River estuary, is an important ecosystem for coastal birds, annually supporting large populations of numerous overwintering and migratory species, as well as some resident populations such as great blue heron. Indigenous groups value coastal birds for social and ceremonial purposes, and several species are hunted. Additionally, large numbers of birdwatchers are attracted to the region.

The abundant populations of coastal birds at Roberts Banks indicate numerous species are habituated to development, including activity from existing port and ferry facilities. The VFPA will engage in long-term monitoring, and apply adaptive management techniques to ensure that ecosystem and species productivity goals are achieved. Taking into account mitigation, including offsetting, the VFPA concluded that residual change in the productivity of coastal birds as a result of the Project will not be significant. The Project is also not expected to result in a measurable incremental adverse cumulative effect to coastal birds.¹¹⁵⁹

The VFPA selected seven sub-components of coastal birds based on their life history strategies and their potential to interact with the Project in analogous ways to structure the assessment: (1) shorebirds, (2) waterfowl, (3) herons, (4) diving birds, (5) raptors, (6)

¹¹⁵⁹ CEAR Doc 181, EIS, Volume 3, at s. 15.

gulls and terns, and (7) passerines.¹¹⁶⁰ Within each sub-component, the VFPA selected representative species to focus the assessment, facilitate data presentation, and interpret potential effects. Representative species were of high regulatory, conservation, scientific, or cultural importance and were informed through input from Indigenous groups, regulatory agencies, stakeholders, and the Productive Capacity TAG.¹¹⁶¹ Due to shared ecological attributes, representative species accurately assessed potential Project effects to the remaining species within each sub-component and the effectiveness of proposed mitigation.¹¹⁶²

The VFPA is confident in the conclusions of the coastal birds assessment as it relied on expert advice, applied multiple lines of evidence, and integrated conservative assumptions. The VFPA elicited input from scientific experts during the TAG process and during engagement with regulatory agencies, helping to focus the assessment on Project-related changes in productivity, and to identify species of interest and the numerous technical studies required to inform existing conditions.

The VFPA relied on multiple lines of evidence in the assessment, including a large body of site-specific data collected over the last 30 years, published literature, Project-specific modelling, and ITK. The merit of each line of evidence was examined using expert opinion and professional judgment to draw assessment conclusions. The VFPA has also drawn on its extensive experience at Roberts Bank, including, for example, the assessment of previous Roberts Bank projects like the DP3 Project, to collect and synthesize site-specific data regarding how the Roberts Bank ecosystem and coastal bird community respond to development and to ensure that the environmental assessment of the Project is robust.

Additionally, the VFPA integrated conservative assumptions into the assessment. Examples of conservatism applied include the adoption of the upper end of the estimated number of barn owl vehicle mortalities on a per kilometre basis of road from the scientific literature and site-specific studies to predict effects from the Project. A further example of conservatism is the assumption that the number of road mortalities for the remaining coastal bird species would be proportional to the increase in traffic volume (i.e., a doubling) with RBT2 in place, despite not documenting similar increases associated with the DP3 Project.

Potential Project-related effects on coastal birds, including noise and other disturbance, additional artificial light, loss of subtidal habitat for diving birds, and mortality of barn owl from vehicle collisions, can be mitigated through the implementation of proven mitigation measures, environmental management plans, and the creation of habitat.

The VFPA concluded, with mitigation in place, effects to coastal birds due to Project-related noise and other disturbance are expected to be negligible. Large bird populations have been documented using habitats at Roberts Bank adjacent to the existing industrial development

¹¹⁶⁰ CEAR Doc 181, EIS, Volume 3, at s. 15.2.1.

¹¹⁶¹ CEAR Doc 181, EIS, Volume 1, at Appendix 7.4-A.

¹¹⁶² CEAR Doc 934, VFPA response to IR9-03.

such as the Deltaport, BC Ferries, and Westshore terminals since the first terminal was constructed in the 1960s. Observations of bird distribution, abundance, and behaviour indicate that much of the bird community is likely habituated to the terminals' daily activities.

The VFPA conducted year-round surveys conducted for the DP3 Adaptive Management Strategy monitoring program and surveys in support of RBT2, and found high use by most coastal bird species within 100 m to 250 m of existing facilities.¹¹⁶³ Results from surveys during DP3 construction regularly observed coastal birds in areas adjacent to construction activities. Post-construction monitoring studies indicated that coastal bird abundance and habitat use within the inter-causeway area (adjacent to the Project) was similar to pre-construction surveys.¹¹⁶⁴ The VFPA expects that similar habituation to Project construction and operation activities will occur, particularly with the establishment of measures to reduce disturbance. For example, the VFPA will develop a Noise and Vibration Management Plan to ensure sound levels are ramped-up slowly to allow birds to habituate or temporarily leave the area during periods of loud construction noise and barriers (e.g., acoustic blankets) will be used to shield wildlife from noise that may result in injury or behavioural changes.¹¹⁶⁵

Increases in road and rail traffic associated with the Project have the potential to increase the number of coastal bird road mortalities within the local assessment area.¹¹⁶⁶ Results from site-specific studies indicated that for all species, apart from barn owls, the potential increase in avian mortalities with the Project in place was anticipated be very low (typically a fraction of 1%) compared to the size of annual populations using the local assessment area.¹¹⁶⁷ Thus, the VFPA determined that prior to mitigation, road and rail mortalities associated with the Project will have a negligible effect to the productivity of coastal bird populations, with the exception of barn owls.

Barn owls, a species designated as threatened pursuant to *SARA*, have an affinity for hunting along grassy road-side verges, which, combined with their low, slow flight behaviour, makes the species particularly vulnerable to collisions with vehicles. The VFPA has committed to a number of mitigation measures as part of the Terrestrial Vegetation and Wildlife Management Plan to both reduce the likelihood of road mortalities and offset the effects of mortality by increasing barn owl productivity. Mitigation measures include increased education and driver awareness of owl vehicle collisions along roads to influence driving habits and collaborating with transportation authorities and CWS to manage vehicle speeds within the local assessment area to decrease the potential for bird-vehicle collisions. Measures to offset barn owl mortalities include the installation of barn owl nest boxes to enhance productivity and supporting the establishment or maintenance of barn owl foraging habitat close to barn owl nest sites, such as grassland set-asides.¹¹⁶⁸ With the application of

¹¹⁶³ CEAR Doc 181, EIS, Volume 3, at s. 15.5.1, 15.7.2.1.

¹¹⁶⁴ CEAR Doc 181, EIS, Volume 3, at s. 15.7.2.1.

¹¹⁶⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitments #25, 59.

¹¹⁶⁶ CEAR Doc 181, EIS, Volume 3, at s. 15.7.2, Figure 15-1; CEAR Doc 934, VFPA response to IR9-05, at Appendix IR9-05-A.

¹¹⁶⁷ CEAR Doc 181, EIS, Volume 3, at s. 15, p. 15-53.

¹¹⁶⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #61.

mitigation, the VFPA concluded that the Project-related increase in vehicular traffic will result in a negligible adverse residual effect to the barn owl population.

To verify the effectiveness of the mitigation and the accuracy of this effect prediction, the VFPA has committed to two Follow-up Program elements.¹¹⁶⁹ The VFPA will design the RBT2 Follow-up Program within an adaptive management approach to identify and apply corrective actions if the monitoring program identifies unanticipated measurable Project effects. This provides greater confidence in environmental management, but also helps to ensure that unexpected environmental consequences are corrected in a timely fashion.

The placement of the terminal in largely subtidal waters will result in the loss of approximately 127 hectares of soft-bottom sand habitat, supporting diving bird (e.g., scoters and grebes) foraging and roosting.¹¹⁷⁰ By placing the terminal away from intertidal waters and minimizing the widening of the causeway, the VFPA has minimized effects to more productive habitats such as eelgrass. The VFPA expects that the loss of subtidal foraging habitat associated with the Project will not limit diving bird foraging opportunities given the large amount of alternate habitat within the local and regional assessment areas (approximately 1,800 hectares and 12,900 hectares, respectively).¹¹⁷¹ The VFPA will nevertheless partially mitigate effects to diving birds through the incorporation of rocky shoreline into the terminal and causeway perimeter design, the natural colonization of bivalves on terminal caissons, and the creation of onsite subtidal rocky reef, sandy gravel beach, and eelgrass habitats, providing foraging habitat for diving birds. With mitigation, the VFPA predicts that the loss of soft-bottom subtidal foraging habitat will result in a non-significant adverse residual effect to diving bird populations. Residual cumulative effects were considered negligible due to the small potential interaction with other certain and reasonably foreseeable projects and activities. The VFPA has committed to determining whether a Follow-up Program element to verify the accuracy of the effect predictions is feasible given natural inter-annual population variability, and has committed to implementing the Follow-up Program element if it is determined to be feasible following the first year of data collection, in recognition of the cultural value and importance of diving birds.¹¹⁷²

The assessment of potential effects to coastal birds also considered the effect of additional artificial light with the Project through potential for attraction, disorientation, or collision with lighting infrastructure.¹¹⁷³ These impacts are typically associated with lit infrastructure that stands out relative to an unlit environment. The existing environment at Roberts Bank is well lit to meet safety requirements with existing terminals situated within a densely populated and developed corridor where urban centres and greenhouses emit large quantities of light.¹¹⁷⁴ The light assessment concluded that, with mitigation, the Project overall will not change the general light environment. Specifically, Project-related lighting

¹¹⁶⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C16, C17.

¹¹⁷⁰ CEAR Doc 934, VFPA response to IR9-05, at Appendix IR9-05-B.

¹¹⁷¹ CEAR Doc 181, EIS, Volume 3, at s. 15.10; CEAR Doc 934, VFPA response to IR9-05, at Appendix IR9-05-A.

¹¹⁷² CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C18.

¹¹⁷³ CEAR Doc 181, EIS, Volume 3, at s. 15.7.2.1; CEAR Doc 314, VFPA response to IR #25.

¹¹⁷⁴ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 10.

will result in a minimal increase in light trespass levels causing incremental increases in sky glow; however, increases will not result in a noticeable change from existing conditions.¹¹⁷⁵

The VFPA will detail applicable mitigation measures in the Project's construction and operation Light Management Plans and will include minimizing the number of light installations, using down shielded lighting fixtures to limit light trespass, and avoiding the use of solid burning or slow pulsing warning lights known to attract birds where possible.¹¹⁷⁶ Furthermore, the VFPA has committed to evaluating the predicted changes in the light trespass and sky glow assessment as well as to monitor coastal bird strandings and collisions due to the Project's artificial lights, to verify the accuracy of the effects predictions to coastal birds.¹¹⁷⁷

The VFPA has committed to over 40 mitigation measures to avoid, reduce, or offset the potential effects of the Project on coastal birds.¹¹⁷⁸ The VFPA has also committed to nine Follow-up Program elements to verify mitigation effectiveness and the accuracy of the effects predictions related to coastal birds.¹¹⁷⁹ The VFPA is confident that the Project will not result in a significant adverse residual effect on the productivity of coastal birds. With careful Project design and effective mitigation in place, Roberts Bank will continue to support productive populations and diverse communities of coastal birds with the Project in place.

3. Key issues raised and VFPA response

(a) Mitigating barn owl collisions

ECCC and Bird Studies Canada expressed concern over the increase in barn owl-vehicle collisions with the Project in place.¹¹⁸⁰ ECCC and Bird Studies Canada stated that even with the implementation of all agreed-upon mitigation, it is highly unlikely that a 0% collision mortality rate could be reasonably achieved in the Project area.^{1181,1182} ECCC recommended that the VFPA implement additional mitigation, including installation of a physical barrier in the local and regional assessment areas, as well as the installation of nest boxes, ongoing nest box monitoring, and annual reporting to assess mitigation effectiveness and any need for adaptive management measures.¹¹⁸³

The VFPA's mitigation program for barn owls has two broad components. First, employing mitigation measures designed to reduce barn owl mortality, and second, employing

¹¹⁷⁵ CEAR Doc 181, EIS, Volume 2, at s. 9.4.8.

¹¹⁷⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #24.

¹¹⁷⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C19, C20.

¹¹⁷⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment # 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 36, 37, 38, 39, 40, 41, 43, 44, 46, 47, 49, 50, 53, 57, 58, 59, 60, 61.

¹¹⁷⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix C.

¹¹⁸⁰ CEAR Doc 1818, Transcript, Volume 11, May 27, 2019, at p. 2823; CEAR Doc 1637, ECCC written submission, at pp. 40-41; CEAR Doc 1673, Bird Studies Canada written submission, at pp. 5-6.

¹¹⁸¹ CEAR Doc 1637, ECCC written submission, at pp. 39-42.

¹¹⁸² CEAR Doc 1673, Bird Studies Canada written submission, at pp. 5-6.

¹¹⁸³ CEAR Doc 1637, ECCC written submission, at pp. 39-42.

mitigation measures designed to increase productivity in order to ensure that any Project-related mortality that does occur is sufficiently offset.

On several occasions, and again most recently in response to ECCC's recent recommendation, the VFPA examined the technical and economical feasibility of installing physical barriers as mitigation to reduce barn owl-vehicle collisions associated with the construction and operation of the Project. The VFPA considered multiple designs of potential barriers. The only option that VFPA considered partially-technically feasible is a 15-foot tall chain-link fence along the causeway, as this was the only barrier design with a sufficiently small footprint to fit within the causeway and withstand anticipated wind loads. However, while this design was technically feasible along the causeway, it was determined to be infeasible along the Deltaport Way overpass, which is an area of documented barn owl-vehicle collisions, making the overall measure partially effective.¹¹⁸⁴

The chain-linked fence also presented other challenges that limited its consideration as a viable option. The VFPA determined that installing a barrier will likely require the removal of road verge habitat considered suitable for barn owl foraging. The installation of fencing would also have an adverse effect on other valued components. For example, to increase barrier visibility to avoid avian-collisions during periods of inclement weather, barriers would need to be installed with visual obstructions such as fence slats, which would impact visual quality. Finally, the VFPA determined the economic cost of modifying the Project design to include a barrier fence was disproportionately large compared to its potential benefits, especially considering the anticipated effectiveness of other mitigation measures the VFPA has committed to implementing.¹¹⁸⁵

The VFPA supports and has committed to implementing numerous measures to mitigate Project-related effects to barn owl. As part of the Terrestrial Vegetation and Wildlife Management Plan, the VFPA has committed to collaborating with transportation authorities and the CWS to develop and implement traffic control measures.¹¹⁸⁶ Such measures include speed management within the coastal bird local assessment area and increasing driver education and awareness of owl-vehicle collisions. The VFPA also commits to installing and maintaining artificial nest structures (e.g., nest boxes) within the coastal bird regional assessment area to enhance barn owl productivity, and verifying their effectiveness to offset potential Project-related effects to barn owls through the implementation of two Follow-up Program elements.¹¹⁸⁷ Finally, the VFPA supports the establishment and maintenance of barn owl foraging habitat close to barn owl nest sites through contribution to third party programs.

The VFPA recognizes there are existing regional threats to barn owl persistence within the Lower Mainland. Primary threats identified by the BC Ministry of Environment include the

¹¹⁸⁴ CEAR Doc 388, Appendix AIR10-C – TDR TW-4.

¹¹⁸⁵ CEAR Doc 934, VFPA response to IR9-01, at pp. 3-4.

¹¹⁸⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #27.

¹¹⁸⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #61, and at Appendix C, Tables C16, C17.

loss of suitable barn owl nest sites, the loss of foraging habitat to development, and the direct loss of owls to road and rail mortalities.¹¹⁸⁸

The suite of measures committed to by the VFPA address both Project-related and these regional threats and focus resources where they will likely be most effective. Working with transportation authorities to manage speed limits is anticipated to reduce the incidence of owl-vehicle road mortalities. Supporting the establishment and maintenance of barn owl foraging habitat close to nest sites and away from high traffic roads is anticipated to increase productivity, while decreasing the likelihood of owl-vehicle collisions. This measure aligns with ECCC's comment that "preserving and increasing suitable foraging habitat will help maintain and recover the current Barn Owl population."¹¹⁸⁹ The VFPA expects that providing additional nest structures will directly increase the annual number of barn owls produced and offset potential Project-related losses due to vehicle road and rail collisions.

A core part of the VFPA's barn owl mitigation is a commitment to increase barn owl productivity through installation and monitoring of additional nest sites.¹¹⁹⁰ As barn owls almost exclusively nest in artificial structures and readily occupy new structures when properly sited, the VFPA will install five nest boxes during the first year of Project construction to mitigate potential road mortalities associated with Project-associated vehicles. Based on multiple years of productivity data collected as part of the Highway 17 South Fraser Perimeter Road Project, the VFPA expects this will annually produce twice as many owls compared to the number of owls anticipated to be affected by the Project.

The VFPA recognizes the importance of ensuring mitigation measures are sufficient to offset potential Project-related effects to the barn owl population and remains committed to ensuring effects to the barn owl population are fully mitigated. The Follow-up Program elements dedicated to barn owls will determine annual road and rail mortality rates within the local assessment area and the number of owls produced by nest boxes.^{1191, 1192} Collectively, data from both Follow-up Program elements will inform the effectiveness of the barn owl mitigation. The VFPA will develop these Follow-up Program elements within an adaptive management approach in consultation with ECCC, BC Ministry of Environment and Climate Change Strategy, City of Delta, and interested Indigenous groups.¹¹⁹³

(b) Artificial light effects on coastal birds

During the public hearing, concerns were raised on the potential effects of artificial light from RBT2 and its effects on coastal birds. During the May 16, 2019 general session, the president of the Delta Rod and Gun Club noted that increased light pollution stemming from the VFPA's existing infrastructure at Roberts Bank has affected changes in waterfowl

¹¹⁸⁸ CEAR Doc 1117, BC Ministry of Environment Recovery Plan for the Barn Owl, at pp. 11-12.

¹¹⁸⁹ CEAR Doc 1454, ECCC comments on the sufficiency of information.

¹¹⁹⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C16.

¹¹⁹¹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C16.

¹¹⁹² CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C17.

¹¹⁹³ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C17.

behaviour and the addition of RBT2 would increase light impacts.¹¹⁹⁴ On June 1, 2019, during the Tsawwassen First Nation community session, Chief Ken Baird expressed similar concerns stating current lighting has been observed to affect the behaviour of some migratory birds, which in turn can affect community members' ability to harvest ducks.¹¹⁹⁵ Further, in its submission to the Review Panel, ECCC recommended a light mitigation and monitoring plan be developed that addresses specific concerns regarding coastal birds, based on current scientific literature and best management practices.¹¹⁹⁶

As previously mentioned, the EIS assessed the effect of additional artificial light on coastal birds.¹¹⁹⁷ The VFPA recognizes that the existing environment at Roberts Bank is well lit with existing terminals situated within a densely populated and developed corridor with urban centres and greenhouses.¹¹⁹⁸ The VFPA conducted a robust light assessment that evaluated the potential change in light from 12 points of reception located between 600 m and 37 km from the proposed Project.¹¹⁹⁹

In addition to the light assessment, the VFPA also conducted site-specific studies to assess the influence of artificial light on shorebird presence at night. The studies concluded that shorebirds neither avoided nor preferred artificially lit environments.¹²⁰⁰

The VFPA has committed to a comprehensive suite of light mitigation as part of the construction and operation Light Management Plans to avoid and reduce potential effects of artificial light on coastal birds.¹²⁰¹ These measures include the following:

- Minimizing the number of light installations, controlling light levels, avoiding the use of decorative lighting, and limiting light use to only that required for safety, operation, or regulatory requirements;
- Orienting lights downward and away from residential and marine areas;
- Controlling light levels and limiting use to areas where activities are occurring;
- Avoiding the use of solid burning or slow pulsing warning lights unless required for safety, operation, or regulatory purposes;
- Using down-shielded lighting fixtures (or equivalent technology) to minimize light trespass;
- Avoiding or restricting the time of operation of exterior lights such as spotlights and floodlights that function to highlight the exterior features of buildings, including on humid, foggy, or rainy nights; and
- In relation to any on-terminal navigational lighting requirements, using the minimum amount of obstruction avoidance lighting on tall structures. This includes use of only

¹¹⁹⁴ CEAR Doc 1755, Transcript, Volume 3, May 16, 2019, at p. 712.

¹¹⁹⁵ CEAR Doc 1860, Transcript, Volume 16, June 1, 2019, at pp. 3976-3977.

¹¹⁹⁶ CEAR Doc 1637, ECCC written submission, at p. 44; CEAR Doc 1454, ECCC comments on the sufficiency of information, at p. 9.

¹¹⁹⁷ CEAR Doc 181, EIS, Volume 2, at s. 9.4, Volume 3, at s. 15.7.2.

¹¹⁹⁸ CEAR Doc 1778, VFPA oral presentation, May 27, 2019, at slide 10.

¹¹⁹⁹ CEAR Doc 181, EIS, Volume 2, at s. 9.4.

¹²⁰⁰ CEAR Doc 388, Appendix AIR10-C – TDR CB-1.

¹²⁰¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #24.

strobe lights at night, at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada.

These reflect and expand on the mitigation recommendations provided by ECCC.¹²⁰²

In summary, the light assessment concluded that, with mitigation, the Project overall will not change the general light environment. The VFPA has committed to verifying this effect prediction by implementing a Follow-up Program element that will verify the changes in light trespass and sky glow and the corresponding Environmental Light Classification Zones at select points of reception are comparable with those predicted in EIS.¹²⁰³ As noted above, the RBT2 Follow-up Program will be developed within an adaptive management approach. If the results of the monitoring program indicate a material departure from the prediction, and if evaluation/diagnosis has confirmed that the cause is Project-related, corrective management action(s) will be initiated.

The VFPA has also committed to verifying the accuracy of the effects predictions to coastal birds by monitoring coastal bird strandings and collisions due to the Project's artificial lights and lit structures associated with the terminal. The Follow-up Program will be developed in consultation with the Follow-up Program Advisory Committee, ECCC, and interested Indigenous groups.¹²⁰⁴ As noted earlier, the Project's Follow-up Program is designed within an adaptive management approach, to ensure that any unforeseen material departures in mitigation effectiveness and effects predictions are resolved.

The VFPA is confident that, with mitigation, the predicted incremental change in the light environment will not adversely affect coastal birds.

4. Conclusion

The VFPA recognizes the importance of the Fraser River estuary in supporting numerous overwintering, migrating, and resident coastal bird species and is a long-term steward helping to ensure the health of the estuary. The VFPA carefully considered the potential Project effects to coastal birds that rely on the productive ecosystem. The VFPA has committed to comprehensive and proven mitigation and offsetting measures, to avoid, reduce, and control potential impacts to coastal birds. In acknowledging the importance of the Roberts Bank ecosystem to coastal birds, the VFPA has also committed to nine Follow-up Program elements focused on coastal birds to verify the accuracy of the effect predictions and/or to determine the effectiveness of mitigation measures.

The VFPA is confident that with mitigation the Project is not expected to result in any significant adverse residual effects to coastal bird populations. This confidence is supported by a robust assessment based on extensive site-specific studies, modelling, and literature

¹²⁰² CEAR Doc 581, ECCC comments, at pp. 25-26.

¹²⁰³ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C19.

¹²⁰⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C19, C20.

review. In addition, the assessment relied on decades of bird studies at Roberts Bank and consultation with Indigenous groups and engagement with experts.

With a carefully designed Project and effective mitigation in place, Roberts Bank will continue to support productive populations and diverse communities of coastal birds, in similar abundance, density, species richness, and diversity as under existing conditions.

CHAPTER XVII. AIR QUALITY

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
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2. Appendix 9.2-A Technical Report – Air Quality Study	181
3. Section 30 – Potential Accidents or Malfunctions	181
PCU Sections	
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2. Attachment D1: Tabulated Summaries of Emissions Calculated for the EIS and PCU Air Quality Assessments	1210
MSA Sections	
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1. 2015 Port Emissions Inventory Report	1412
2. 2008 Port Metro Vancouver Land Side Air Emissions Inventory	1469
CEA Agency IRs and Response	
1. IR #19 – British Columbia and Canadian Ambient Air Quality Objectives	314
2. IR #20 – Metro Vancouver Ambient Air Quality Objectives	314
3. IR #21 – Sulphur Oxides	314
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1. IR4-02 – Vessel Traffic Projections – Vessel Size	934
2. IR6-04 – Air Quality – Modelling: NMM-WRF model runs	934
3. IR6-05 – Air Quality – Modelling: Evaluation of WRF-NMM	934
4. IR6-06 – Air Quality – CALMET Modelling	934
5. IR6-07 – Air Quality – WRF-NMM and CALMET Modelling: Wind Fields	934
6. IR6-08 – Air Quality – WRF-NMM and CALMET Modelling: Hourly Hodographs	934
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14. IR6-16 – Air Quality – Emissions Modelling, Switcher Locomotive Fleet Turnover Rates	934
15. IR6-17 – Air Quality – Emissions Modelling, Cargo Handling Equipment	934
16. IR6-18 – Air Quality – Emissions Modelling, Ships	934
17. IR6-19 – Air Quality – Shore Power	934

Documents Relevant to Topic	CEAR Doc #
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19. IR6-21 – Air Quality – Baseline and Modelling, Ozone and PM2.5	934
20. IR6-22 – Air Quality – Ozone Limiting Method	934
21. IR6-23 – Air Quality – Objectives	934
22. IR6-24 – Air Quality – Methodology, Maximum Over-water and Overland	934
23. IR6-25 – Air Quality – Emissions from Marine Shipping	934
24. IR6-26 – Air Quality – Emissions from Locomotives, Clarification	934
25. IR6-27 – Air Quality – Future Conditions	934
26. IR6-28 – Air Quality – NO ₂ Exceedances During Construction	934
27. IR6-29 – Air Quality – Contaminant Emission Reduction: Reducing Marine-source NO _x	934
28. IR6-30 – Air Quality – Contaminant Emission Reduction: On-road Vehicles	934
29. IR6-31 – Air Quality – Greenhouse Gas Emissions	934
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2. Overview

The VFPA's assessment predicts that ambient air quality in Delta, which is already some of the best in the Lower Fraser Valley, will improve in the future, both with and without the Project. This trend is a result of anticipated reductions in emissions at the three existing marine terminals at Roberts Bank (Deltaport Terminal, Westshore Terminals, and BC Ferries Tsawwassen Terminal) and other emission sources as a result of improvements in engine technologies, use of cleaner fuels, as well as regional emission reduction initiatives.¹²⁰⁵

The air quality assessment methods used in the RBT2 Air Quality Study (the **AQ Study**)¹²⁰⁶ are aligned with regulatory guidance and modelling best practice, and consistent with regulator input received during the Air Quality Scoping Study (**AQSS**) process.¹²⁰⁷ The emission inventory assumptions and the use of hypothetical worst-case emission assumptions in the dispersion modelling methodology generated predicted concentrations from the three existing marine terminals that have been shown to be conservative. The VFPA has demonstrated that model-predicted concentrations at air quality monitoring Station T39 in Tsawwassen are consistently higher than observations for the period of 2010 to 2016 and higher than observations made on TFN Lands in 2014 to 2015.¹²⁰⁸ Since the VFPA used the same inventory and modelling approaches for existing and future conditions scenarios, the VFPA anticipates that actual future levels will be lower than model-predicted concentrations.

The VFPA does not expect that air quality concentrations associated with Project construction and marine terminal operations at Roberts Bank will cause exceedances of air quality criteria for contaminants of potential concern. Through monitoring, the VFPA will evaluate air quality concentrations during Project construction and operation phases.¹²⁰⁹

3. Key issues raised and VFPA response

The key issues related to the AQ Study approach and predictions that were raised during sufficiency review and during the public hearing are discussed below.

(a) Model domain size and regional emission sources

ECCC recommended that the AQ Study include additional analysis using a larger modelling domain size coupled with the inclusion of regional emission sources to allow for a complete assessment of the Project's effects on air quality.¹²¹⁰ ECCC also provided their view on the

¹²⁰⁵ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3275.

¹²⁰⁶ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A.

¹²⁰⁷ AQSS process participants included Tsawwassen First Nation, Corporation of Delta (now the City of Delta), Environment Canada (now ECCC), Metro Vancouver, and the BC Ministry of Environment (now the BC Ministry of Environment and Climate Change Strategy (BC MOE)). In this chapter, the entity names relevant at the time are used.

¹²⁰⁸ CEAR Doc 934, VFPA response to IR6-09.

¹²⁰⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #18, 19.

¹²¹⁰ CEAR Doc 1637, ECCC written submission, at s. 3.2.; CEAR Doc 1616, Metro Vancouver written submission, at s. 2.4.4.

sensitivity analyses that were conducted by the VFPA, stating that the use of one point source in the centre of the modelled domain does not capture all possible interactions the Project may have with existing and future regional emissions sources.¹²¹¹ Metro Vancouver reiterated ECCC's concern that the AQ Study domain is "too small and does not accurately capture dispersion of pollutants and the complex movement of pollutants in this region of the airshed."¹²¹² During the topic-specific session on May 29, 2019, Metro Vancouver's slide 15¹²¹³ stated that the CALPUFF sensitivity study "did not consider concentrations outside of Local Study Area" and "sensitivity analysis demonstrated an increase in concentrations near the edge of domain."

The VFPA disagrees that additional analysis is necessary, as additional modelling on a larger domain size will not change the AQ Study conclusions. The VFPA included regional sources and captured recirculation in the AQ Study model domain. Furthermore, ECCC and Metro Vancouver have misinterpreted the purpose of the sensitivity analyses.

The 2015 British Columbia Air Quality Dispersion Modelling Guideline issued by the BC Ministry of Environment (**BC MOE**) recommends several methods to establish the domain.¹²¹⁴ The AQ Study, which used CALPUFF/CALMET models, is consistent with the following methods from that Guideline:

- a) *"As a starting point, establish the domain on the basis of the isopleth resulting from the project only case that represents 10% of the ambient air quality objective."* The AQ Study was aligned with this recommendation. The EIS states "The goal of defining the dimensions of the local study area (LSA) domain for the Project is to ensure that all air quality effects greater than 10% of the ambient air quality objectives are evaluated within its boundaries."¹²¹⁵ An internal analysis of modelled Project-only emissions for the operation phase showed that predicted concentrations of all pollutants except 1-h average NO₂ were less than 10% of ambient air quality objectives within the AQ Study model domain. The exception of 1-h average NO₂ was not a concern to the modelling team, due to the overprediction of NO₂ concentrations (see Sections 3.(c) and 3.(g) below for further explanation).¹²¹⁶
- b) *"Consider sensitive receptor areas (e.g., a hospital, recreation area or neighbourhood) or areas of interest such as nearby residents/communities where interest in the predictions may be high."* The AQ Study is consistent with this recommendation. Of the 8,642 gridded receptor locations within the local study area, the VFPA selected 18 discrete receptors for two reasons: 1) to assess populated and publicly accessed locations that could potentially be affected by changes to air quality

¹²¹¹ CEAR Doc 1637, ECCC written submission, at s. 3.2.

¹²¹² CEAR Doc 1616, Metro Vancouver written submission, at s. 2.4.4.

¹²¹³ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019.

¹²¹⁴ BC MOE, 2015 British Columbia Air Quality Dispersion Modelling Guideline, at p. 63.

¹²¹⁵ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C, p. 2.

¹²¹⁶ The internal analysis was a verification process and results were not included in the EIS; however, the process was documented in EIS Appendix 9.2-A, Appendix C, Section 2.1 and during the topic-specific session on May 29, 2019. See CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slide 17 and CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3288.

in the area surrounding the Project; and 2) to assist with the presentation and interpretation of the more than 8,600 model results for each of the parameters assessed, and especially for explaining changes in predicted air quality parameter concentrations in the future (with or without the Project) compared to existing conditions.¹²¹⁷ The VFPA selected the receptor locations as reference points to represent populated locations that could potentially experience changes to air quality due to the Project and may not necessarily represent 'sensitive' receptors.¹²¹⁸ In response to requests for the inclusion of more sensitive receptor sites, the VFPA provided predicted concentrations for a total of 70 sensitive receptor locations, the inclusion of which did not result in any changes to the AQ Study conclusions.¹²¹⁹

- c) *"Consider other emission sources that need to be included in the modelling such as sources that contribute to baseline...whether they currently exist or could be built in the future."* The AQ Study is consistent with this recommendation. The VFPA included both Project emissions in the model scenarios (except existing conditions) and all operating terminals (Westshore, Deltaport, and BC Ferries) at Roberts Bank. Emissions from these operating terminals are the key regional sources that could interact with Project sources (i.e., emissions could be cumulative under certain wind conditions). The response to IR6-12 explains that other larger sources that could be distinguished in the region will come from different wind directions and are captured in background levels at Station T39. Regarding Metro Vancouver's comment about complex movement of pollutants in this region of the airshed,¹²²⁰ the complex movement of pollutants from land-sea conditions would be monitored at Station T39. Regional sources are captured in the AQ Study with the inclusion of one of the highest background levels (98th percentile concentration) measured at Station T39 from mid-2010 to 2012.¹²²¹
- d) *"CALPUFF domain should be big enough to capture potential recirculation of pollutants."* The AQ Study is consistent with this recommendation. As requested by ECCC during the AQSS process and through the environmental assessment review process, the VFPA has undertaken validation exercises and sensitivity analyses, and each time, has shown that the models have adequately captured meteorological conditions. AQSS participants initially requested a 30 km x 30 km domain, as was used for the DP3 Project—the VFPA provided this sensitivity analysis in the EIS.¹²²² The response to IR6-11 presents the results of two additional sensitivity analyses.¹²²³ Since all domain sizes produced comparable results, the 24 km x 26 km domain adequately captures changes associated with the Project and meteorological processes (including recirculation). Contrary to ECCC's and Metro Vancouver's comments on the sensitivity analyses not capturing all possible emissions, the sensitivity analyses were not for the purposes of re-modelling all possible

¹²¹⁷ CEAR Doc 934, VFPA responses to IR6-14, IR6-24, IR13-02.

¹²¹⁸ CEAR Doc 181, EIS, Volume 2, at s. 9.2.5.4.

¹²¹⁹ CEAR Doc 934, VFPA responses to IR13-02, IR14-03.

¹²²⁰ CEAR Doc 1616, Metro Vancouver written submission, at s. 2.4.4.

¹²²¹ CEAR Doc 934, VFPA response to IR6-12.

¹²²² CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C, Attachment 1.

¹²²³ CEAR Doc 934, VFPA response to IR6-11.

interactions of the Project with other existing and reasonably foreseeable sources. Regarding Metro Vancouver's statements with respect to increases in concentrations near the edge of the domain,¹²²⁴ the VFPA's air quality technical lead, Mr. Bohdan Hrebenyk, clarified that the noted increase based on a darker colour near the southern edge of the domain is clearly an edge effect of the modelling, as confirmed by the sensitivity analysis using larger domains in which that effect disappears.¹²²⁵

The 2015 British Columbia Air Quality Dispersion Modelling Guideline also states the following:

"the model domain will generally be greater for tall stacks with buoyant emissions where a domain of 50 by 50 km centred on the stack may be required due to the large area affected by the emissions. For shorter stacks, a smaller domain may be appropriate (e.g., 10 km by 10 km)."¹²²⁶

The RBT2 emission sources consist of short stacks on ships whose emissions are affected by the vessel cargo and superstructure and result in highest predicted concentrations close to the berths, and volume sources for road, rail, and cargo handling equipment, which are dispersed close to the ground.¹²²⁷ Therefore, based on the BC dispersion modelling guidelines, the use of a 50 km x 50 km modelling domain is considered to be inappropriate for the purpose of evaluating emissions from RBT2 and nearby marine terminals.

Based on both 2008 and 2015 guidance from the BC MOE for dispersion modelling and the results of sensitivity analyses, the VFPA is confident that the AQ Study modelling domain adequately captures meteorological conditions, the most relevant regional sources, changes in emissions, and anticipated air quality associated with the Project.

(b) Meteorological modelling

During the topic-specific session on May 29, 2019, Metro Vancouver raised concerns pertaining to meteorological modelling undertaken for the AQ Study, including the use of 2010 as a representative year and the inclusion of meteorological data from Metro Vancouver air quality monitoring network stations.¹²²⁸

The VFPA discussed its approach to modelling meteorological conditions during the first AQSS meeting on February 13, 2013 and ECCC recommended that the assessment be completed using "a representative year with a warmer summer for meteorology data."¹²²⁹ The VFPA also selected 2010 because it had the highest frequency of atmospheric calms

¹²²⁴ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019, at slide 15.

¹²²⁵ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3423-3424.

¹²²⁶ BC MOE, 2015 British Columbia Air Quality Dispersion Modelling Guideline, at p. 63.

¹²²⁷ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C, s. 3.4; CEAR Doc 934, VFPA response to IR6-12.

¹²²⁸ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019, at slide 13; CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3389-3390.

¹²²⁹ CEAR Doc 934, VFPA responses to IR6-04, IR6-10.

based on a comparison of five years (2008-2012) of meteorological data at the Vancouver International Airport station. The comparison showed that there was little difference in wind speed and direction between the five years.¹²³⁰ Given the similarity between all five years in terms of wind speed and direction, the use of more than one year is unlikely to result in major differences in maximum predicted concentrations. The meteorological model (WRF-NMM) results presented in the EIS provide a reasonably accurate measure of the atmospheric state throughout the modelling domain for input to the air quality dispersion modelling.¹²³¹ The use of conservative assumptions in hypothetical worst-case emission scenarios had a far greater effect on predicted concentrations of contaminants of potential concern than variability in year-to-year meteorology.

With respect to the use of meteorological data from Metro Vancouver monitoring stations, the stations in Tsawwassen and Richmond South were established for the purpose of monitoring air quality and do not meet World Meteorological Organization anemometer siting requirements.¹²³² The stations used for WRF-NMM model validation conform to the siting guidelines.¹²³³ ECCC acknowledged that there are “challenges with the wind data due to local features at the T39 site, and this is common at several other locations in the Metro Vancouver air quality monitoring network.”¹²³⁴

During the public hearing, Ms. Pamela O’Hara pointed out that the WRF-NMM model was applied over a large domain that extends more than 800 kilometres east and west and 670 kilometres north to south, and that the VFPA selected the model domain in order to capture the large-scale meteorological characteristics in the region.¹²³⁵ Ms. O’Hara also indicated that a fine horizontal model resolution (i.e., grid spacing) of 2 km was used over this model domain, even though the 2015 British Columbia Air Quality Dispersion Modelling Guideline states that typical grid resolutions are 4 km, and that the testing of the model to determine whether it produced realistic meteorological fields was also conducted in accordance with the assessment measures outlined in the 2015 British Columbia Air Quality Dispersion Modelling Guideline.¹²³⁶ Ms. O’Hara reiterated that the “fine horizontal model resolution was applied in order to better resolve realistic mesoscale meteorological features within the project study area.”¹²³⁷ This statement is applicable to both the WRF-NMM model resolution of 2 km and the CALMET model horizontal resolution of 100 m.

The VFPA is confident that 2010 meteorology used in air dispersion modelling is representative of meteorological conditions in the local study area. The VFPA has shown that meteorological variation at space and time scales appropriate for the modelling of plume dispersion from the Project has been adequately captured based on the following:

¹²³⁰ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Figure 2-6 in Appendix C.

¹²³¹ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Figure 2-6 in Appendix C; CEAR Doc 934, VFPA response to IR6-05.

¹²³² CEAR Doc 934, VFPA response to IR6-05.

¹²³³ CEAR Doc 934, VFPA response to IR6-05.

¹²³⁴ CEAR Doc 1969, ECCC response to Undertaking #41.

¹²³⁵ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3419. See also CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C, Figure 2-1.

¹²³⁶ BC MOE, 2015 British Columbia Air Quality Dispersion Modelling Guideline, at pp. 50-51.

¹²³⁷ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3419.

- The VFPA validated meteorological model outputs from both WRF-NMM and CALMET in accordance with BC guidance;¹²³⁸
- The VFPA compared WRF-NMM model outputs to observational data from the meteorological stations at the Vancouver International Airport, Sand Heads Climate Station, and Abbotsford Airport;¹²³⁹
- The VFPA demonstrated that hourly hodographs of wind direction showed that the CALMET modelled winds did capture the effects of sea breeze within the model domain;¹²⁴⁰
- The VFPA statistically compared model results based on 2010 meteorology with 30-year climate normal data, and the comparisons indicated that the WRF-NMM modelled winds had a higher frequency of westerly winds than the climate normal data, resulting in a higher frequency of emissions from marine sources being transported towards land in Delta;¹²⁴¹ and
- The VFPA conducted additional validation using aircraft-measured profiles of wind speed and direction and surface temperatures from a Fraser River buoy in response to EIS Guidelines requirements and based on input from Environment Canada during the AQSS process.¹²⁴²

(c) Air Quality dispersion modelling approach

Metro Vancouver and ECCC raised several issues with respect to the VFPA's approach used in dispersion modelling for the AQ Study. Specifically, Metro Vancouver stated that the "assessment did not conduct cumulative modelling,"¹²⁴³ and that the "assessment did not follow key recommended practices when conducting dispersion modelling, multiple steps in the process which require expert assessment and judgement, and modelling is an iterative process."¹²⁴⁴

With respect to cumulative modelling, the statement by Metro Vancouver is incorrect. The VFPA included all existing operating terminals at Roberts Bank in existing, expected, and future modelling scenarios (modelled levels were based on worst-case emission scenarios), and background concentrations representing all other emission sources that were not modelled were added to the predicted concentrations. The VFPA conservatively based background concentrations on the 98th percentile of observed contaminant concentrations at Station T39, as was recommended by representatives of Metro Vancouver, Environment Canada, and the BC MOE during the AQSS process.¹²⁴⁵ Station T39 was explicitly established in 2010 to monitor air quality in relation to the operation of the marine

¹²³⁸ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C presents validation results, and is supported by additional information provided in CEAR Doc 934, VFPA responses to IR6-04 (including Appendix IR6-04-A for a summary of discussions with Environment Canada on this topic) and IR6-05.

¹²³⁹ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C presents validation results; CEAR Doc 934, VFPA responses to IR6-04, IR6-05.

¹²⁴⁰ CEAR Doc 934, VFPA response to IR6-08.

¹²⁴¹ CEAR Doc 934, VFPA response to IR6-04.

¹²⁴² CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C Attachments 2, 3.

¹²⁴³ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019, at slide 9.

¹²⁴⁴ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019, at slide 12.

¹²⁴⁵ CEAR Doc 934, VFPA response to IR6-04, at Appendix IR6-04-A.

terminals at Roberts Bank, and is used by regulators to demonstrate attainment of the Canadian Ambient Air Quality Standards (CAAQS).¹²⁴⁶ Since the VFPA added background concentrations to predicted concentrations from marine terminal emissions, the VFPA double-counted emissions from these terminals in the total concentrations. Predicted concentrations for the existing conditions scenario were higher than observations, which illustrates the conservative and cumulative nature of the emissions scenarios and modelling of those scenarios. For example, monitoring data at Station T39 for the period of 2010-2016 shows lower 1-h NO₂ concentrations than model predicted concentrations for existing conditions.¹²⁴⁷ Ms. O'Hara explained that 1) predictions for existing conditions overestimate concentrations by a factor of approximately two and that these concentrations are primarily attributed to emissions from existing terminals; and 2) the VFPA predicts that the relative contribution from RBT2 will be relatively small (i.e., less than 1 µg/m³ for 24-hour average PM_{2.5} and 5 µg/m³ for 1-hour average NO₂) in comparison to the other emission sources.¹²⁴⁸

The VFPA conducted the AQ Study in accordance with standard practices for air dispersion modelling and the 2008 and 2015 BC air dispersion modelling guidelines. The VFPA established the AQSS process prior to undertaking the AQ Study. The study approach (including aspects such as the selection of model grid resolution and background air quality data, and conversion method to predicted ambient NO₂ concentrations) was reviewed by participants including representatives from TFN, the Corporation of Delta, Environment Canada, Metro Vancouver, and the BC MOE. The VFPA incorporated feedback from these participants over the course of and after completion of the AQ Study (February 13, 2013 to December 10, 2015). Metro Vancouver participated in the process and its feedback on the draft study approach and protocol is summarized in Appendix IR6-04-A of the VFPA's response to IR6-04.¹²⁴⁹

ECCC questioned whether future emissions from ships underway in the Strait of Georgia would be captured in background concentrations at Station T39.¹²⁵⁰ The VFPA has shown that emissions from ships and large sources (up to 30 km from Station T39) can be detected in ambient monitoring in Tsawwassen at Station T39. The VFPA's scatter plots illustrated that ship emissions from existing vessel traffic (i.e., 2.6 vessel movements per hour) are captured in monitoring data at Station T39 for winds blowing from 260° to 340° as well as from ships transiting in the Strait of Georgia for winds blowing from 166° to 259°.¹²⁵¹ Since almost 90% of the vessel traffic is included in background levels,¹²⁵² adding modelled emissions ships for ships in transit would double count emissions. Furthermore, in 2004, prior to the establishment of Station T39, Metro Vancouver conducted temporary monitoring at Delta Hospital and showed spikes in air contaminants from the Tilbury cement

¹²⁴⁶ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3277.

¹²⁴⁷ CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slides 11-13.

¹²⁴⁸ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3285-3287.

¹²⁴⁹ CEAR Doc 934, VFPA response to IR6-04, at Appendix IR6-04-A.

¹²⁵⁰ CEAR Doc 1795, ECCC oral presentation, May 29, 2019, at slide 8.

¹²⁵¹ CEAR Doc 934, VFPA response to IR6-12.

¹²⁵² The traffic levels in 2012 represent about 2.6 vessel movements/hour and in the 2025 are expected to be 2.9 vessel movements/hour (2.6/2.9 = 90%).

plant with easterly winds, and oil refineries at Cherry Point with southerly winds.¹²⁵³ The conclusions of this study support the VFPA's position that monitoring stations in the local area (either temporary or Station T39) will capture ship and other large sources of emissions in the region.

ECCC also stated that "Modelling of more than one year would allow for a comprehensive assessment of the Project's effects on air quality"¹²⁵⁴ and that "in the context of environmental assessment, the goal of air modelling is to produce accurate predictions of existing and future ambient concentrations."¹²⁵⁵ As outlined in the VFPA's presentation, the goal of dispersion modelling for environmental assessment is to ensure that predicted concentrations are not under-predicted, as well as to determine the change in concentration due to the sources modelled.¹²⁵⁶

The VFPA disagrees with ECCC's recommendation that modelling of more than one year would allow for a comprehensive assessment of the Project's effects on air quality. Additional modelling would simply reproduce similar results to those already derived from the analysis completed and would not change the AQ Study conclusions.

As stated above, predicted concentrations are not underestimated, as shown by comparisons between measured and model-predicted concentrations for existing conditions. For example for 1-hour NO₂, as illustrated in the VFPA's air quality presentation, the maximum measured 1-hour NO₂ concentration at Station T39 was 78.0 µg/m³, while the predicted maximum 1-hour average NO₂ concentration at receptor location Station T39 (including background) was 163.3 µg/m³, more than double the actual maximum measured concentration.¹²⁵⁷ Using the same approaches for the emission inventories and modelling as for existing conditions, the VFPA's predictions for expected conditions and future conditions with RBT2 are also highly conservative.¹²⁵⁸ Even with highly conservative assumptions, the incremental maximum 1-hour average NO₂ concentration at Station T39 due to maximum hourly emissions from the Project amounts to only 5.0 µg/m³ (of the total predicted concentration of 150.6 µg/m³).

The VFPA and AQSS process participants expected predicted concentrations to be higher than measured concentrations because the AQ Study intentionally incorporated highly conservative, hypothetical assumptions about terminal operations and associated emissions (to ensure that the air quality concentrations predicted by the modelling analysis were not under-predicted). The VFPA has provided additional details on the specific conservative assumptions incorporated in the AQ Study in the EIS and these are summarized in the VFPA's response to IR6-15 for the maximum worst-case 1-hour emission scenario.¹²⁵⁹ These

¹²⁵³ CEAR Doc 934, VFPA response to IR6-12.

¹²⁵⁴ CEAR Doc 1795, ECCC oral presentation, May 29, 2019, at slide 19.

¹²⁵⁵ CEAR Doc 1637, ECCC written submission, at s. 3.3.

¹²⁵⁶ CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slide 9.

¹²⁵⁷ CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slides 10-11.

¹²⁵⁸ CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slides 12-13.

¹²⁵⁹ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix A, Attachment 1-11; CEAR Doc 934, VFPA response IR6-15.

conservative assumptions for Project-related emissions are additional to the conservative assumptions built into the dispersion model itself.

Based on the results of the AQ Study, the VFPA has achieved the dispersion modelling goals of ensuring that predicted concentrations are not under-predicted and determining the change in concentration due to the sources modelled.

(d) Model bias

ECCC raised issues with respect to modelling uncertainty and bias, including the need to use time-matched comparisons for observed and predicted concentrations, and to use a minimum of one year of meteorological data for dispersion modelling analysis.

(i) Time-matched comparisons

In its presentation and written submission, ECCC recommended that the VFPA apply a more rigorous statistical approach using time-matched values of observed and modelled concentrations of NO₂.¹²⁶⁰

In response, the VFPA presented Exhibit 29, entitled "Modelling Uncertainty and Bias," which outlined that the BC MOE air dispersion modelling guidelines (2008 and 2015) do not support ECCC's recommendation and specifically state the following:

"The models are reasonably reliable in estimating the magnitude of highest concentrations occurring sometime, somewhere in the area."

"Estimates of concentrations that occur at a specific time and site are poorly correlated with actual observed concentrations (paired in space and time) and are much less reliable."¹²⁶¹

ECCC provided an analysis of Exhibit 29 and acknowledged "that using time-matched pairs of concentrations has some limitations" but insisted that for the assessment of model bias "time-matched pairs are relevant" and "are important to assess recirculation phases of the sea/land breezes."¹²⁶²

The VFPA reaffirms it has adopted a standard method for estimating model bias and fractional bias.¹²⁶³ Instead of comparisons between predicted and observed concentrations paired in time and space, evaluations of model bias in applied dispersion modelling studies typically make comparisons between the highest set of predicted contaminant concentrations to the highest set of observations at a location, regardless of when those

¹²⁶⁰ CEAR Doc 1637, ECCC written submission, at s. 3.3; CEAR Doc 1795, ECCC oral presentation, May 29, 2019, at slide 19.

¹²⁶¹ CEAR Doc 1845, Exhibit 29 from the VFPA, at p. 2.

¹²⁶² CEAR Doc 1969, ECCC response to Undertaking #41, at p. 1.

¹²⁶³ CEAR Doc 934, VFPA response to IR14-03.

occurred during the monitoring/modelling period being evaluated. The evaluation method used in the response to IR14-03 continues to be cited in the most recent version of the US Environmental Protection Agency's regulatory air dispersion modelling guideline (Appendix W 2017).¹²⁶⁴

Further, ECCC stated that "Observed values of concentrations need to be compared with modelled values derived from modelling runs using the same meteorology to avoid confounding effects."¹²⁶⁵ An understanding of how regulatory dispersion models are designed and the results that they can be expected to produce is important context for this issue. The inability of dispersion models to replicate observations at a specific time and space has been recognized for over thirty years.¹²⁶⁶ The 2008 and 2015 BC air dispersion modelling guidelines outline that models are reasonably reliable in estimating the magnitude of highest concentrations occurring sometime and that estimates of concentrations that occur at a specific time and site are poorly correlated with actual observed concentrations.¹²⁶⁷ ECCC has not provided a measure of model performance that it would consider to be appropriate in any such comparison of predicted and observed contaminant concentrations.

In response to ECCC's concerns about the statistical method used for evaluating the RBT2 modelling results,¹²⁶⁸ the VFPA also presented Q-Q plots in Exhibit 29 for all predicted 1-hour average NO₂ concentrations against all observed 1-hour average NO₂ concentrations at Station T39.¹²⁶⁹ The Q-Q plots illustrated that the AQ Study modelling results consistently overpredicted observations by a factor of two for winds blowing from the direction of the Roberts Bank marine terminals. The VFPA is confident that the modelling results presented in the AQ Study are conservative and appropriate, and maintains that the model bias and fractional bias analyses presented in response to ECCC's concerns were completed using methods recognized and accepted in modelling guidelines issued by the US Environmental Protection Agency and are in accordance with the 2008 and 2015 BC air dispersion modelling guidelines.

(ii) Length of modelling period

ECCC stated the following:

"The biases that are calculated between the modelled year 2010 and the five years of monitoring data (2011-2015) are subject to several confounding factors... and are therefore not valid. To compare model results to the years 2011-2015 of

¹²⁶⁴ As outlined in the VFPA's response to IR6-20 (CEAR Doc 934), the BC Air Quality Dispersion Modelling Guideline limits the dispersion model possibilities to those endorsed by the US Environmental Protection Agency, since ECCC does not develop and support models of this type. US Environmental Protection Agency's 2017 Appendix W Final Rule was previously referenced in VFPA's responses to IR6-07, IR6-10, IR6-20, and IR6-22.

¹²⁶⁵ CEAR Doc 1637, ECCC written submission.

¹²⁶⁶ CEAR Doc 1845, Exhibit 29 from the VFPA, at p. 2.

¹²⁶⁷ CEAR Doc 1845, Exhibit 29 from the VFPA, at p. 2.

¹²⁶⁸ CEAR Doc 1637, ECCC written submission, at s. 3.3.

¹²⁶⁹ CEAR Doc 1845, Exhibit 29 from the VFPA, at pp. 3-4.

monitoring data, the Proponent should conduct modelling for those particular years.”¹²⁷⁰

Subsequently, in its response to Undertaking #41, ECCC recommended that “at the very least, the analysis should be performed for a full 12-month contiguous period” to permit a comprehensive determination of model bias.¹²⁷¹

The VFPA disagrees with both recommendations (i.e., to model for five-year and one-year periods), for the reasons outlined above in Section 3.(b) above and those provided below.

The observed NO₂ concentrations at Station T39 in the years 2011-2015 were not exceptionally different to those measured in 2010.¹²⁷² For example, the 98th percentile 1-hour average NO₂ concentration in the period 2013-2015 was only 0.4 µg/m³ higher than in the preceding period 2010-2012. If using the same unvarying, hypothetically worst-case emission rates that were used for the EIS modelling for any of the years 2011-2015, compared to those already presented for 2010, predicted NO₂ concentrations would not be substantially different. The factor of two difference between predicted and observed 1-hour average NO₂ concentrations, presented in the EIS and IR responses and illustrated in the Q-Q plots,¹²⁷³ will not resolve to closer agreement through the inclusion of more data from other years because the modelling analysis is based on the use of conservative estimates of NO_x emission rates at the marine terminals, in conjunction with the use of a conservative method (i.e., Ozone Limiting Method (**OLM**)) to estimate NO₂ concentrations from modelled NO_x concentrations. The overprediction of NO₂ presented in the EIS is consistent with the factor 1.7 to 2.0 overprediction reported in validation studies (refer to Section 3.(g) below for more information).

ECCC also suggested that the VFPA compare temperatures at inland stations to evaluate the CALPUFF model’s ability to address sea breeze phenomena.¹²⁷⁴ The VFPA confirms that it has already compared inland temperatures; specifically, the VFPA undertook the following comparisons as required by the EIS Guidelines and based on further input from Environment Canada:

- Attachment 2:¹²⁷⁵ The VFPA compared Aircraft Communications Addressing and Reporting System data provided by Environment Canada to WRF-NMM derived vertical profiles of temperature, wind speed and wind direction at the Vancouver International Airport for 2010. The comparisons showed that any differences were either explainable (such as in a sub-optimal meteorological station location), expected to have minimal impact on the final conclusions (minor temperature differences), or are minor relative to other uncertainties in the full assessment; and

¹²⁷⁰ CEAR Doc 1637, ECCC written submission.

¹²⁷¹ CEAR Doc 1969, ECCC response to Undertaking #41.

¹²⁷² CEAR Doc 934, VFPA’s response to IR6-09.

¹²⁷³ CEAR Doc 1845, Exhibit 29 from the VFPA.

¹²⁷⁴ CEAR Doc 1969, ECCC response to Undertaking #41.

¹²⁷⁵ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C.

- Attachment 3:¹²⁷⁶ The VFPA compared Fraser River Buoy observed air temperatures with CALMET air temperatures. The comparisons showed that the CALMET data adequately reflects the variability of the Fraser River Buoy surface air temperatures, and any differences in the data can be considered marginal.

In addition, the VFPA has already addressed the issue of sea breeze effects in the response to IR6-08, which concluded that diurnal variation in onshore/offshore wind flows has been appropriately captured by the CALMET model.¹²⁷⁷

Therefore, the VFPA disagrees with ECCC's recommendations for conducting further comparisons or additional modelling coinciding with a longer period of monitoring data.

(e) Background air quality used in air quality study

ECCC recommended that "data from monitoring station T17 [Richmond South] should also be included in calculating baseline conditions",¹²⁷⁸ and Metro Vancouver remarked that the AQ Study "only included a single Metro Vancouver station when developing the background concentrations."¹²⁷⁹

The use of the Richmond South station would artificially inflate background levels.¹²⁸⁰ The fact that Station T39 measures some of the lowest ambient concentrations in the region does not mean that it is not representative of the local receiving environment; Station T39 is used by regulators to demonstrate attainment of the CAAQS.¹²⁸¹ Station T39 was specifically established in 2010 after the environmental assessment for the DP3 Project.¹²⁸² The station was established to assess air quality near Deltaport, marine activities, and other sources, and to help fill a gap in the monitoring network in the southwest part of the region.¹²⁸³ The VFPA provides funding for the operation and maintenance of the station. Neither Metro Vancouver nor the BC MOE have indicated that air quality monitoring at Station T39 is not representative, and these regulators, as well as Environment Canada, supported the use of this station for representative background, as outlined below.

In 2013, AQSS participants supported the VFPA's use of 98th percentile background concentrations from Station T39 measured over the 2010 to 2012 period to incorporate non-modelled emission sources (both primary and secondary pollutants) in the total predicted concentrations.¹²⁸⁴ A 2014-2015 study on TFN Lands concluded that Station T39 is

¹²⁷⁶ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix C.

¹²⁷⁷ CEAR Doc 934, VFPA response to IR6-08.

¹²⁷⁸ CEAR Doc 1795, ECCC oral presentation, May 29, 2019, at slide 8.

¹²⁷⁹ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019, at slide 9.

¹²⁸⁰ CEAR Doc 934, VFPA response to IR6-05.

¹²⁸¹ Levels are typically below regional, provincial, and national air quality objectives for all parameters at Station T39.

¹²⁸² CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slide 5.

¹²⁸³ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3311.

¹²⁸⁴ See CEAR Doc 934, VFPA response to IR6-04, at Table IR6-04-1 and CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3280.

representative of air quality levels for CO, NO₂, SO₂, O₃, and PM_{2.5} in overland areas at Roberts Bank and on TFN Lands.¹²⁸⁵

During the public hearing, Mr. Hrebenyk discussed the history of the T39 station. The environmental assessment and modelling conducted for the DP3 Project prior to 2006 used data from the Richmond South station as representative of background concentrations in the area. The use of that data from Richmond South artificially inflated the background levels used in the air dispersion modelling analysis conducted for the DP3 Project and led, in part, to the overprediction of air quality changes due to the DP3 Project. Subsequent to that assessment, Station T39 was established in consultation with Metro Vancouver and Environment Canada (amongst others) as an appropriate site for monitoring air quality in the Tsawwassen area.¹²⁸⁶

Mr. Hrebenyk reiterated that the Richmond South station is not representative as it is located in a residential area with a much greater density of residences and automobile traffic; therefore, this station consistently records higher concentrations of NO₂ and CO, but lower concentrations of SO₂ because it is further from the shipping lanes.¹²⁸⁷ Hourly averaged NO₂ concentrations observed at the Richmond South station are typically about 19% to 22% higher than at Station T39.¹²⁸⁸ With respect to SO₂ concentrations, the VFPA's response to IR6-37 explains that SO₂ monitoring data at Station T39 over the period of 2010-2016 has shown that ambient levels of SO₂ have declined with the introduction of the North America Emission Control Area requirements for lower sulphur in marine fuel, which is a clear indication that Station T39 provides a good measure of changes in emissions from ships operating in the Strait of Georgia and at Roberts Bank.

(f) Air quality criteria

Metro Vancouver stated that the assessment did not consider appropriate future air quality objectives, including the 2020 and 2025 CAAQS¹²⁸⁹ and that it is its "view that AQOs [air quality objectives] should be applied uniformly across the entire domain, to ensure that any potential error in spatial prediction is captured."¹²⁹⁰ In contrast, ECCC recommended modelling results be compared to the most stringent federal, provincial, or territorial air quality objectives applicable to the given area.¹²⁹¹

To provide the most conservative assessment, and in accordance with ECCC's recommendation, the VFPA compared the AQ Study results to the most stringent standards currently available from federal, provincial, Metro Vancouver, and US agencies, where

¹²⁸⁵ CEAR Doc 934, VFPA response to IR6-09, including Appendix IR6-09-A.

¹²⁸⁶ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3318-3321.

¹²⁸⁷ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3319.

¹²⁸⁸ CEAR Doc 934, VFPA response to IR6-21.

¹²⁸⁹ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019.

¹²⁹⁰ CEAR Doc 1616, Metro Vancouver written submission, at p. 7.

¹²⁹¹ CEAR Doc 1637, ECCC written submission, at p. 14.

applicable.¹²⁹² The VFPA subsequently updated these comparisons based on updated criteria.¹²⁹³

Some regulatory agencies did not consider the explanatory notes provided under Figures IR6-24-08,¹²⁹⁴ IR6-24-09, and IR6-24-11 (as examples) when interpreting the results for the existing conditions scenario. ECCC, for example, stated the VFPA's "predictions of SO₂ for the existing conditions are above the CAAQS, however the future case for SO₂ is predicted to be below the CAAQS."¹²⁹⁵ The SO₂ CAAQS, updated in 2016, are applicable to 2020 and 2025 and, therefore, do not apply to existing conditions in 2010. Health Canada errantly stated that "Measured levels of NO₂ already indicated the potential for occasional exceedances of the CAAQS (IR6-09, CEAR #1113)."¹²⁹⁶ The existing levels (2010) of NO₂ do not exceed applicable criteria, because, as shown in Table IR6-09-1, the maximum measured concentrations for the period of 2013 to 2015 was 84.8 µg/m³, which would not exceed 2020 standard (113 µg/m³), even if it was applicable.

(g) Interpretation of nitrogen dioxide predicted concentrations

During the May 29, 2019 topic-specific session, Metro Vancouver, ECCC, and Health Canada expressed concerns that NO₂ predicted concentrations exceed current and known future criteria.¹²⁹⁷

These regulatory agencies did not acknowledge or consider that comparisons of predicted-to-measured levels show that predictions are higher or that NO₂ concentrations predicted using all NO_x-to-NO₂ conversion methods are known to result in conservative estimates of NO₂ concentrations, as recommended in the 2008 and 2015 BC dispersion modelling guidelines (i.e., OLM, Ambient Ratio Method (**ARM**), Plume Volume Molar Ratio Method).¹²⁹⁸ The VFPA submits that these conversion methods are conservative screening-level methods because they do not employ all of the atmospheric chemical and mechanical processes that are important to estimating the evolution of the atmospheric NO₂/NO_x ratio. The VFPA has been clear that these methods are designed to produce predicted NO₂ concentrations that

¹²⁹² CEAR Doc 181, EIS, Volume 2, at Table 9.2-4.

¹²⁹³ CEAR Doc 934, VFPA responses to IR6-23, IR6-24, IR14-03. The VFPA acknowledges that Metro Vancouver has suggested that Metro Vancouver's bylaws may apply to the VFPA. The VFPA works collaboratively on many air quality initiatives with Metro Vancouver, and in comparing its AQ Study results to the most stringent of current or known future standards has demonstrated that RBT2 emissions would comply with Metro Vancouver's bylaws, if those bylaws did apply to Port of Vancouver operations. However, as Mr. Jennejohn for Metro Vancouver acknowledged, Port of Vancouver container terminals have not been issued any air emissions permits by Metro Vancouver. CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3414-3415.

¹²⁹⁴ As an example, Figure IR6-24-08, which provides isopleth plots for maximum 1-hour SO₂ concentrations over land states, "for comparison purposes, the 2016 CAAQS (170 µg/m³) applicable to future conditions (2025) has also been applied to existing conditions (2010). The area of exceedance shown for existing conditions, therefore, is not an accurate spatial representation of the area exceeding the objective applicable in 2010 (450 µg/m³)."

¹²⁹⁵ CEAR Doc 1637, ECCC written submission, at p. 16.

¹²⁹⁶ CEAR Doc 1782, Health Canada oral presentation, May 29, 2019, at slide 9.

¹²⁹⁷ CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019, at slide 16; CEAR Doc 1795, ECCC oral presentation, May 29, 2019, at slide 6; CEAR Doc 1782, Health Canada oral presentation, May 29, 2019, at slides 9-11.

¹²⁹⁸ In validation studies, the conversion methods have all been shown to overestimate observed NO₂ concentrations by a factor of 1.7-2.0.

are higher than would normally be observed to ensure that maximum predicted NO₂ concentrations are not underestimated in regulatory applications.¹²⁹⁹

The VFPA has repeatedly explained that NO₂ concentrations using the OLM are overpredicted for all scenarios (existing and future conditions) based on comparisons of measured and predicted concentrations at Station T39.¹³⁰⁰ The VFPA also explained that RBT2 emissions contribute little to those predictions (in its presentation during the May 29, 2019 topic-specific session).¹³⁰¹

During the topic-specific session, Metro Vancouver stated “it’s our view the ambient ratio method is more realistic way to assess the conversion in the atmosphere than the ozone limiting method” and that it would like to “see the ARM method applied, and that’s really for consistency across projects.”¹³⁰² Ms. O’Hara clarified that, although Metro Vancouver stated the preferred method for areas with good air quality data is ARM,¹³⁰³ the BC Guidelines do not specify a preference in methods and the VFPA used the method recommended by AQSS participants, including Metro Vancouver.¹³⁰⁴ Although the VFPA expressed concern to AQSS participants about the conservative nature of the methods (including OLM and ARM) recommended in the 2008 BC Guidelines for estimating NO₂ concentrations, the participants did not accept that an alternative method (i.e., the Janssen method), which had been shown in an internal test-case modelling exercise in 2012, to predict NO₂ concentrations in better agreement with observations at Station T39.¹³⁰⁵ Use of the OLM, nevertheless, was favoured over the use of the Janssen method by AQSS participants. The VFPA therefore used the OLM method in the AQ Study.¹³⁰⁶

As Mr. Hrebenyk stated during the public hearing, the available methods for estimating NO₂ concentrations using OLM, ARM, or even Plume Volume Molar Ratio Method, are too crude to provide meaningfully accurate results, especially in relation to the new, more stringent 1-hour average NO₂ CAAQS.¹³⁰⁷ Whereas the use of these highly conservative NO_x-to-NO₂ conversion methods was perhaps appropriate when the ambient air quality objective was 400 µg/m³, the use of such conservative methods for estimating NO₂ in relation to a future CAAQS level of 79 µg/m³ cannot provide results that are accurate enough to determine whether or not the standard will be exceeded, especially when the defined background

¹²⁹⁹ As explained in the response to IR6-22 (CEAR Doc 934), with respect to NO_x conversion, the use of OLM to estimate NO₂ concentrations resulted in over prediction of actual NO₂ concentrations by a factor of two using the 98th percentile observed ozone concentration at Station T39, and by a factor of 2.0 to 2.9 if using the 100th percentile observed ozone concentration.

¹³⁰⁰ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Sections 3.3.1, 4.2.1; Appendix C, Section 3.6.2; CEAR Doc 934, VFPA responses to IR6-14, IR6-22, IR6-24, IR6-28, IR6-29, IR6-37, IR14-03. See also CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slides 11-13.

¹³⁰¹ CEAR Doc 1794, VFPA oral presentation, May 29, 2019, at slides 13, 15. See Section 3.(c), above.

¹³⁰² CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3402, 3425.

¹³⁰³ CEAR Doc 1616, Metro Vancouver written submission, at s. 2.1., CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3401.

¹³⁰⁴ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3424; CEAR Doc 934, VFPA response to IR6-04, at Table IR6-04-A1.

¹³⁰⁵ CEAR Doc 934, VFPA responses to IR6-04, at Table IR6-04-A1, IR6-22.

¹³⁰⁶ Additional information on the limitations of the OLM and rationale for using this alternative method is provided in CEAR Doc 934, VFPA response to IR6-22, at Appendix IR6-22-A.

¹³⁰⁷ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3426-3427.

concentration (as in the case of the Project), based on the 98th percentile of observed values at Station T39, alone accounts for more than 50% of the standard. The available NO₂ estimation levels based on dispersion modelling do not provide a reliable measure of whether or not the CAAQS will be exceeded. This can only be determined through ambient monitoring once the Project is in operation.

Metro Vancouver also stated the following:

“Metro Vancouver uses these air quality modelling guidelines to ensure the modelling within our region is done in accordance with best practices. In some situations, Metro Vancouver does deviate from these guidelines in small ways which are clearly outlined to our permit applicants during their permitting process.”¹³⁰⁸

The use of OLM by the VFPA is not a deviation from the BC Guidelines. Mr. Hrebenyk reiterated:

“The Deltaport Third Berth Project was conducted using the ambient ratio method and produced similar degrees of overprediction as our current analysis using the ozone limiting method.

Furthermore, as documented in our [RBT2] Environmental Impact Statement, a validation study by PODRES in 2013 and 2015 of all three methods, ozone limiting method, ambient ratio method, and plume volume molar ratio method, showed similar degrees of overprediction for all three methods.

So there is not one method that is somehow going to solve this problem.”¹³⁰⁹

The VFPA is unaware of any available method for estimating future NO₂ concentrations that would align more closely with observations because of the complexity of the chemical and mechanical processes of NO-to-NO₂ formation and destruction in the atmosphere as a plume is being transported downwind from a source.

In addition, the VFPA provided the range of overprediction anticipated for future 1-hour maximum NO₂ levels.¹³¹⁰ ECCC acknowledged that the CAAQS are “not intended to be used as enforceable standards to be achieved at the project perimeter, [and] during an environmental assessment process the CAAQS may be used in conjunction with the results

¹³⁰⁸ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, p. 3388.

¹³⁰⁹ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, p. 3426.

¹³¹⁰ CEAR Doc 934, VFPA response to IR14-03; CEAR Doc 1845, Exhibit 29 from the VFPA.

from air quality modelling to predict the impact of a project on downwind locations, including communities and sensitive receptors.”¹³¹¹

As indicated above in Sections 3.(c) and 3.(d), the VFPA expects that model-predicted concentrations for existing conditions will to be higher than measured concentrations because:

- The VFPA modelled hypothetical worst-case emissions for the operating marine terminals at Roberts Bank as per direction from the AQSS process representatives;¹³¹²
- The VFPA added background levels that include terminal emissions, thereby double counting these emission sources; and
- The VFPA used a conservative, screening-level method (i.e., OLM) for converting model-predicted NO_x concentrations to predicted ambient NO₂ concentrations.

In summary, although the modelling suggests a potential exceedance of the NO₂ objective for cumulative future conditions with the Project, the VFPA submits that actual exceedance of the criterion is unlikely, and any exceedances of criteria will not be caused by RBT2 because the exceedance of the criteria is almost exclusively being attributed by the modelling to existing emission sources, as explained above. Since observations at Station T39 for the period 2010-2016 and on TFN Lands for 2014-2015 showed no indication of ambient NO₂ concentrations for existing marine terminal operations that would compare to model predicted levels, the modelling results are predictably too high, consistent with the reported and expected conservatism in the methods used.

Lastly, the VFPA notes that isopleth plots should not be interpreted as an aggregate plume that covers the AQ Study area, but as an indication of the highest concentrations that could occur on a once-per-year or once-per-day basis in a given location.¹³¹³ For a 1-hour averaging period, as an example, the plotted value is the highest predicted concentration of all 8,760 hours in a year that levels were predicted and include the 98th percentile background concentration. It is unlikely that this background concentration would occur simultaneously with the hour having the highest predicted concentration at all receptors.

(h) Marine emissions – ship Tier III levels and predicted concentrations

ECCC questioned the VFPA's analysis with respect to the assumed rate of introduction of container vessels with Tier III compliant engines and asserted that this assumption was overly optimistic and should be revised to account for new information on the rate of

¹³¹¹ CEAR Doc 1637, ECCC written submission, at p.13.

¹³¹² For example, to capture the maximum potential hourly averaged NO₂ concentrations, worst-case emissions occurring in every hour of the year were assumed, which is unlike emissions from actual port operations.

¹³¹³ As explained in CEAR Doc 934, VFPA responses to IR6-24, IR14-04.

introduction of Tier III compliant vessels into the fleet.¹³¹⁴ Metro Vancouver raised the same concern that NO₂ predictions for marine shipping are underestimated.¹³¹⁵

In light of these concerns, the VFPA retained Mercator International to review and consider the introduction of Tier III ships based on current industry knowledge and trends. Mercator International projects that in the future with RBT2, the percentage of ships that will comply with the stricter Tier III NO_x standards is likely to fall within approximately 54% and 72%, depending on whether vessels are retired after 20 or 25 years of service.¹³¹⁶ Note that ECCC's prediction based on preliminary forecasting was that less than 40% of ships calling at the Port of Vancouver will be Tier III in 2030,¹³¹⁷ while the VFPA's response to IR6-18 stated 91% of vessels would be Tier III compliant by that time.¹³¹⁸

The introduction rate of Tier III compliant ships has no bearing on the conclusions of the AQ Study presented in the EIS and MSA for maximum hourly averaged NO₂ predictions (the parameter and averaging period of greatest concern due to the recent adoption of the stringent CAAQS), as the modelling of hypothetical maximum hourly averaged NO_x emissions did not assume any Tier III ships. Only Tier I and II ships were assumed to be at berth or manoeuvring to/from berths at Deltaport and RBT2.¹³¹⁹ As stated by Ms. O'Hara during the public hearing, "For container vessels, the maximum hourly NO_x emission factors for main engines was 14.8 grams per kilowatt-hour, represented by 85 percent of tier 2 [II] vessels and 15 percent of tier 1 [I] vessels, and no tier 3 [III] vessels."¹³²⁰ Since the conversion to Tier III ships reduces NO_x emissions by 80% when compared to Tier I vessels and 76% compared to Tier II vessels,¹³²¹ the VFPA expects that hourly NO₂ emissions will substantially decrease from those predicted in the AQ Study as the Tier III vessels are introduced to the region.

When considering the information presented by ECCC and Metro Vancouver as opposed to that presented by Mercator, it is important to consider the expertise of ECCC and Metro Vancouver.

With respect to Metro Vancouver, at the Orientation Session #2 on September 16, 2016, Metro Vancouver presented on its area of jurisdiction, which in relation to the Project, is primarily air quality. With respect to that jurisdiction, Metro Vancouver stated the following:

"For air quality and greenhouse gases, Metro Vancouver has been delegated the authority to manage air quality in the region, and this includes emissions, regulations related to point sources, ambient air quality monitoring and that

¹³¹⁴ CEAR Doc 1637, ECCC written submission, at s. 3.5; CEAR Doc 1795, ECCC oral presentation, May 29, 2019, at slide 11.

¹³¹⁵ CEAR Doc 1616, Metro Vancouver written submission, at s. 2.3; CEAR Doc 1803, Metro Vancouver oral presentation, May 29, 2019, at slide 10.

¹³¹⁶ CEAR Doc 1846, Exhibit 30 from the VFPA.

¹³¹⁷ CEAR Doc 1637, ECCC written submission, at s. 3.5.

¹³¹⁸ CEAR Doc 934, VFPA response to IR6-18.

¹³¹⁹ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Attachment 1 in Appendix A.

¹³²⁰ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3283.

¹³²¹ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Appendix A. Emission factors for Tier I, Tier II, and Tier III ships are provided in Table 2-14 and aggregate emission factors for main and auxiliary engines for 2010 and 2025 are presented in Table 2-15.

stems from the BC Environmental Management Act, as well as the GVRD letters patent. We have several management plans, and I will point out relevant to the Robert Banks Terminal 2 Project that it is the Vancouver Port Authority that is responsible for mitigating environmental impacts related to port operations. And our air quality does not, regulations do not extend to vessels. That is a federal jurisdiction."¹³²² [Emphasis added]

With respect, Metro Vancouver does not have expertise in shipping or vessel regulation. Nor does it have jurisdiction over federally regulated vessels. For those reasons, it is inappropriate for the Review Panel to rely on conclusions reached by Metro Vancouver with respect to the introduction of Tier III vessels.

Similarly, as was outlined at the first Orientation Session on June 26, 2016, ECCC does not have expertise in shipping or vessel regulation.¹³²³ Instead, this falls within Transport Canada's mandate.¹³²⁴ In addition, in conducting its analysis, ECCC has relied on a draft document, published in July 2017 as support for its position.¹³²⁵ It is VFPA's view that a draft report that is two years old is should not be relied upon.

Accordingly, the VFPA submits that the VFPA's assessment contained in introduction of Tier III should be preferred over that presented by ECCC or Metro Vancouver. The result of this assessment remains the same – that there is not expected to be any effect on air quality as a result of vessel traffic.

(i) Locomotive emissions

ECCC recommended that locomotive emissions be reassessed with a more conservative assumption of tier levels to reflect the current and expected near term (2025) fleet of yard switcher locomotives in Canada.¹³²⁶ In its view, the VFPA had not used appropriate assumptions in their modelling of switch locomotive emissions, stating that it was unlikely that 100% of switch locomotives will meet Tier 1 in 2025.¹³²⁷ Additional information was not provided to support their recommendation or view.

In 2013, at the start of the AQ Study, the VFPA consulted with BC Rail to see what tier level engines switch locomotives were likely to be equipped with in 2025. The locomotive assumptions used in the AQ Study are summarized in the EIS and the VFPA's response to IR6-16.¹³²⁸ BC Rail advised that switch locomotives would be Tier 1 locomotives by 2025. Of the three switchers currently servicing the Deltaport Terminal, one of the switchers was rebuilt to Tier 0+ and the other two (manufactured in 1986) are Tier 0 and nearing the end

¹³²² CEAR #558, p. 58.

¹³²³ CEAR #490, pp. 30-33.

¹³²⁴ CEAR #490, p. 12.

¹³²⁵ CEAR #1970, p. 3, see: <http://www.cleanairactionplan.org/documents/vessel-forecast-draft.pdf/>

¹³²⁶ CEAR Doc 1637, ECCC written submission, at s. 3.6.

¹³²⁷ CEAR Doc 1637, ECCC written submission, at s. 3.6.

¹³²⁸ CEAR Doc 181, EIS, Volume 2, at Appendix 9.2-A, Attachments 4 and 5 of Appendix A. A memorandum dated April 5, 2013 summarizing BC Rail guidance on locomotive parameter and activity assumptions is provided in CEAR Doc 934, VFPA response to IR6-16, at Appendix IR6-16-A.

of their useful life.¹³²⁹ In terms of the emission factors, the difference between Tier 0 and Tier 1 locomotives is very small, and Tier 0+ has slightly lower emissions standards than Tier 1 for NO_x emissions.¹³³⁰ All three switcher locomotives have anti-idling (SmartStart) technologies installed.¹³³¹

During the general session on May 16, 2019, Canadian Pacific Railway stated that they continue to invest in modern locomotives, since newer locomotives are more fuel efficient than older locomotives, and they continue to rebuild older locomotives to a higher standard, and include additional technologies that improve the efficiencies of those locomotives.¹³³² Canadian Pacific Railway confirmed that they are aggressively equipping their locomotive fleet with automatic stop/start systems as it delivers benefits not only to the company, but also to the communities in which they operate.¹³³³

Mr. Hrebenyk explained that since switch locomotives spend 85% of their duty cycle sitting idle, the implementation of anti-idling technology on all three switch locomotives at the Deltaport Terminal has reduced the bulk of the emissions coming from those locomotives to zero while they are shut down, and this is of far greater significance to reducing emissions from these locomotives than their engine tier level.¹³³⁴

Mr. Hrebenyk also reiterated that “In terms of the emission factors, the difference between tier 0 and tier 1 locomotives, there’s actually a very, very small difference” and if the VFPA were to assume Tier 0 instead of Tier 1 engines, it would not change the conclusion of the modelling analysis.¹³³⁵ He also reiterated that the emission factors used in the AQ Study are those listed in the annual locomotive emissions monitoring reports of the Railway Association of Canada, which are peer reviewed by representatives of both Transport Canada and ECCC, and are identical to the emission standards listed in the official record of the locomotive emission regulation in the USA in the federal register.¹³³⁶ The US Environmental Protection Agency’s locomotive emission standards for new and remanufactured engines form an integral part of the *Canadian Locomotive Emissions Regulations*.¹³³⁷ The Canadian regulations closely match US regulations in order to ensure that railway companies are able to operate locomotives on both sides of the border using the same environmental standards. Therefore, the emission factors used by the VFPA in the EIS were the same emission standards that apply to locomotives in both Canada and the USA.

Based on previous and recent input from the railways, and reviews of trends in fleet turnover documented by the Railway Association of Canada and regulations, the VFPA is

¹³²⁹ CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 249; CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3322.

¹³³⁰ CEAR Doc 934, VFPA response to IR6-16, at Table IR6-16-1.

¹³³¹ CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 249.

¹³³² CEAR Doc 1755, Transcript, Volume 3, May 16, 2019, at pp. 610-611.

¹³³³ CEAR Doc 1755, Transcript, Volume 3, May 16, 2019, at pp. 611-612.

¹³³⁴ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3323.

¹³³⁵ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3322-3323.

¹³³⁶ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3324.

¹³³⁷ SOR/2017-121

confident that the emission factors used in the AQ Study do not underestimate emissions from the switcher locomotives, and disagrees with the views and recommendations made by ECCC.

(j) Cargo handling equipment emissions

ECCC made five recommendations pertaining to emissions from cargo handling equipment.¹³³⁸ Details pertaining to each of the recommendations and the VFPA's response are outlined below.

1. *The Proponent should select equipment with low emissions that meet the latest applicable Canadian emissions standards and guidelines.* As outlined in the response to IR6-17, the Project will be built and operated with equipment meeting the applicable standards of the day. Based on direction from the VFPA, preliminary engineering of the Project included as much electrified cargo handling equipment as technically possible: all ship to shore cranes, all container yard automatic stacking cranes, all intermodal yard rail mounted gantry cranes, and all reefer plug-in points will be electric. The VFPA has committed to measures for reducing air emissions from the Project, including all diesel-powered, cargo-handling equipment meeting or exceeding applicable emission standards at time of introduction in 2029 (i.e., Tier IV compliant engines or better).¹³³⁹ The VFPA expects that electrified mobile equipment will be used at some point in the operational life of the Project.¹³⁴⁰
2. *The Proponent should not remove emission control technologies from off road equipment.* The VFPA has no intention of removing or tampering with cargo handling equipment emission control technologies. Further, the VFPA is committed to continuously reducing air emissions from diesel-powered cargo handling equipment through its Non-Road Diesel Emissions Program, and is a participant in the Northwest Ports Clean Air Strategy (**NWPCAS**), which includes voluntary targets such as 80% of cargo handling equipment meeting Tier IV interim emission standards or equivalent by 2020.¹³⁴¹
3. *The Proponent should implement an emission control technology maintenance program, which may include combined use of individual equipment fuel usage indicators, equipment emission testing, and electronic diagnosis techniques to trigger maintenance.* The VFPA has committed to ensuring that all equipment and vehicles will be maintained, inspected, and operated during the construction and operation phases according to manufacturer specifications to ensure peak performance while minimizing air (and noise) emissions.¹³⁴²
4. *The Proponent should also provide employee training on minimizing off road equipment idling and the importance of avoiding tampering with emissions control*

¹³³⁸ CEAR Doc 1637, ECCC written submission, at s. 3.7.

¹³³⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

¹³⁴⁰ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3329-3330.

¹³⁴¹ CEAR Doc 934, VFPA response to IR6-17.

¹³⁴² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #58, 60.

systems. Prior to the start of construction and operation, the VFPA has committed to the development of Environmental Training Plans to the satisfaction of a qualified professional(s).¹³⁴³ The training will include general training for all on-site personnel and role-specific training as determined by the infrastructure developer's and terminal operator's environmental managers. Prior to the start of construction and operation, the VFPA has also committed to developing Air Emission Management Plans to the satisfaction of a qualified professional(s).¹³⁴⁴ Specific to this recommendation, the VFPA has committed to ensuring that a no-idling policy is developed prior to the start of construction.¹³⁴⁵ Operation phase measures include, but are not limited to, all diesel-powered cargo handling equipment meeting or exceeding existing emission standards at time of introduction (i.e., for 2029 when the Project could be operational, Canadian Tier IV standard or better).¹³⁴⁶

5. *The Proponent commit to meeting the most stringent emission standards and turn equipment over to electric as soon as feasible.* As indicated above, the Project has been designed to be electrified to the extent possible and the VFPA has committed to ensuring that all diesel powered cargo handling equipment meet or exceed existing emission standards at time of introduction.¹³⁴⁷ It is reasonable to assume that some mobile equipment, originally defined as being diesel-powered in 2011 based on uncertainties with technological advancements, may be electric by the time it is purchased or, if purchased as diesel powered equipment to then current standards, replaced by electric equipment once it has reached its useful life.

(k) Air quality monitoring and management initiatives

With respect to monitoring and managing air quality, ECCC recommended that the VFPA implement a local air quality monitoring program in multiple locations, participate in local/regional air quality management initiatives where applicable, and take an iterative approach to air quality management and adapt project equipment or procedures to prevent emissions from contributing to deteriorating air quality in the local and regional area.¹³⁴⁸

The VFPA has committed to Air Emission Management Plans for construction and operation that will outline monitoring programs to be implemented in each phase.¹³⁴⁹ The VFPA will document the following information in each program:

- Contaminants of potential concern to be monitored and reported on;
- Monitoring locations and equipment to obtain air quality concentrations and meteorological data;
- Monitoring details, including frequency of data analysis and reporting requirements;
- Quality assurance / quality control measures;

¹³⁴³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #22.

¹³⁴⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

¹³⁴⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #57.

¹³⁴⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

¹³⁴⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

¹³⁴⁸ CEAR Doc 1637, ECCC written submission, at s. 3.1.

¹³⁴⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

- Air quality thresholds; and
- Adaptive management measures to be implemented if contaminant levels approach pre-determined levels.

The VFPA has committed to developing these plans in consultation with BC MOE, CEA Agency, City of Delta, ECCC, Health Canada, Metro Vancouver, and TFN, Musqueam, and other interested Indigenous groups.

With respect to regional air management initiatives, the VFPA is engaged in emissions management through the NWPCAS.¹³⁵⁰ The VFPA has partnered with the ports of Seattle/Tacoma and the Northwest Seaport Alliance, with input from ECCC, Metro Vancouver, and other US agencies, to reduce port-related air emissions in the shared Georgia Basin-Puget Sound air shed. The overarching goals of the NWPCAS, relative to a 2005 baseline, are a 75% reduction in diesel particulate matter emissions per tonne of cargo by 2015 and 80% by 2020, and a 10% reduction in greenhouse gas emissions per tonne of cargo by 2015 and 15% by 2020. Based on 2015 emissions inventory data, the Port of Vancouver met the 2015 targets. Specific regional initiatives are outlined in the NWPCAS 2016 Implementation Report.¹³⁵¹ The VFPA is committed to continued participation and collaboration with Metro Vancouver and other stakeholders on regional initiatives (e.g., Metro Vancouver's Integrated Air Quality and Greenhouse Gas Management Plan and Regional Ground-Level Ozone Strategy, and the Lower Fraser Valley Air Quality Coordination Committee) pertaining to improving air quality.¹³⁵²

With respect to adaptive management, the VFPA has committed to implementing adaptive measures through the Air Emission Management Plans for construction and operation as part of the overarching construction and operation Compliance Management Plans.¹³⁵³ The VFPA has also committed to adaptive measures, including corrective actions, through the Human Health Air Quality Follow-up Program element,¹³⁵⁴ which will be informed by the monitoring results and compared to applicable health effect thresholds to be determined in consultation.

4. Conclusion

The VFPA is confident that the modelling approach used in the AQ Study has met the goal of dispersion modelling for environmental assessment which is to ensure that predicted concentrations are not under-predicted and to determine the change in concentrations due to the sources modelled. Predicted contaminant levels for existing conditions at Station T39 were higher than measured levels when winds are blowing from the direction of the existing operating terminals. Since the same modelling approach was used for existing and future conditions, future levels have not been underestimated.

¹³⁵⁰ CEAR Doc 934, VFPA response to IR6-32, at Appendix IR6-32-A.

¹³⁵¹ CEAR Doc 934, VFPA response to IR6-32.

¹³⁵² CEAR Doc 934, VFPA response to IR13-01.

¹³⁵³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #18.

¹³⁵⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #81; Appendix C, at Table C21.

Based on hypothetical worst-case emission scenarios, the VFPA is confident that no combination of activities from terminal operation could result in higher emissions and higher predicted concentrations. Based on the conservative approach taken, exceedances of air quality criteria are not expected from Project construction and marine terminal operation at Roberts Bank. A thorough and robust assessment was conducted by the VFPA and study conclusions will be validated by monitoring during construction and operation. The VFPA is committed to reducing emissions from port operations and will continue to lead or be a collaborative partner on regional air management initiatives.

CHAPTER XVIII. NOISE AND VIBRATION

1. VFPA evidence

Documents Relevant to Topic		CEAR Doc #
EIS Sections		
1.	Section 9.3 – Noise and Vibration	181
2.	Section 27 – Human Health Effects Assessment (Revised June 2016)	412
3.	Additional Information to the Environmental Impact Statement - WSANEC Nation - Section 5 Human Health Effects Assessment	930
PCU Sections		
1.	Section 3.1.2 – Noise and Vibration	1210
MSA Sections		
1.	Section 7.4 – Atmospheric Noise Effects Assessment	316
2.	Section 9.1 – Human Health Effects Assessment	316
3.	Additional Information to the Marine Shipping Addendum - Musqueam First Nation and Tsleil-Waututh Nation – Section 3	572
VFPA Technical Reports		
1.	Technical Data Report – Effects of Meteorological Conditions on Sound Propagation from Roberts Bank Terminals	986
Panel IRs and Responses		
1.	IR7-01 – Atmospheric Noise Modelling Using Worst Case Meteorological Conditions	934
2.	IR7-02 – Atmospheric Noise – Transient Vessels	934
3.	IR7-03 – Atmospheric Noise – Rail Traffic	934
4.	IR7-04 – Atmospheric Noise – Baseline Low-Frequency	934
5.	IR7-05 – Atmospheric Noise – Variations in Low Frequency	934
6.	IR7-06 – Low Frequency	934
7.	IR7-07 – Measurement of Traffic Volumes	934
8.	IR7-08 – Atmospheric Noise – Clarification, Traffic Forecasts	934
9.	IR7-09 – Atmospheric Noise – Nighttime Shift Changes	934
10.	IR7-10 – Atmospheric Noise – Nighttime Levels	934
11.	IR7-11 – Atmospheric Noise – Mitigation and Adaptive Management Measures	934
12.	IR7-12 – Atmospheric Noise – Technical and Economic Feasibility of Mitigation	934
13.	IR12-05 – Atmospheric Noise – Modelled Scenarios	934
14.	IR12-06 – Human Health – Noise Monitoring	934
15.	IR12-07 – Human Health Risk Assessment – Noise and Vibration	934
16.	IR14-05 – Human Health – Worst Case Scenario for Noise Human Health Risk Assessment	934
17.	IR14-06 – Human Health – Low Frequency Noise	934
18.	Updated Project Commitments	2001

2. Overview

The VFPA recognizes the importance of noise management to the communities neighbouring port operations. To this end, the VFPA initiated the RBT2 noise and vibration assessment with a community survey to better understand the types and sources of noise, and types of noise-related disturbance experienced by the residents at different locations. The findings of this survey informed the scoping of a thorough noise and vibration assessment for the Project using multiple noise parameters as indicators, including the following:

- Continuous day and nighttime noise levels;
- Low frequency noise (**LFN**, perceived as vibration);
- Transient/impulsive noise; and
- Ground-borne vibration.

Underwater noise was assessed separately and is discussed in Chapter XIII of these Closing Remarks. The results of the noise and vibration assessment were incorporated into five effects assessments:

- Human health;
- Outdoor recreation;
- Coastal birds;
- Marine commercial use; and
- Current Use.

The primary focus of the noise and vibration assessment was to inform the human health risk assessment (**HHRA**) for noise and vibration. The VFPA used methods for the noise and vibration technical study in accordance with industry standards, informed by Health Canada guidance.

The noise study approach and results were driven by the dynamic nature of the study area, which is predominantly mixed suburban development. At the time of EIS development, several residential, industrial, and commercial developments were planned or underway for the local study area, meaning that noise measurements taken to reflect existing conditions in 2013 would not account for additional future sources and types of noise in the community. For this reason, and to provide an assessment based on a realistic future without the Project, the noise and vibration assessment included a modelled noise scenario for 'expected conditions', predicting the future without the Project, including projected noise from known developments that were already under construction. To account for the changing noise environment going forward, the VFPA has proposed an adaptive approach to noise management through the Follow-up Program that accounts for the wide range of noise sources, and ensures that mitigation measures are focused on Project contributions to noise in the community.

Given the concerns expressed by the local community, and the presence of other industrial and port development in the area, the VFPA used a conservative approach in the noise and

vibration assessment to avoid underestimating future noise levels associated with the Project. The assessment was conservative in the following ways:

- The VFPA conducted measurements for the basis of the analysis during the summer when community noise levels are expected to be at their highest due to increased activity (e.g., higher traffic volumes, more ferry sailings to and from the BC Ferries Tsawwassen Terminal);
- The VFPA conducted measurements to represent Project sources when ships associated with increased noise were in berth, based on community feedback;
- The VFPA established the Deltaport Terminal noise source, also used as the Project noise source, based on nighttime measurements, which included all sources of community noise. As such, any other sources of noise that were present will be double counted in the analysis;
- The VFPA assumed the Project will produce the same amount of noise as the Deltaport Terminal at full capacity, even though RBT2 is expected to have fewer ship calls and have more pieces of equipment being electric instead of diesel-powered;
- The VFPA assumed the Project will produce the same number and range of noise levels for transient/impulsive events, even though the sources of terminal-related events are farther away from receptors and operational improvements are likely; and
- For the construction analysis, the VFPA assumed all causeway-related noise will originate from the point on the causeway closest to the shore-based receptor.¹³⁵⁵

Even with the conservative assumptions above, the noise and vibration study, supplemented by analysis completed during the IR process, found that Project-related changes in annual average noise levels, including LFN, in communities near the Project are expected to be minor. The VFPA expects incremental changes in continuous and intermittent noise during peak construction, but these changes will be temporary. The VFPA does not expect that incremental change in continuous noise due to Project operation will change the type of sounds heard or how the sound is experienced. Similarly, transient or impulsive events during Project operation, while predicted to increase in number, are not expected to change in terms of the type of sounds heard or how the sound is experienced.

Although the VFPA predicted changes in noise and vibration to be minor, the VFPA has committed to implementing 19 measures related to atmospheric noise and vibration.¹³⁵⁶ The Noise and Vibration Management Plans are an important mitigation measure for noise as they will include continuous noise monitoring, and standard proactive measures to mitigate noise specific to construction and operation. The Updated Project Commitments list additional measures that will be applicable to managing Project-related noise. For example, commitment #59 through 62 include measures to ensure that equipment and vehicles are maintained, inspected, and operated to minimize noise and air emissions. Noise suppression systems will also be used and maintained for all equipment where such systems are

¹³⁵⁵ CEAR Doc 934, VFPA response to IR12-05, at p.10.

¹³⁵⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3, 10, 11, 13, 14, 15, 16, 17, 18, 21, 25, 31, 32, 38, 57, 58, 59, 60, 82, at Appendix C, Table C22.

available and practical.¹³⁵⁷ Management of noise will be strengthened by implementation of the Land and Marine Traffic Management Plan for construction, the Communications Plans in construction and operation, and awareness and training through the Environmental Training Plans.¹³⁵⁸

The VFPA has also committed to a Follow-up Program element for human health related to noise.¹³⁵⁹ The human health Follow-up Program element will include continuous monitoring throughout construction, plus one year of operation at minimum. As part of the Follow-up Program, the VFPA will rely on three established mechanisms for feedback from community members, captured within the Communications Plans for construction and operation.¹³⁶⁰ These include the Port Community Liaison Committee in Delta, the 24-hour Community Response Line, and the dedicated RBT2 Project email address. If the VFPA receives a complaint through these or other mechanisms such as the Delta Community Office, the VFPA will evaluate and respond accordingly.¹³⁶¹

If, during Project construction or operation, the VFPA receives noise-related complaints related to any type of noise, the VFPA may conduct additional monitoring at residences or other strategic locations to identify noise sources and investigate mitigation approaches. Similarly, if noise levels at night are higher than predicted, the VFPA will determine the source and cause and may implement additional mitigation as needed. The VFPA will determine specific adaptive mitigation measures on a case-by-case basis, and selected from options outlined in the final Noise and Vibration Management Plans.

During the public hearing, the VFPA confirmed that adaptive mitigation may include receptor-based measures, including residential window treatments, and would be dependent upon monitoring and adaptive measures most appropriate to address potential issues.¹³⁶² The VFPA will develop Noise and Vibration Management Plans and the Follow-up Program in consultation with the Follow-up Program Advisory Committee, regulators, TFN, Musqueam First Nation, and other interested Indigenous groups, as appropriate.

With this thorough and responsive noise management and follow-up system in place, which the VFPA has designed to be adaptive to the changing noise environment, the VFPA is confident that Project-related noise will be minimized and community concerns about noise will be appropriately responded to in a timely manner.

3. Key issues raised and VFPA response

The sections that follow describe the key issues raised in relation to noise and vibration. The VFPA's response to each issue is linked to the commitments for monitoring, mitigation, and adaptive management described in the section above.

¹³⁵⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #38, 58, 60.

¹³⁵⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #21, 32.

¹³⁵⁹ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Table C22.

¹³⁶⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #21.

¹³⁶¹ CEAR Doc 934, VFPA response to IR12-06.

¹³⁶² CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3501.

(a) Noise under worst-case meteorological conditions

Comments were received about meteorological conditions affecting sound propagation, and the VFPA was requested to recalculate noise levels assuming the influence of worst-case weather conditions.¹³⁶³

The predictive noise modelling in the EIS and PCU noise assessments accounted for varying meteorological conditions. The VFPA provided a detailed review of meteorological effects on noise propagation in a technical study conducted prior to the noise and vibration study.¹³⁶⁴ In the EIS, the VFPA applied annualized wind directions to the analysis to provide the annual-average results required for the human health assessment.

The VFPA expanded on this analysis in IR responses to address the request to use a different methodology for the influence of meteorological conditions. The VFPA conducted analysis with a suggested alternate prediction method, CONCAWE, which assumed a 'worst-case' weather condition to be sustained for 100% of the year.¹³⁶⁵ This analysis demonstrated that the original ISO 9613 approach used in the EIS and PCU was conservative. For operation, the difference between the original assessment and the alternate 'worst-case' meteorological approach is negligible, as the difference is within the margin of error of noise meters used in the outdoor environment. The noise predictions in the EIS incorporated several conservative assumptions, as outlined in Section 2 above. Applying the alternate method, CONCAWE, to already conservative construction noise predictions increased the uncertainty to a level at which the health risk assessment would not be reliable for management decisions.¹³⁶⁶ In summary, through additional analysis, the VFPA demonstrated that the original approach was sufficient and appropriate as the findings resulted in no changes to EIS conclusions.

(b) Transient noise events

Health Canada advocated for acknowledgement of impacts from transient noise events and recommended increased controls on transient noise events.¹³⁶⁷ This recommendation was based on the predicted maximum sound level for transient noise (L_{max}) being near the sleep disturbance threshold of 60 L_{max} . During the public hearing, Health Canada acknowledged that controlling noise at the source should be prioritized over implementing controls at residences but advocated for implementation of receptor-based noise controls, if other adaptive management measures at source were not successful.¹³⁶⁸

¹³⁶³ CEAR Doc 1000, IR Package 7 from the Review Panel; CEAR Doc 1286, Health Canada comments on the sufficiency of information; CEAR Doc 1436, Health Canada comments on the sufficiency of information.

¹³⁶⁴ CEAR Doc 986, Effects of Meteorological Conditions on Sound Propagation from Roberts Bank Terminals.

¹³⁶⁵ CEAR Doc 934, VFPA responses to IR7-01, IR7-04, IR12-05, IR12-07, IR14-05.

¹³⁶⁶ CEAR Doc 934, VFPA response to IR14-05.

¹³⁶⁷ CEAR Doc 1436, Health Canada comments on the sufficiency of information; CEAR Doc 1608, Health Canada written submission.

¹³⁶⁸ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3470.

The noise and vibration study concluded that, while transient noise events are predicted to increase in number during Project operation, the noise level of the events themselves would still be below health thresholds even with conservative assumptions applied. This conclusion did not change, even with the added conservatism of the CONCAWE method described above.¹³⁶⁹

The VFPA's position is that the interpretation of the assessment of intermittent noise, and the potential for exceedance of the sleep disturbance threshold, should consider the following:

- The Project was conservatively assumed to produce the same range of noise levels for transient/impulsive events occurring at the existing Deltaport marine terminal, even though the sources of Project terminal-related events are farther away from receptors;
- The VFPA has committed to conducting pile driving, the loudest transient noise during construction, during daytime hours to reduce the potential for sleep disturbance;¹³⁷⁰ and
- The average predicted L_{max} values with the Project are well below the 60 L_{max} threshold. Health Canada assumed that all transient events would be equal to the highest L_{max} values. The average values demonstrate this was not the case.¹³⁷¹

During the public hearing, the VFPA clarified that the predicted nighttime L_{max} levels in the future with Project operation range from 52 dBA and 58.5 dBA, and the average transient event is predicted to be 55 L_{max} . Ms. Teresa Drew, the VFPA's technical lead on noise for RBT2, stated "55-decibels is very different than approaching 60-decibels. In order to change from 55 to 58-decibels, a 3-decibel difference, you would have to double the amount of energy."¹³⁷² Ms. Drew further clarified that "a 3 dB difference or a 5 dB difference between an average transient event and the maximum event that is expected to occur, is a large difference." Given this explanation, the VFPA concludes that the predicted L_{max} levels with the Project are not in fact approaching the threshold.

The VFPA is confident in its predictions, and in the suite of noise mitigation measures proposed to minimize Project noise, and does not propose additional mitigation for intermittent noise.

Transient noise predictions will be verified through monitoring, and adaptive measures will be implemented if health thresholds are exceeded as a result of Project-related activities. The specific measures to be adopted will be listed in the Follow-up Program; however, several adaptive measures that could apply to transient noise are identified in the response

¹³⁶⁹ CEAR Doc 934, VFPA response to IR14-05.

¹³⁷⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #25.

¹³⁷¹ CEAR Doc 934, VFPA Response to IR12-05.

¹³⁷² CEAR Doc 1829 Transcript, Volume 13, May 29, 2019, at p. 3499.

to IR7-12.¹³⁷³ As stated above, adaptive mitigation could include receptor-based measures, if appropriate.

(c) Low frequency noise

Comments were raised about community concerns for existing LFN, and the potential for health effects from any increase in LFN. Health Canada recommended additional specific mitigation for LFN.¹³⁷⁴ Health Canada requested specific detail on controls, including that the proponent commit to mitigation at specific receptors.

The VFPA conducted additional analysis in IR responses to address comments about LFN. LFN levels were measured on TFN Lands, as described in response to IR12-07.¹³⁷⁵ Existing LFN levels on TFN Lands are higher than the estimates presented in the EIS, and exceed the threshold for a health effect of annoyance (70 dB rattle criterion). While the VFPA predicts the Project will contribute an incremental amount of LFN to overall community noise levels, the VFPA also predicts there will be exceedances of the 70 dB threshold in expected conditions without the Project as well.

The VFPA would like to reiterate that there is existing noise, including LFN, throughout the study area due to multiple sources, which the VFPA expects will increase with or without the Project. The incremental change expected due to the Project is within the normal range of variation in the area, and no new exceedances of health thresholds are predicted as a result of the Project.

The VFPA acknowledges that LFN is a concern to community members, and is confident that the specific measures included in the Noise and Vibration Management Plans will serve to reduce potential LFN to the extent possible. The mitigation analysis provided in the response to IR7-12 included controls that would address LFN, and the response to IR14-06 indicates which specific mitigation approaches, as listed in the Updated Project Commitments, can be used to address LFN from the Project.¹³⁷⁶

During the public hearing, the VFPA specified that while LFN mitigation measures would first target noise from the source, the VFPA will consult with residents on possible receptor-based mitigation as adaptive measures if required, as described above.

(d) Noise at Tsawwassen First Nation School

Both Health Canada and TFN commented on the need to manage sound outside the proposed future school on TFN land, and Health Canada raised the need to implement

¹³⁷³ CEAR Doc 934, VFPA response to IR7-12, at Appendix IR7-12-A.

¹³⁷⁴ CEAR Doc 1608, Health Canada written submission; CEAR Doc 1782 Health Canada oral presentation on human health on May 29, 2019.

¹³⁷⁵ CEAR Doc 934, VFPA response to IR12-07.

¹³⁷⁶ CEAR Doc 934, VFPA responses to IR7-12, IR14-06. See also CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #10, 11, 13, 14, 15, 16, 17, 18, 21, 25, 31, 32, 38, 57, 58, 59, 60.

mitigation to ensure outdoor noise levels remain below 50 dBA (the threshold for speech interference).¹³⁷⁷

Although there is existing noise throughout the study area that is expected to increase with or without the Project, the VFPA has committed to monitoring noise levels, and mitigating noise should Project-related activity increase sound levels at the school over the 50 dBA daytime threshold during construction or operation. During the public hearing, the VFPA indicated that if noise values at the permanent noise monitoring station close to the school started to approach the threshold, the VFPA would “investigate if the source of that noise was project related, and then would look to adaptively manage the source of that noise at the source first.”¹³⁷⁸

As noted previously, the Noise and Vibration Management Plans and the Follow-up Program will be developed in consultation with TFN, and will include the adaptive measures and effective mitigation methods that could be used during construction or operation to avoid or reduce potential noise-related effects near the proposed TFN school.

4. Conclusion

The VFPA has a good understanding of the concerns about noise of local community members, and has provided a thorough and conservative analysis of potential changes in noise and vibration as a result of the Project. Project-related changes in noise and vibration are considered minor, and must be considered in the context of the changing noise environment of a rapidly developing community. The VFPA is confident that effects related to transient noise and LFN will be mitigated through implementation of both proactive standard management practices, as well as adaptive measures relying on feedback from the community about noise experiences.

¹³⁷⁷ CEAR Doc 1608, Health Canada written submission; CEAR Doc 1461, TFN comments on the sufficiency of information.

¹³⁷⁸ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3503.

CHAPTER XIX. HUMAN HEALTH

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
1. Section 9.2 – Air Quality	181
2. Section 9.3 – Noise and Vibration	181
3. Section 9.4 – Light	181
4. Section 27 – Human Health Effects Assessment	181
5. Section 27 – Human Health Effects Assessment (Revised)	412
6. Section 30 – Potential Accidents or Malfunctions	181
PCU Sections	
1. Section 3.2.15 – Human Health	1210
MSA Sections	
1. Section 7.3 – Air Quality	316
2. Section 7.4 – Atmospheric Noise	316
3. Section 7.5 – Light	316
4. Section 9.1 – Human Health Effects Assessment	316
5. Section 10.0 – Potential Accidents or Malfunctions	316
CEA Agency IRs and Responses	
1. IR #28 – Aboriginal Health	314
2. IR #31 – Country Foods	314
3. AIR #31 – Country Foods	388
4. MSA IR #11 – Country Foods	391
5. AIR #13 – Schedule 13-10: Human Health Total Cumulative Effects Assessment	412
Panel IRs and Responses	
1. IR4-33 – Marine Invertebrates: Contaminants in Crab Hepatopancreas	934
2. IR11-23 – Quality of Marine Sediment	934
3. Preamble to Shellfish IRs	934
4. IR12-01 - Human Health - Indigenous Health, Traditional Foods, and Baseline and Effects Assessment	934
5. IR12-02 – Human Health – Indigenous Health and Consumption Rates	934
6. IR12-03 – Human Health – Indigenous Health, Accidents and Malfunctions, and Contaminants in Marine Traditional Resources	934
7. IR12-04 – Human Health Risk Assessment – Marine Resources and Contamination	934
8. IR12-05 – Atmospheric Noise – Modelled Scenarios	934
9. IR12-06 – Human Health – Noise Monitoring	934
10. IR12-07 – Human Health Risk Assessment – Noise and Vibration	934
11. IR13-04 – Human Health Risk Assessment: Air quality – Exposure Limits	934
12. IR13-05 – Human Health Risk Assessment: Air quality – Chemical Mixture	934
13. IR13-06 – Human Health Risk Assessment: Multi-media Exposure Assessment	934
14. IR13-07 – Human Health Risk Assessment: Multiple Sources of Exposure	934

Documents Relevant to Topic	CEAR Doc #
15. IR13-08 – Human Health Risk Assessment: Incremental Lifetime Cancer Risk	934
16. IR13-09 – Human Health Risk Assessment: Ingestion Rates – Farmers	934
17. IR13-10 – Human Health Risk Assessment: Air Quality – Effects of the Project and Cumulative Effects	934
18. IR13-11 – Human Health Risk Assessment - Crab Contamination - TEQs	934
19. IR13-12 – Human Health Risk Assessment – Shellfish Contamination, Cadmium Concentrations	934
20. IR13-13 – Human Health Risk Assessment – Shellfish Contamination – Cumulative Effects Assessment	934
21. IR13-14 – Human Health Risk Assessment – Terrestrial and Aquatic Vegetation – Food Security, Cumulative Effects Assessment	934
22. IR13-15 – Human Health – Health inequity – Effects and Cumulative Effects Assessment	934
23. IR14-04 – Human Health Risk Assessment – Air Quality Exposure Limits	934
24. IR14-05 – Human Health – Worst Case Scenario for Noise Human Health Risk Assessment	934
25. IR14-06 – Human Health – Low Frequency Noise	934
26. Updated Project Commitments	2001

2. Overview

The VFPA recognizes the importance of the human health assessment to local communities and those who use the Roberts Bank area for harvesting, recreational activities, and Current Use purposes. In an effort to reduce the effects of growing trade on local communities, the VFPA has been working with the communities in close proximity to the existing Roberts Bank terminals to address matters potentially affecting health. For example, the VFPA worked with TFN to implement a mobile air quality monitoring program to confirm the representativeness of the T39 air quality station, which is funded by the VFPA. In relation to noise, the VFPA monitors noise in the Roberts Bank area continuously with permanent noise monitoring stations, and is responsive to community inquiries and complaints via its community feedback line, and implemented adaptive measures during construction of the DP3 Project. In response to concerns about shellfish contamination, the VFPA worked with Indigenous harvesters to collect and analyze Dungeness crab to determine the cause of black shells.

The VFPA assessed potential health effects of the Project using a dual approach to consider a broad spectrum of physical, biophysical, and social determinants of health, employing both an HHRA and a health impact assessment (**HIA**). The HHRA quantified the potential health risks of exposure to air emissions, noise and vibration, as well as contaminants in edible shellfish, using established numerical thresholds. The HIA broadened the assessment to reflect the holistic nature of health to include evaluation of indirect effects on health due to Project-related changes in key socio-economic factors. The HIA included the sub-components of stress and annoyance, employment and income, food security, and health inequity. This dual approach helped ensure that the potential for non-quantifiable health effects were fully evaluated, and that individual differences were accounted for in the assessment.

The human health assessment incorporates the findings of several other assessments in the EIS, such as the intermediate components of air quality (EIS Section 9.2), noise (EIS Section 9.3), and surficial geology and marine sediment (EIS Section 9.6). The VFPA considered and interpreted the findings of these assessments for use in the human health assessment so that health risk predictions are conservative enough to be protective, but not so overly conservative that the predictive value of the assessment was lost. The findings of the human health assessment in turn influenced other assessments, such as outdoor recreation and Current Use.

The assessment relied on input received through consultation with Indigenous groups, local communities, and regulatory agencies. The VFPA held scoping workshops with TFN members and Tsawwassen community members to identify and better understand concerns about health related to port activities. Input from these meetings helped shape the scope of the assessment, and provided information on existing conditions and potential effect pathways. The VFPA also conducted a community survey conducted to understand existing sources, locations, and experiences of noise.

The VFPA incorporated ITK into the assessment, indicating the importance of traditional food in maintaining good nutrition, strength, and general health. Traditional knowledge also reflected how effects from past and present projects and activities have affected health through changes to traditional foods, specifically marine resources. The VFPA assessed potential effects on health related to traditional food resources in the sub-components of food security, shellfish contamination, and health inequity.¹³⁷⁹

The health assessment concludes that the Project is not expected to result in any significant adverse residual or cumulative effects on human health. The VFPA will mitigate potential Project-related effects identified by the assessment through the implementation of environmental management plans and additional mitigation. The Updated Project Commitments lists 29 measures that will contribute to mitigation of potential human health effects.¹³⁸⁰ Key mitigation measures include the Air Emission Management Plans and Noise and Vibration Management Plans for construction and operation.¹³⁸¹ The VFPA will develop these plans in consultation with regulatory authorities, local municipalities, TFN, Musqueam First Nation, and other Indigenous groups, as appropriate. In addition to standard practices for reducing air emissions and noise, the VFPA will require all diesel-powered cargo-handling equipment for the operation of RBT2 to meet or exceed existing emission standards at time of introduction.¹³⁸² The VFPA has implemented the mitigation noted in the EIS for stress and annoyance related to perceived shellfish contamination, through sharing of results of additional shellfish studies, and has additionally committed to participating in discussions

¹³⁷⁹ CEAR Doc 181, EIS, Volume 5, at s. 32.2; CEAR Doc 316, MSA, at s. 9.5.; CEAR Doc 181, EIS, Volume 4, at s. 27.4; CEAR Doc 934, VFPA response to IR12-02.

¹³⁸⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3, 10, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32, 34, 38, 42, 46, 57, 58, 59, 60, 66, 67.

¹³⁸¹ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19, 25.

¹³⁸² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

with interested health authorities and Indigenous groups on a collaborative approach to improving the understanding of shellfish quality at Roberts Bank.¹³⁸³

The Follow-up Program will verify mitigation effectiveness and human health effect predictions for elements related to air quality and noise. The Follow-up Program will be informed by air quality and noise monitoring, and the VFPA will develop the details of monitoring programs, including monitoring parameters, locations, durations, and frequencies, in consultation with Indigenous groups and regulators. If air contaminant concentrations or sound levels related to the Project are higher than predicted and are approaching health effect thresholds, the VFPA will identify the source and/or cause of the elevated noise or air emissions and implement additional mitigation measures as needed.¹³⁸⁴

The VFPA is confident in the conclusions of the assessment, based on a comprehensive approach, conservative assumptions, rigorous evaluation methods, and application of effective mitigation. The VFPA has demonstrated its commitment to addressing noise and air quality concerns within the community through continuous monitoring using permanent stations in the area, along with an established community feedback approach. The VFPA will continue to engage with communities and Indigenous groups during construction and operation to understand and address concerns collaboratively.

3. Key issues raised and VFPA response

(a) Use of the 2025 Canadian Ambient Air Quality Standards Supports EIS Conclusions

Several regulators requested that the VFPA assess the potential health risks of exposure to 1-hour NO₂ based on the future 2025 CAAQS, and expressed concern that health risks related to air quality would be higher than predicted in the EIS when the future CAAQS were taken into account.¹³⁸⁵

In response to IR14-04, as an update to the air quality assessment, the VFPA presented isopleth figures showing concentrations for upper-limit NO₂ concentrations based on dispersion modelling, and also presented tables of the predicted NO₂ concentrations inclusive of model-predicted concentrations from contributing sources and background concentrations.¹³⁸⁶

To respond to the human health portion of IR14-04, the VFPA used the updated 1-hour NO₂ concentrations to update the health risk assessment to apply the CAAQS as exposure limits

¹³⁸³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #67.

¹³⁸⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix C, Tables C21, C22.

¹³⁸⁵ CEAR Doc 1346, ECCC comments on the sufficiency of information; CEAR Doc 1286 Health Canada comments on the sufficiency of information; CEAR Doc 1608, Health Canada written submission; CEAR Doc 1319, Metro Vancouver comments on the sufficiency of information; CEAR Doc 1601, BC Ministry of Health written submission.

¹³⁸⁶ CEAR Doc 934, VFPA response to IR14-04, at p. 3.

for the original 18 receptor locations in the HHRA.¹³⁸⁷ In order to provide realistic estimates of potential health risk, the VFPA adjusted the risk quotient threshold from one to two, in order to account for the two-fold overestimation in the air quality modelling. Predicted risk quotients below two were considered low risk for public health, whereas risk quotients greater than two indicate increased potential for adverse health effects. The risk quotient values indicate that exposure to predicted 1-hour NO₂ concentrations pose low risk at all upland receptors. The use of the CAAQS does result in risk quotients above two at the maximum point of impingement over land and water during operation and construction. However, risk quotients above two were also predicted at these locations in the future without the Project. Therefore, the EIS conclusions remain unchanged as there are no additional exceedances of health thresholds as a result of the Project when the CAAQS are used as exposure limits.¹³⁸⁸

Comments by Health Canada and the BC Ministry of Health in written submissions and during the public hearing indicate that the results of IR14-04 may have been misinterpreted.¹³⁸⁹ According to Health Canada, the figures showing isopleths for 1-hour NO₂ concentrations compared to CAAQS were interpreted as “the worst-case conditions that may actually happen.”¹³⁹⁰

The VFPA clarified that the isopleths represent a conservative air quality modelling output, rather than a health effect prediction.¹³⁹¹ The isopleths indicate the highest concentrations that could occur on a once-per-year and once-per-day basis in a given location. For example, for a 1-hour averaging period, they represent the highest predicted concentration of all 8,760 hours in a year that levels were predicted. The maximum point of impingement indicates the highest concentration of all 8,642 receptor locations in the air quality model. For a 1-hour averaging period, the maximum point of impingement is the highest predicted concentration from 8,642 receptors x 8,760 hours (i.e., the highest of 75.7 million predictions). Panel Member Dr. Steyn also clarified “recognizing that these are not isopleths of pollution on a particular day, but rather, isopleths of the statistics of exceedance [of the] 98 percentile of this particular pollutant...”¹³⁹²

In relation to the CAAQS as exposure limits, during their presentation, ECCC specified that “the CAAQS are intended to be drivers for air quality improvements and aren’t intended to protect human health and the environment. The CAAQS are not to be treated as [‘pollute-up-to’] levels but more as management levels for the air zone.”¹³⁹³

Therefore, while air quality modelling outputs were interpreted as indicating an increased health risk, the VFPA has clarified that the updated HHRA provides a realistic prediction of

¹³⁸⁷ An update of the acute inhalation risk quotient values for the respiratory irritant group was also calculated as the respiratory irritant group considers combined exposure to acetaldehyde, naphthalene, NO₂, and SO₂.

¹³⁸⁸ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3435-3436.

¹³⁸⁹ CEAR Doc 1601, BC Ministry of Health written submission, at pp. 4-5; CEAR Doc 1608, Health Canada written submission, at p. 9.

¹³⁹⁰ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3514.

¹³⁹¹ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3513.

¹³⁹² CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3535.

¹³⁹³ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at p. 3333.

health risk for 1-hour NO₂, accounting for model conservatism. Human health effects of the Project are unlikely to occur because concentrations were overpredicted, and access to the marine areas where effects were predicted near the terminal will be restricted during construction for safety reasons, making exposure to predicted concentrations highly unlikely.¹³⁹⁴ As described above, air emissions from the Project will be managed through monitoring and specific mitigation measures included in the Air Emission Management Plans for construction and operation.¹³⁹⁵

(b) Appropriate thresholds for noise and vibration health effects

The VFPA's health assessment for noise and vibration was appropriately conservative and reflects the changing nature of the study area. The VFPA predicts that noise and vibration will increase in the future, even without the Project. Issues raised relating to noise and vibration are discussed in Chapter XVIII of these Closing Remarks. Several regulators requested that the VFPA provide additional information on predicted health effects from updated LFN analysis.

The VFPA conducted additional field measurements in 2017 to support the updated prediction of health effects related to LFN. The VFPA also considered additional thresholds for LFN based on the level of development in the community. Based on literature reviewed, the conclusion of this additional analysis is that the LFN level of 65 dBC is an appropriate indicator for increased complaints warranting further investigation, and the 70 dB level, the rattle criterion, remains the appropriate threshold for human health effects related to annoyance. The VFPA is also of the position that the 65 dBC and 70 dB criteria are complementary, as the 65 dBC is an appropriate indicator for further evaluation of monitoring and investigation, and the 70 dB threshold is appropriate for potential health effects requiring mitigation, based on source identification.¹³⁹⁶

With the updated LFN measurements, LFN levels exceed the 65 dBC and 70 dB thresholds in some areas before Project noise is considered, both in the existing and the expected conditions. The VFPA predicts that the Project contribution to LFN will not result in measurable Project-related health effects. However, the VFPA acknowledges that LFN is a concern in the community and individual experience of noise increases may vary.¹³⁹⁷ The VFPA has also assessed the potential for stress and annoyance related to noise even when Project-related noise does not result in the exceedance of health thresholds, as part of the qualitative evaluation of the stress and annoyance health sub-component.

To mitigate the potential for Project-related noise to affect human health, the VFPA has committed to implement 16 measures related to noise through both the construction and operation phases.¹³⁹⁸ Key mitigation measures include Construction and Operation Noise

¹³⁹⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #66.

¹³⁹⁵ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #19.

¹³⁹⁶ CEAR Doc 934, VFPA response to IR14-06, at p. 3.

¹³⁹⁷ CEAR Doc 934, VFPA response to IR14-06, at pp. 3-5.

¹³⁹⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #3, 14, 15, 17, 18, 22, 25, 31, 32, 38, 57, 58, 59, 60.

and Vibration Management Plans and Environmental Training Plans, as well as a Land and Marine Traffic Management Plan. Specific mitigation measures for noise within these plans include equipment maintenance, use of adaptive equipment alarms, conducting vibratory hammer and impact pile-driving during daylight hours only, and noise mitigation training. The inclusion of shore power in the Project design provides the opportunity to further minimize noise (in particular LFN) from vessels at berth. The VFPA is also proposing a Follow-up Program, including adaptive management. While the VFPA's priority is to mitigate noise at the source, the VFPA will also consider receptor-based adaptive management measures, as discussed in greater detail in Section XVIII of these Closing Remarks, as required.¹³⁹⁹

(c) Shellfish consumption

(i) Negligible Project effects

The VFPA is confident that the Project will not increase the risk of contaminant bioaccumulation in shellfish as the Project is not a source of contaminants to the marine environment during construction or operation phases, sediments to be resuspended through Project construction are not contaminated, and Project-related increases in suspended sediments will not increase the bioavailability of contaminants at Roberts Bank. This rationale also extends to other marine food resources at Roberts Bank.¹⁴⁰⁰ On the basis of these sediment-related findings, rather than concluding 'no effect', the VFPA assessed a negligible potential effect on human health related to exposure to shellfish contamination to acknowledge that environmental assessment is predictive by nature and inherently involves some degree of uncertainty. However, there is a high degree of certainty in the prediction of a negligible effect from shellfish consumption. A negligible potential effect means that if there is an effect at all, the Project-related change would not be detectable at the valued component level, and can therefore not be characterized or assessed further.¹⁴⁰¹

The VFPA's prediction is based on a detailed understanding of sediment dynamics and chemistry in the Fraser River estuary, which is informed by extensive sediment sampling and analysis, including over 700 samples.¹⁴⁰² The 95% upper confidence limit of mean concentration for each contaminant measured in sediments proposed to be dredged and placed as part of Project construction activities was calculated.¹⁴⁰³ ECCC identified the Canadian Council of Ministers of the Environment (**CCME**) Interim Sediment Quality Guidelines and Disposal at Sea Lower Action Levels benchmarks as the level below which no effects to the marine environment or human health are expected.¹⁴⁰⁴ The 95% upper confidence limit of mean concentrations showed that results are below the CCME Interim Sediment Quality Guidelines and Disposal at Sea Lower Action Levels benchmarks for all

¹³⁹⁹ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3501-3502.

¹⁴⁰⁰ CEAR Doc 934, Preamble to Shellfish-related Information Requests, at p. 3.

¹⁴⁰¹ CEAR Doc 181, EIS, Volume 4, at s. 27.6.1.3 and 27.7.3.

¹⁴⁰² CEAR Doc 181, EIS, Volume 2, at Appendices 9.5-A, 9.6-A, 9.6-B, 9.6-C; CEAR Doc 934, VFPA response to IR11-23.

¹⁴⁰³ CEAR Doc 934, VFPA response to IR11-23.

¹⁴⁰⁴ CEAR Doc 1091, ECCC response to ECCC IR-04, at p. 3.

contaminants, except for copper. The concentration of copper was found to be consistent with naturally occurring background levels in the broader geographic area and Fraser River basin. These results, described in response to IR11-23, further demonstrate that sediments being resuspended by Project construction are of similar quality as suspended sediments from wave and tidal action and Fraser River discharge under existing conditions. This confirms the EIS conclusion that the resuspension of sediments during Project construction will have a negligible effect to shellfish consumers.¹⁴⁰⁵

As a precautionary measure related to the evaluation of contaminant risk to SRKW, the VFPA has committed to alternative management of the upper 0.5 m of the existing tug basin and tug basin expansion area sediments to avoid release of fines in the supernatant discharge and thereby reduce the potential for increasing PCB concentrations in the receiving environment.¹⁴⁰⁶ While the VFPA is confident in its assessment that PCB concentrations within the tug basin and tug basin expansion area are reflective of background concentrations in the Fraser River estuary—that they are not contaminated—the VFPA recognizes that taking this additional step as a precautionary approach will also further reduce the potential for risks to human health.¹⁴⁰⁷

(ii) Perception of shellfish contamination – request for monitoring

Comments have been raised by Health Canada, the BC Ministry of Health, and Indigenous groups related to potential Project impacts to traditional foods, including requests for additional analysis of existing risks and recommendations for a traditional foods monitoring program related to contaminant uptake in marine food resources, as well as studies to confirm consumption habits.¹⁴⁰⁸

The VFPA recognizes the importance of traditional foods to Indigenous groups and individuals who harvest at Roberts Bank. To mitigate stress and annoyance related to perceptions of shellfish contamination, the VFPA has implemented mitigation specified in the EIS by sharing the results of EIS and additional shellfish studies with Indigenous groups, including the analyses of black crab and crab hepatopancreas.¹⁴⁰⁹ In recognition of the interests of multiple groups in advancing the understanding of shellfish quality in the region, the VFPA has additionally committed to participate in discussions with interested regulators and Indigenous groups on a collaborative approach to improving the understanding of shellfish quality at Roberts Bank.¹⁴¹⁰

¹⁴⁰⁵ CEAR Doc 934, Preamble to Shellfish-related Information Requests, at p. 3.

¹⁴⁰⁶ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #47.

¹⁴⁰⁷ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3428-3429, 3479-3480, 3548.

¹⁴⁰⁸ CEAR Doc 579, Health Canada comments; CEAR Doc 1608, Health Canada written submission; CEAR Doc 629, BC Ministry of Health comments; CEAR Doc 1601, BC Ministry of Health written submission; CEAR Doc 1091, ECCC response to ECCC IR-04; CEAR Doc 396, Penelakut Tribe letter to PMV dated January 4, 2016; CEAR Doc 615, Penelakut Tribe comments; CEAR Doc 651, TFN comments; CEAR Doc 1784, Transcript, Volume 6, May 21, 2019, at p. 1429.

¹⁴⁰⁹ CEAR Doc 934, VFPA responses to IR4-34, IR4-33.

¹⁴¹⁰ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #67.

The VFPA has not proposed a traditional foods monitoring program because a) the VFPA is confident in the prediction of a negligible Project-related effect on health for shellfish consumers at Roberts Bank; b) the existing conditions assessment has demonstrated low risk to shellfish consumers from coal-related contaminants, and additional analysis would not change this conclusion; and c) Project-specific monitoring cannot address the broader regional concerns about shellfish contamination.

The VFPA is supportive of initiatives to build on the work conducted for the RBT2 Project, led by the appropriate agencies with convening and decision-making power. As described at the public hearing by Dr. Shandro, health impact assessment lead for the VFPA, there would be several challenges associated with a traditional foods monitoring program led by a project proponent, particularly with regard to the collection of community health information. Dr. Shandro explained that community-specific dietary information is very sensitive information and difficult to obtain by project proponents, and that Indigenous groups have rights to the ownership, control, access, and possession of their information, which must be respected.¹⁴¹¹ The VFPA's efforts to collect dietary information are detailed in the responses to IR #31, AIR #31, and MSA IR #11.¹⁴¹² Dr. Shandro further explained that in cases where a proponent has funded and led such a study, participation rates have traditionally been very low, even when the study involves participation by community researchers. Finally, in the case of the assessment of effects of RBT2 related to shellfish quality, additional information on consumption habits would not change the conclusions, as there is no mechanism for a Project-related increase in shellfish contamination.¹⁴¹³

4. Conclusion

The VFPA has gone beyond the standard approach to health assessment to evaluate a broad range of determinants of health, based on input from Indigenous groups and community members. The assessment results are based on conservative assumptions, together with comprehensive mitigation, monitoring, and follow-up plans. The VFPA has considered the questions raised by Indigenous groups and input of regulators and provided additional analysis in IR responses, which further support the conclusions of the EIS. That is, with mitigation, the Project is not expected to result in any significant adverse residual or cumulative effects on human health.

The VFPA is committed to continuing engagement with Indigenous groups, local communities, and regulatory agencies, as well as local government (City of Delta) through the development and implementation of environmental management plans and follow-up programs to prioritize protection of human health during Project construction and operation.

¹⁴¹¹ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3481-3482.

¹⁴¹² CEAR Doc 314, VFPA response to IR #31; CEAR Doc 388, VFPA response to AIR #31; CEAR Doc 391, VFPA response to MSA IR #11.

¹⁴¹³ CEAR Doc 1829, Transcript, Volume 13, May 29, 2019, at pp. 3481-3483.

CHAPTER XX. SOCIO-ECONOMICS

1. VFPA evidence

Documents Relevant to Topic	CEAR Doc #
EIS Sections	
1. Section 9.4 – Light	181
2. Section 18 – Social and Economic Setting	181
3. Section 19 – Labour Market Effects Assessment	181
4. Section 20 – Economic Development Effects Assessment	181
5. Section 22 – Local Government Finances Effects Assessment	181
6. Section 23 – Services and Infrastructure Effects Assessment	181
7. Section 24 – Outdoor Recreation Effects Assessment	181
8. Section 25 – Visual Resources Effects Assessment	181
9. Section 26 – Land and Water Use Effects Assessment	181
10. Section 34 – Benefits to Canadians	181
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PCU Sections	
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2. Section 3.2.8 – Economic Development	1210
3. Section 3.2.9 – Local Government Finances	1210
4. Section 3.2.10 – Services and Infrastructure	1210
5. Section 3.2.12 – Outdoor Recreation	1210
6. Section 3.2.13 – Visual Resources	1210
7. Section 3.2.14 – Land and Water Use	1210
MSA Sections	
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2. Section 10.5.11 – Potential Accidents or Malfunctions – Outdoor Recreation	316
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4. MSA IR #9 – Socio-Economic Conditions Assessment	391
Panel IRs and Responses	
1. IR1-02 – Alignment with Federal and Provincial Strategies	934
2. IR7-36 – Outdoor Recreation – Baseline Effects Assessment	934
3. IR7-37 – Outdoor Recreation – Baseline	934
4. IR7-38 – Outdoor Recreation – Tsawwassen First Nation Recreational Boating, Effects and Mitigation	934
5. IR7-39 – Outdoor Recreation – Beach Access, Clarification	934
6. IR7-40 – Outdoor Recreation – Recreational Trail, Mitigation	934

Documents Relevant to Topic	CEAR Doc #
7. IR7-41 – Outdoor Recreation – Tourism and Bird Watching, Effects Assessment	934
8. IR7-42 – Outdoor Recreation – Astronomy, Effects Assessment	934
9. IR7-43 – Outdoor Recreation – Crab Harvesters, Mitigation and Effects Assessment	934
10. IR8-10 – Outdoor Recreation – Changes to Environmental Setting	934
11. IR8-11 – Visual Resources – Technical Boundaries	934
12. IR8-12 – Visual Resources – Night-time Spatial Boundaries	934
13. IR8-13 – Visual Resources – Expectations for Visual Quality	934
14. IR8-14 – Visual Resources – Influence of Agricultural Land on Landscape Character	934
15. IR10-07 – Current Use of Lands and Resources for Traditional Purposes – Economic Conditions	934
16. IR10-14 – Current Use of Lands and Resources for Traditional Purposes – Socio-Economic Conditions	934
17. IR10-27 – Effects Assessment Socio-Economic Conditions – Commercial Ventures for Indigenous Peoples	934
18. IR10-28 – Effects Assessment Socio-Economic Conditions – Labour Market for Indigenous Peoples	934
19. IR13-18 – Marine and Land-based Outdoor Recreation – Cumulative Effects Assessment	934
20. Updated Project Commitments	2001
Public Hearing Documents	
1. Undertaking #18: From the Vancouver Fraser Port Authority – Project Area and Navigational Closure Area	1872

2. Overview

The VFPA has a vision to be the world’s most sustainable port, defined as one that delivers economic prosperity through trade, maintains a healthy environment, and enables thriving communities.¹⁴¹⁴ The importance of considering the Project’s contribution and potential effects on economic, social, recreational, and visual quality resources that are valued by local communities and Indigenous groups is recognized by the VFPA and reflected in the EIS.

The socio-economic assessment considered valued components that could potentially interact with the Project, including labour market, economic development, local government finances, services and infrastructure, outdoor recreation, visual resources, and land and water use.¹⁴¹⁵ The VFPA used multiple lines of evidence to characterize existing socio-economic conditions and predict socio-economic effects from the Project. This included field surveys and landscape modelling; interviews and engagement with Indigenous groups, municipalities, industry organizations, regulatory agencies, service providers, and recreational and other user groups; population and economic impact modelling; and consideration of results from other assessments completed for the EIS. The Updated Project

¹⁴¹⁴ CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 178.

¹⁴¹⁵ The Project’s effects on marine commercial use are discussed in Chapter XII of these Closing Remarks.

Commitments list 41 measures that will contribute to mitigation or benefit enhancement of socio-economic valued components.¹⁴¹⁶

The Project will result in positive economic impacts, including generating a large number of well-paying jobs and local business contracts and revenues during construction and operation, and will contribute tax revenues for all levels of government. The Project will not result in any adverse effects on labour market, economic development, or local government finances.

The Project will also generate opportunities for Indigenous workers and businesses. The VFPA has committed to develop an Indigenous Training, Employment, and Procurement Plan¹⁴¹⁷ for the Project that will describe the objectives, actions, roles and responsibilities, and monitoring and reporting frameworks to support Indigenous training, employment, and procurement opportunities during construction and operation. The VFPA will develop this plan prior to beginning Project construction, in consultation with Indigenous groups and through the Indigenous Advisory Committee.¹⁴¹⁸

The Project will have no measurable residual effects to service and infrastructure,¹⁴¹⁹ outdoor recreation,¹⁴²⁰ and land and water use.¹⁴²¹ Payment in lieu of taxes and property taxes to the City of Delta will support the provision of emergency, water and solid waste services, and infrastructure to the Project. Mitigation measures for potential adverse effects include a water service agreement with the City of Delta, Health and Safety and Emergency Response Plans, a Land and Marine Traffic Management Plan, Waste and Hazardous Materials Management Plans, and Communications Plans. Mitigation to address displacement of recreational crab harvesters from the proposed navigational closure area expansion includes biophysical mitigation measures to support crab productivity for recreational crab harvesting and engagement and information sharing with recreational crab harvesters.

Project construction and operation will result in changes to daytime visual resources from the addition of physical structures and to nighttime visual resources from Project-related lighting. The visibility of Project-related features will not change the overall character of the visual landscape during daytime viewing. The VFPA is committed to developing a Light Management Plan,¹⁴²² optimizing the colour of the ship-to-shore gantry cranes,¹⁴²³ and verifying light effects predictions and mitigation effectiveness through the Light Trespass and Sky Glow Follow-up Program element.

¹⁴¹⁶ CEAR Doc 2001 Updated Project Commitments, at Appendix A, Commitment #3, 4, 10, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32, 34, 36, 38, 40, 41, 42, 44, 46, 47, 49, 51, 57, 58, 59, 60, 63, 64, 65, 66, 78.

¹⁴¹⁷ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #42.

¹⁴¹⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #42.

¹⁴¹⁹ CEAR Doc 181, EIS, Volume 4, at s. 23.9.

¹⁴²⁰ CEAR Doc 181, EIS, Volume 4, at Tables 24-5, 24-6.

¹⁴²¹ CEAR Doc 1210, PCU at s. 3.2.14.

¹⁴²² CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #24.

¹⁴²³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #64. See also CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at pp. 3574-3575.

3. Key issues raised and VFPA response

(a) Economic benefits

The Review Panel sought clarification at the May 30, 2019 topic-specific session on the economic benefits of the Project, including how person-years of employment translates to number of construction jobs,¹⁴²⁴ and the estimated peak construction employment.¹⁴²⁵

The VFPA assessed employment effects in person-years, which takes into account the number of hours worked in one year by full-time, part-time, and temporary employees, as well as self-employed persons. The person-years job unit transforms the different employment categories into one unit based on overall averages of full-time hours worked in one year in the business and government sectors. During the public hearing, Dr. Mike Trethaway, Chief Economist with InterVISTAS and former professor of transportation economics, explained the relationship between jobs and 'person-years' during operations:

"In our studies, we actually provide data on both jobs and person-years. We call them, typically, FTEs for full-time equivalents.

In round numbers, there are typically 110 jobs for every 100 person-years of employment so you can inflate roughly by 10 for the operational impacts.

And that reflects a combination of seasonal employment, you know, in various sectors. Part-time, a number of people, of course, prefer that.

So that 10 percent ratio is one that we have found consistent in both the surveys that we do of employers when we do economic impact work for the Port as well as in the Statistics Canada and B.C. statistics input-output tables."¹⁴²⁶

Dr. Trethaway also explained that a similar ratio would apply during construction.¹⁴²⁷

The Project is expected to generate 12,700 person-years of direct, indirect, and induced employment for BC during construction, which includes an estimated 4,150 person-years of direct employment to Metro Vancouver from on-terminal construction activities.¹⁴²⁸ An average of 754 person-years of employment will be generated annually by the Project during construction, with an estimated peak annual employment of 840 person-years in the

¹⁴²⁴ CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at p. 3589.

¹⁴²⁵ CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at p. 3599.

¹⁴²⁶ CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at pp. 3591-3592.

¹⁴²⁷ CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at pp. 3592-3593.

¹⁴²⁸ CEAR Doc 181, EIS, Volume 4, at s. 19, Table 19-11.

first year of construction.¹⁴²⁹ An estimated \$1 billion in labour income will be generated within BC, and an estimated \$1.3 billion in revenues will be generated for BC business supplying materials, goods and services for construction activities, of which \$837 million is expected to accrue to supplier industries in Metro Vancouver.¹⁴³⁰ Project construction is also expected to generate an estimated \$174 million in provincial and local government fees, as well as \$127 million in federal tax revenue.¹⁴³¹ Of the estimated \$20 million in taxes and fees paid to municipalities and regional governments, approximately \$13 million is expected to go to local governments within Metro Vancouver, with the majority to the City of Delta.

An estimated 1,550 person-years of direct, indirect, and induced employment will be generated annually from on-terminal Project operations. This includes 928 person-years annually of direct employment, with the majority of this employment expected to be unionized and accruing to Metro Vancouver.¹⁴³² An estimated \$186 million in labour income and \$33 million in revenues for BC suppliers and services will be generated annually within BC from on-terminal Project operations.¹⁴³³ The Project will also generate approximately 11,000 direct jobs annually from off-terminal operations, including in trucking and warehousing.

An estimated \$19.7 million in government revenues will be paid annually to provincial and local governments during operation, of which \$6.9 million will be paid to Vancouver municipalities and the regional district.¹⁴³⁴ An estimated \$4.8 million of this amount comprises property tax payments, of which more than 95% is expected to be paid annually to the City of Delta.

To further support economic benefits to Indigenous groups, the VFPA will engage the Indigenous Advisory Committee and Indigenous groups to develop an Indigenous Training, Employment, and Procurement Plan for Project construction and operation. The plan will describe the overarching objectives, actions, roles and responsibilities, and monitoring and reporting frameworks to support Indigenous employment, procurement, training, and skills development during construction and operation. The VFPA will provide training funding to facilitate Indigenous employment on the Project. As part of this plan, the VFPA will develop a monitoring process, including a requirement that the contractor annually report on Indigenous employment and training. The VFPA will review this reporting annually to determine the degree of compliance with their contract agreement in regard to Indigenous participation and identify and address any potential obstacles to implementation of the plan. The VFPA has also committed to an Indigenous Monitors Plan, which will provide specific employment opportunities to Indigenous groups.¹⁴³⁵

¹⁴²⁹ CEAR Doc 181, EIS, Volume 4, at s. 19, p. 32; CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at p. 3599.

¹⁴³⁰ CEAR Doc 181, EIS, Volume 4, at Appendix 20-A, Table C-1.

¹⁴³¹ CEAR Doc 1341, Updated Project Rationale, at p. 7.

¹⁴³² CEAR Doc 181, EIS, Volume 4, at Table 19-11.

¹⁴³³ CEAR Doc 181, EIS, Volume 4, at Appendix 20-A, p. 28.

¹⁴³⁴ CEAR Doc 1806, VFPA oral presentation, May 30, 2019, at slide 14.

¹⁴³⁵ CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at p. 3604.

(b) Outdoor recreation quality of experience

At the May 30, 2019 topic-specific session, the Review Panel raised questions regarding the change in quality of outdoor recreational experience from noise in the worst-case meteorological conditions.¹⁴³⁶ The predicted quantitative changes in average daytime noise levels described in the EIS are reflective of predicted quantitative changes in average daytime noise levels under worst-case meteorological conditions.¹⁴³⁷ The relative difference in noise levels between more neutral meteorological conditions and worst-case meteorological conditions is not expected to change in the future with the Project. With the implementation of the VFPA's construction and operation Noise and Vibration Management Plans,¹⁴³⁸ noise levels at outdoor recreational use areas during Project construction and operation under both neutral and worst-case meteorological conditions are expected to be consistent with the existing outdoor recreational environment at Roberts Bank.

(c) Recreational crab harvesting

The Review Panel raised questions about the displacement of recreational crab harvesters from the proposed expansion of the navigational closure area, including the role of consultation in mitigation with DFO and the Lower Fraser Sport Fishing Advisory Committee.¹⁴³⁹

Recreational crab harvesters holding a valid British Columbia Tidal Waters Sport Fishing Licence can harvest coast-wide within the Pacific region, year-round as per DFO regulations. Biophysical mitigation measures to support crab productivity, including salvaging and relocating crabs to outside the proposed navigational closure area, will support the availability of eligible crab for recreational crab harvesting. Residual effects on recreational crab harvesting as a result of the proposed navigational closure area expansion are expected to be negligible.¹⁴⁴⁰ The VFPA has engaged with the Lower Fraser Sport Fishing Advisory Committee and has committed to continued engagement with this organization and with DFO concerning the proposed navigational closure area expansion, to provide recreational crab harvesters with information about the nature, location, status, and progress of the proposed expansion of the navigational closure area, as well as construction work and operational activities to allow harvesters to adapt their activities. Where identified with DFO, recreational harvesters, and Indigenous groups, the VFPA will consider additional measures and implement these with appropriate parties.¹⁴⁴¹

¹⁴³⁶ CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at pp. 3582, 3584.

¹⁴³⁷ CEAR Doc 181, EIS, Volume 4, at s. 24.7.

¹⁴³⁸ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #25.

¹⁴³⁹ CEAR Doc 1850, Transcript, Volume 14, May 30, 2019, at p. 3568.

¹⁴⁴⁰ CEAR Doc 181, EIS, Volume 4, at s. 24.8.

¹⁴⁴¹ CEAR 2001, Updated Project Commitments, at Appendix A, Commitment #63.

(d) Agricultural land

Questions were raised at the May 15, 2019 general session by the City of Delta about the VFPA's intention to acquire agricultural land for the Project.¹⁴⁴² The VFPA clarified that following negotiations with BC Rail, the VFPA acquired a small parcel of land (referred to as Lot 3) from BC Rail at the foot of the causeway for the purpose of a rail right-of-way.¹⁴⁴³ As the VFPA explained at the Project Information Session on January 30, 2019, the VFPA "had sought a right of way from BC Rail for a narrow strip of Lot 3, but instead we were offered the entire property because BC Rail no longer needed it for rail purposes."¹⁴⁴⁴ Approximately one hectare of the land acquired from BC Rail will be used for the Project.¹⁴⁴⁵ While Lot 3 was designated as agricultural, none of the land required for the rail right-of-way was or is currently being used for agricultural purposes, and the VFPA's acquisition of Lot 3 will not affect existing farmers. As clarified in the VFPA's response to Undertaking #2, railway use is typically an authorized use under the Agricultural Land Reserve.¹⁴⁴⁶ The VFPA has designated Lot 3 as a 'special study area' under the VFPA's Land Use Plan, requiring additional studies, consultation, and planning to determine future use of the remainder of the property. Existing use will be maintained in the interim, and the VFPA will consult with interested parties if changes to the land use designation for this parcel of land are proposed by way of a formal amendment to the VFPA's Land Use Plan.¹⁴⁴⁷

(e) Security and policing at Roberts Bank

At the May 15, 2019 general session, the City of Delta raised the multijurisdictional approach to policing at Roberts Bank, highlighting the role of the Delta Police Department (**Delta Police**) in providing police services. At the Review Panel's request, the VFPA described the roles of the terminal operator and agencies in providing site security, policing, and trade-related security services at Roberts Bank. Site security is provided by a private security company employed by the terminal operator. The Delta Police respond to illegal activity and traffic-related incidents as well as provides traffic control services on Deltaport Way. The Royal Canadian Mounted Police respond to illegal activity related to illicit commodities and organized crime, while the Canadian Border Services Agency provides integrated border services that support national security and public safety priorities, including container inspections and responding to immigration related issues.¹⁴⁴⁸ With the Project, demand for Delta Police resources during construction is expected to be negligible, and during operation the estimated number of traffic-related incidents requiring Delta Police resources is expected to be 10 to 15 calls per year.

¹⁴⁴² CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 222.

¹⁴⁴³ CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 222.

¹⁴⁴⁴ CEAR Doc 1413, Information Session Transcript, January 30, 2019, at p. 41.

¹⁴⁴⁵ CEAR Doc 181, EIS, Volume 1, at s. 4.1.2.

¹⁴⁴⁶ CEAR Doc 1832, VFPA's response to Undertaking #2. See also CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 223.

¹⁴⁴⁷ CEAR Doc 1413, Information Session Transcript, January 30, 2019, at p. 41.

¹⁴⁴⁸ CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at pp. 230-233; CEAR Doc 181, EIS, Volume 4, at s. 23.5.3.2.

The City of Delta described the need for more information sharing between the different agencies responsible for security and policing at Roberts Bank.¹⁴⁴⁹ The VFPA has committed to developing Health and Safety and Emergency Response Plans, which will include procedures in the event of an emergency for communication with emergency service providers, as well as measures to ensure emergency service providers have current information regarding the nature, location, status, and progress of construction work and operational plans, activities, timelines, service requirements, and management of emergency services utilisation.¹⁴⁵⁰ These plans will be developed in consultation with the Delta Police, and other emergency response providers. A Land and Marine Traffic Management Plan will also be developed in consultation with the City of Delta and Delta Police, and will include measures to mitigate land and marine construction traffic congestion, control traffic, and mitigate potential traffic hazards.¹⁴⁵¹

In their closing remarks to the Review Panel, the City of Delta requested a multi-jurisdictional port policing authority be established to address their concerns regarding organized crime and illegal goods movement through the port.¹⁴⁵² The VFPA regularly engages with federal and municipal law enforcement agencies to facilitate open dialogue, including through its membership with the Canadian Association of Chiefs of Police and the National Port Security Committee. The VFPA also maintains and regularly upgrades its security systems to enhance real-time situational awareness and secure information sharing with law enforcement agencies.

4. Conclusion

The Project is consistent with the VFPA's vision to be the world's most sustainable port by delivering economic prosperity through trade, maintaining a healthy environment, and enabling thriving communities. In this context, the VFPA recognizes the importance of addressing potential Project effects (both positive and adverse) on socio-economics aspects, including those valued by local communities and Indigenous groups. The Project will generate positive economic effects through local and regional employment and labour income, revenues to local businesses, payment of taxes and payments in lieu of taxes to local and regional governments, and Indigenous employment and procurement. Potential adverse socio-economic effects of the Project will be fully mitigated.

¹⁴⁴⁹ CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 238.

¹⁴⁵⁰ CEAR 2001, Updated Project Commitments, at Appendix A, Commitment #23.

¹⁴⁵¹ CEAR 2001, Updated Project Commitments, at Appendix A, Commitment #32.

¹⁴⁵² CEAR Doc 1738, Transcript, Volume 2, May 15, 2019, at p. 238; CEAR Doc 2009, Closing Remarks from the City of Delta, p. 2.

CHAPTER XXI. JUSTIFICATION AND CONCLUSIONS

1. Any significant environmental effects are justified in the circumstances

Under section 47 of *CEAA 2012*, after receiving the Review Panel's report, the Minister of Environment and Climate Change must make a decision on the Project. As outlined in section 52 of *CEAA 2012*, the Minister must decide if, taking into account the implementation of any mitigation measures the Minister considers appropriate, the Project is likely to cause significant adverse environmental effects referred to in either subsections 5(1) or 5(2) of *CEAA 2012*.

If the Minister decides that the Project is likely to cause significant adverse environmental effects, the Minister must then refer the decision to the Governor in Council on the matter of whether those effects are justified in the circumstances. The Review Panel's mandate, as outlined in section 3.4 of the Terms of Reference, includes the mandate to "receive and take into account information with respect to whether any significant adverse environmental effects are justified in the circumstances." Therefore, while the Review Panel is not mandated to make a decision with respect to the justifiability of any significant adverse environmental effects, it is mandated to receive information on the justifiability of any significant adverse environmental effects.

As set out in these Closing Remarks, the VFPA's assessment has shown that, taking mitigation into account, the Project will not result in significant adverse environmental effects. However, the VFPA has predicted the Project would result in an adverse residual effect for acoustic disturbance and behavioural effects to SRKW resulting from underwater noise. This residual effect of the Project alone will not significantly affect the SRKW population, and will not jeopardize the survival or recovery of SRKW. As discussed in Chapter XIII of these Closing Remarks, due to past activities resulting in SRKW's endangered status, the VFPA took the conservative approach of assuming that SRKW have already been significantly adversely affected under existing conditions due to other physical activities that have already been carried out. Although the VFPA assessed the Project contribution to acoustic disturbance and behavioural effects due to underwater noise to be not significant, when examined in combination with the effects of other physical activities that have been carried out, the VFPA acknowledges the cumulative residual effect is significant. That is, the cumulative effect currently experienced by SRKW under existing conditions will remain significant, but will not measurably worsen with the Project. The conservatism of this conclusion is further underscored by the findings in the 2018 Mercator Report, which indicates that there will be no increase in vessel traffic in the marine shipping area with the Project.

The VFPA has committed to adopting all technically and economically feasible mitigation measures within the VFPA's care and control to reduce the environmental effects of the Project, including measures to reduce construction-related acoustic disturbance to SRKW. In addition, as presented in the Updated Project Commitments, the VFPA has committed to exploring and evaluating additional opportunities to contribute to, support, and/or

participate in regional and/or multi-stakeholder initiatives that will inform effective management and recovery of SRKW, and support the management and productivity of adult salmon populations, particularly Chinook salmon, SRKW's primary prey.¹⁴⁵³ The VFPA will continue to collaborate and provide assistance to agencies leading measures that will reduce the effects of marine shipping on SRKW.¹⁴⁵⁴ Further, the VFPA has taken a leadership role in other regional initiatives designed to mitigate effects of underwater noise on SRKW, such as the VFPA-led ECHO Program, and the signing of a section 11 SARA conservation agreement for SRKW.

In light of these efforts, the predicted minor contribution of the Project to the already significant cumulative effect on SRKW is justified in the circumstances given the benefits of the Project to both the local economy and to Canada as a whole. The VFPA has presented significant evidence in support of this justification, including the following:

- The rationale for the Project;¹⁴⁵⁵
- The executive summary;¹⁴⁵⁶
- Presentations at the Orientation Sessions;¹⁴⁵⁷
- IR1-03 – Purpose of the Project, including Ocean Shipping Consultants' Container Traffic Forecast Study – Port of Vancouver, 2016;¹⁴⁵⁸
- The updated Overview and Rationale, October 2018;¹⁴⁵⁹
- InterVISTAS "Review of OSC's Container Traffic Forecast Study - Port of Vancouver, 2016";¹⁴⁶⁰
- Presentations made at the Information Session (January 2019);¹⁴⁶¹ and
- A summary of socio-economic impacts and benefits.¹⁴⁶²

The future of Canada's economic prosperity depends on efficient and reliable trade. The Project is necessary to meet container demand on Canada's west coast and maintain the Port of Vancouver's advantage for Canada as a gateway for trade with Asia. The VFPA's independent container traffic forecasts clearly demonstrate that this additional capacity is required.

Major infrastructure projects like RBT2 are complex, and require a long lead time to plan, design, and complete the environmental assessment process and consult with Indigenous groups on potential impacts. They also take many years to construct. The VFPA has planned the Project to ensure the capacity is available when it is forecast to be needed and avoid a shortfall in capacity, which would result in increased costs to Canadian businesses,

¹⁴⁵³ CEAR Doc 2001, Updated Project Commitments, at Appendix A, Commitment #54, 55.

¹⁴⁵⁴ CEAR Doc 2001, Updated Project Commitments, at Appendix B.

¹⁴⁵⁵ CEAR Doc 181, EIS, Volume 1, at s. 2.

¹⁴⁵⁶ CEAR Doc 186, EIS Executive Summary, at s. 4.

¹⁴⁵⁷ CEAR Doc 452, VFPA submission for June 28, 2016 Orientation Session; CEAR Doc 482, VFPA presentation for June 28, 2016 Orientation Session.

¹⁴⁵⁸ CEAR Doc 934, VFPA response to IR1-03.

¹⁴⁵⁹ CEAR Doc 1341, Updated Project Rationale.

¹⁴⁶⁰ CEAR Doc 1364, Review of 2016 Container Traffic Forecast Study by InterVISTAS.

¹⁴⁶¹ CEAR Doc 1405, VFPA presentation for January 30, 2019 Information Session.

¹⁴⁶² CEAR Doc 181, EIS, Volume 4; CEAR Doc 1806, VFPA oral presentation, May 30, 2019.

consumers, and the economy as a whole. RBT2 is the only project in a position to meet this demand in a timely way.

Unlike a private proponent, the VFPA is not motivated by shareholder interest. Instead, as a Canada Port Authority, the VFPA is mandated to enable Canada's trade objectives while also ensuring safety, environmental protection, and consideration for local communities. The VFPA is accountable to the federal Minister of Transport, and works for the benefit of all Canadians, operating in the public interest. The VFPA does so by ensuring its decision making is consistent with its three pillars of sustainability—economic prosperity through trade, a healthy environment, and thriving communities—as it strives to become the most sustainable port. RBT2 is consistent with those pillars and that aspiration.

The Project will result in significant benefits to the local employment market. During construction, it will generate 12,700 person years of direct, indirect, and induced employment for BC, including 4,150 person-years of direct employment from on-terminal construction activities. This will generate an estimated \$1 billion in labour income and an estimated \$1.3 billion in revenues for BC business supplying and goods services for construction activities.

During operation, the on-terminal Project related activities will generate an estimated 1,550 person-years of direct, indirect, and induced employment each year, including 928 person-years of direct on terminal employment. This will generate \$186 million in labour income, as well as \$33 million in revenues for BC suppliers and services.

The Project will also contribute to \$174 million in provincial and local government taxes and fees during construction, as well as \$127 million in federal tax revenue. During operation, on-terminal activities for the Project will generate an estimated \$19.7 million in provincial and local government revenues annually.

The VFPA has designed the Project to mitigate the environmental effects to the greatest extent feasible, while taking into account and addressing concerns of Indigenous communities, the public and regulators. The RBT2 Project is in Canada's interest. It is necessary for the economic prosperity of the country as a whole.

2. Conclusion

As stated in the introduction to these Closing Remarks, and as detailed in each of the subsequent chapters, the VFPA has conducted a thorough and comprehensive environmental assessment of the Project.

In developing the environmental assessment, the VFPA conducted extensive Indigenous group and public consultation. The VFPA also engaged with regulatory agencies through TAGs and ongoing communications and responses to submissions and IRs. The feedback received helped ensure that the Project was developed in a way that considers the community and protects the environment.

Throughout the environmental assessment process, including the public hearing, the VFPA has listened carefully to all points of view and has responded to questions and concerns in a responsible and respectful manner.

With respect to Aboriginal and treaty rights and related interests, the VFPA has engaged and consulted with Indigenous groups and has outlined measures identified to mitigate the potential adverse impacts of the Project on potential or established Aboriginal and treaty rights and related interests. The VFPA has heard suggestions raised by Indigenous groups for avoiding, reducing, mitigating, or otherwise accommodating the potential impacts of the Project on potential or established Aboriginal and treaty rights and related interests and has incorporated this feedback into the Project where feasible. Engagement and consultation has continued throughout the environmental assessment, and, if the Project is approved, will continue through the permitting, detailed design, construction, and operation phases. The VFPA has negotiated a number of mutual benefit agreements with Indigenous groups and has a MOA with TFN that was agreed to in 2004. The VFPA respectfully submits that the engagement with Indigenous groups has been adequate to this phase in the environmental assessment process and will continue throughout the development, construction and operation of the Project.

The VFPA is confident in its conclusion that the Project, after taking into account design measures to avoid potential effects, measures to reduce or minimize potential effects, mitigation measures, offsetting measures, and the implementation of the Follow-up Program will not result in any significant adverse effects on any of the valued environmental or socio-economic components.

3. Request for a recommendation of approval

The VFPA requests that the Review Panel, in its report to the Minister, make a recommendation that RBT2 be approved. The VFPA acknowledges DFO's position that a SARA permit or a SARA-compliant *Fisheries Act Authorization* would be required. The VFPA is confident that the Project meets the necessary preconditions for those authorizations, and is committed to working constructively with DFO and Indigenous groups in the permitting process.

APPENDIX A – SUMMARY OF RECOMMENDED MITIGATION MEASURES

Appendix A. Summary of Recommended Mitigation Measures

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
1	<p>Environment and Climate Change Canada Topic: Water Quality April 15, 2019 submission; CEAR Document #1637¹⁴⁶⁴, p. 10</p> <ul style="list-style-type: none"> ECCC recommends that all fill material be characterized (dredgeate and quarry sand) to demonstrate that acceptable supernatant discharge quality can be maintained throughout the Project's construction period. ECCC also recommends that the supernatant either not be discharged when dredgeate from the upper layers of the tug basin is being placed as fill, or further details to demonstrate that these sediments will not exceed the DFO upper threshold (200 pg/g) or increase ambient PCB concentrations in SRKW critical habitat would be necessary. 	<ul style="list-style-type: none"> The VFPA has committed to ensuring that quarry material (once a quarry source is identified) will be characterized to demonstrate that Project construction activities, including supernatant discharge, will not result in marine pollution, as defined in the London Protocol and Convention and summarised by ECCC in CEAR Document #1091¹⁴⁶⁵, and will meet the pollution prevention provisions as determined by DFO, as part of the <i>Fisheries Act</i> Authorization (Commitment #46). The VFPA has committed to employing specific dredging practices to handle the upper 0.5 m of the existing tug basin and tug basin expansion area to avoid discharge of fines in supernatant and reduce the potential for increasing PCB concentrations in the receiving environment to the satisfaction of a qualified professional(s) (Commitment #47). 	<ul style="list-style-type: none"> The VFPA commitment is specific to characterizing quarry material because sediments proposed to be dredged and placed for Project land development have already been characterized as part of an extensive sediment sampling program and were found to be not contaminated. Further details pertaining to sampling program and analytical results are provided in the VFPA's response to IR11-23.
2	<p>Environment and Climate Change Canada Topic: Accidents and Malfunctions April 15, 2019 submission; CEAR Document #1637, p. 11</p> <ul style="list-style-type: none"> ECCC recommends that clarification of the oil types that were modelled would be required to inform the appropriate response and recovery strategy as different types of oil will have different effects. ECCC recommends that spill probability modelling be required to support the Proponent's assessment of an accident scenario involving a collision between a container ship and tanker carrying crude oil, particularly as the Proponent estimates the potential worst-case spill volume to be higher than original estimates. ECCC also recommends that the types of oil included in the potential maximum spilled volume be clarified. ECCC further recommends that if the estimate was only specific to a spill of a single type of oil, then all other plausible fuel oil types such as marine diesel and heavy fuel oil should also be modelled 	<ul style="list-style-type: none"> Regarding the oil type and volume that were modelled, the response to IR11-11 identified that modelling undertaken for the Trans Mountain Expansion Project, and used to inform the MSA assessment for grounding scenario involving a 7,500 m³ heavy fuel oil spill, was conducted assuming a spill of 8,250 m³ of heavy fuel oil (specifically, Cold Lake winter blend crude oil). As outlined in the response to IR11-04, a spill of heavy oil has a higher potential impact during all seasons relative to a light fuel oil spill, and potential impacts are highest in the spring when considering the composite of all resources averaged over all areas in the marine shipping area. 	<ul style="list-style-type: none"> The VFPA has not committed to conduct the requested spill probability modelling of a hypothetical accident scenario involving a collision between a container ship and tanker carrying crude oil because it is beyond the scope of the assessment defined by the EIS Guidelines (section 17). For the hypothetical worst-case scenario presented in the MSA and this hypothetical accident, the response to IR11-08 acknowledges the differences in spill volume, similarities in oil properties, and concludes that spills of this magnitude will have high consequences, regardless of the actual volume released. In addition, it was assumed that the spill would disperse unmitigated into MSA Segments A and E to the north and into Segments C, D, and G to the south. Model predictions would not inform response and recovery strategies. Transport Canada is the lead federal agency overseeing Canada's Marine Oil Spill Preparedness and Response Regime, with support from other agencies and WCMRC. As outlined in the responses to IR11-04 and IR11-10, specific mitigation measures would be selected based not only on the product spilled, but also on conditions at the time of the spill and site-specific response plans.
3	<p>Environment and Climate Change Canada Topic: Air Quality April 15, 2019 submission; CEAR Document #1637, pp. 16-17 ECCC recommends that:</p> <ul style="list-style-type: none"> The Proponent design and implement a local air quality monitoring program in multiple locations. The Proponent participate in local and regional air quality management initiatives, where applicable. The Proponent takes an iterative approach to air quality management and makes any necessary adaptations to Project equipment or procedures to prevent Project emissions from 	<ul style="list-style-type: none"> The VFPA has committed to developing and implementing a local air quality monitoring program as part of the construction and operation Air Emission Management Plans (Commitment #19) within a compliance management framework, as part of the construction and operation Compliance Management Plans (Commitment #18). The VFPA is engaged in emissions management through the Northwest Ports Clean Air Strategy and is tracking progress towards set targets by completing emission inventories every 5 years. The VFPA also participates in the Lower Fraser Valley Air Quality Coordination Committee. The VFPA has committed to implementing adaptive measures through the Air Emission Management Plan for construction and operation (Commitment #19), as part of the overarching construction and operation 	<ul style="list-style-type: none"> The VFPA will conduct air quality monitoring in accordance with details to be provided in the Air Emissions Management Plans, relying on Station T39, which is representative of ambient air quality in the local area (as described in IR6-09). The VFPA will also monitor air quality periodically at select locations during construction. The VFPA has not committed to monitoring at multiple locations in the local area because Station T39 was established to assess air quality near Deltaport, marine activities and other sources, and to help fill a gap in the Metro Vancouver monitoring network in the southwest part of the region.

¹⁴⁶³ All commitments listed in this Appendix are as presented in CEAR 2001, Updated Project Commitments.

¹⁴⁶⁴ CEAR Doc 1637, ECCC written submission.

¹⁴⁶⁵ CEAR Doc 1091, ECCC responses to IRs.

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		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	contributing to deteriorating air quality in the local and regional area.	Compliance Management Plans (Commitment #18). The VFPA has also committed to adaptive measures, including corrective actions, where thresholds are shown to be exceeded as a result of the Project, through the Human Health Air Quality Follow-up Program element (Commitment #81 and Appendix C, Table C21).	
4	<p>Environment and Climate Change Canada Topic: Air Quality – CALMET-CALPUFF Model Domain Size and Regional Emission Sources April 15, 2019 submission; CEAR Document #1637, p. 19</p> <p>ECCC continues to recommend that the air quality assessment for the Project include the additional analysis that has been described in section 3.2. A larger modelling domain coupled with inclusion of regional emission sources would allow for a complete assessment of the Project's effects on air quality.</p>	Not Applicable	<ul style="list-style-type: none"> The VFPA has demonstrated that the modelled domain size adequately captures meteorological conditions and changes associated with the Project. Predicted concentrations for the existing conditions scenario were higher than observations, which illustrates the conservative and cumulative nature of the emissions scenarios and modelling of those scenarios. <ul style="list-style-type: none"> The VFPA included both Project emissions in the model scenarios (except existing conditions) and all operating terminals (Westshore, Deltaport, and BC Ferries) at Roberts Bank (modelled levels were based on worst-case emission scenarios). Emissions from these operating terminals are the key regional sources that could interact with Project sources (i.e., emissions could be cumulative under certain wind conditions). The response to IR6-12 explains that other larger sources that could be distinguished in the region will come from different wind directions and are captured in background levels at Station T39. Background concentrations representing all other emission sources that were not modelled were added to the predicted concentrations. The background concentrations were conservatively based on the 98th percentile of observed contaminant concentrations measured at T39 from mid-2010 to 2012, as was recommended by representatives of Metro Vancouver, Environment Canada, and the Ministry of Environment during the AQSS process. Since the background concentration was added to predicted concentrations from marine terminal emissions, emissions from these terminals were double-counted in the total concentrations.
5	<p>Environment and Climate Change Canada Topic: Air Quality – Model Bias April 15, 2019 submission; CEAR Document #1637, p. 22</p> <ul style="list-style-type: none"> ECCC recommends that the air quality assessment for the Project apply a more rigorous statistical approach using timed-matched values of observed and modelled concentrations of NO₂. Modelling of more than one year would allow for a complete assessment of the Project's effects on air quality. 	Not Applicable	<ul style="list-style-type: none"> Contrary to ECCC's recommendation, the BC dispersion modelling guidelines (2008 & 2015) state that: "The models are reasonably reliable in estimating the magnitude of highest concentrations occurring sometime, somewhere in the area" and "Estimates of concentrations that occur at a specific time and site are poorly correlated with actual observed concentrations (paired in space and time) and are much less reliable." Evaluations of model bias in applied dispersion modelling studies typically make comparisons between the highest set of predicted contaminant concentrations to the highest set of observations at a location, regardless of when those occurred during the monitoring/modelling period being evaluated. The VFPA applied this approach in response to IR14-03 and Exhibit 29. With respect to modelling for more than one year, the VFPA has demonstrated that 2010 meteorology provides a reasonably accurate measure of the atmospheric state throughout the modelling domain for input to the air quality dispersion modelling in the local study area based on the following: <ul style="list-style-type: none"> Meteorological model outputs from both WRF-NMM and CALMET were validated in accordance with BC guidance; WRF-NMM model outputs were compared to observational data from the meteorological stations at the Vancouver International

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		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
			<p>Airport, Sand Heads Climate Station, and Abbotsford Airport;</p> <ul style="list-style-type: none"> ○ Hourly hodographs of wind direction showed that the CALMET modelled winds did capture the effects of sea breeze within the model domain; ○ Model results based on 2010 meteorology were statistically compared with 30-year climate normal data, and the comparisons indicated that the WRF-NMM modelled winds had a higher frequency of westerly winds than the climate normal data, resulting in a higher frequency of modelled emissions from marine sources being transported towards land in Delta; and ○ Additional validation was conducted using aircraft-measured profiles of wind speed and direction and surface temperatures from a Fraser River buoy in response to EIS Guidelines requirements and based on input from Environment Canada during the AQSS process. <ul style="list-style-type: none"> • In addition, the VFPA discussed its approach to modelling meteorological conditions during the first AQSS meeting on February 13, 2013 and Environment Canada recommended that the assessment be completed using “a representative year with a warmer summer for meteorology data.” In addition to this recommendation, 2010 was also chosen because it had the highest frequency of atmospheric calms based on a comparison of five years (2008-2012) of meteorological data at the Vancouver International Airport. As discussed in the EIS, the comparison showed that there was little difference in wind speed and direction among the five years. Given the similarity among all five years in terms of wind speed and direction, the use of more than one year is unlikely to result in major differences in maximum predicted concentrations.
6	<p>Environment and Climate Change Canada Topic: Air Quality – Background Air Quality April 15, 2019 submission; CEAR Document #1637, pp. 24</p> <ul style="list-style-type: none"> • ECCC is of the view that the above analysis is required in order to determine the appropriate background for the Project. The background value should be determined using more than one air quality station, a more complete analysis of differences between monitoring stations, and more recent data particularly given recent changes in emission controls and monitoring technology. 	Not Applicable	<ul style="list-style-type: none"> • At the start of the RBT2 Air Quality Study in 2013, AQSS participants supported use of 98th percentile background concentrations from Station T39 to incorporate non-modelled emission sources (both primary and secondary pollutants) in the total predicted concentrations. A 2014-2015 study on TFN Lands study concluded that Station T39 is representative of air quality levels for CO, NO₂, SO₂, O₃ and PM_{2.5} in overland areas at Roberts Bank and on TFN Lands. • As the VFPA outlined in the response to IR6-05, the use of other stations in the region, such as the Richmond South station, would artificially inflate background levels. The fact that Station T39 measures some of the lowest ambient concentrations in the region does not mean that it is not representative of the local receiving environment; Station T39 is used by regulators to demonstrate attainment of the CAAQS.
7	<p>Environment and Climate Change Canada Topic: Air Quality – Marine Emissions April 15, 2019 submission; CEAR Document #1637, pp. 27</p> <ul style="list-style-type: none"> • ECCC recommends that additional information and analysis would be required to account for future marine emissions from ships underway in the Strait of Georgia as these emissions would not be captured in a background concentration. ECCC is of the view that this information is necessary to assess the contribution of emissions resulting from marine shipping associated with the Project. 	Not Applicable	<ul style="list-style-type: none"> • The VFPA has shown that emissions from large distant sources (up to 30 km from Station T39) can be detected in ambient monitoring in Tsawwassen at Station T39. In the VFPA's response to IR6-12, scatter plots illustrated that ship emissions from existing vessel traffic are captured in monitoring data at Station T39 for winds blowing from 260° to 340° as well as from ships transiting in Strait of Georgia for winds blowing from 166° to 259°. Since the majority (90%) of future vessel traffic is included in background levels, adding modelled emissions ships for ships in transit would double count emissions. • Predicted concentrations are not underestimated, as shown by comparisons between measured and model-predicted concentrations for existing conditions. Using the same approaches for the emission inventories and modelling as for existing conditions, highly conservative

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		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
			predictions for expected conditions and future conditions with RBT2 are also predicted.
8	<p>Environment and Climate Change Canada Topic: Air Quality – Locomotive Emission Rates April 15, 2019 submission; CEAR Document #1637, pp. 28</p> <ul style="list-style-type: none"> ECCC continues to recommend reassessing the locomotive emissions with a more conservative assumption of Tier levels to reflect the current and expected near term (2025) fleet of yard switcher locomotives in Canada. As indicated in section 3.1 above, the predicted NO₂ concentrations are above the CAAQS over the majority of the study area. As ECCC notes, the Proponent has not used appropriate assumptions for calculating locomotive emissions and therefore NO_x emissions are underestimated, which leads to the potential for NO₂ predictions to be underestimated as well. 	Not Applicable	<ul style="list-style-type: none"> The VFPA is confident that the emission factors used in the AQ Study do not underestimate emissions from the switcher locomotives. This conclusion is based on previous and recent input from the railways, and reviews of trends in fleet turnover documented by the Railway Association of Canada and regulations. <ul style="list-style-type: none"> In 2013 at the start of the AQ Study, BC Rail advised the VFPA that switch locomotives would be Tier I locomotives by 2025. BC Rail confirmed to the VFPA on May 8, 2019 that, of the three switchers currently servicing the Deltaport Terminal, one of the switchers (originally built in 1989) was rebuilt in 2013 to Tier 0+ and the other two (manufactured in 1986) are Tier 0. In terms of the emission factors, the difference between Tier 0 and Tier I locomotives is very small, and Tier 0+ has slightly lower emissions standards than Tier I for NO_x emissions, as shown in Table IR6-16-1. BC Rail also confirmed that all three switcher locomotives have anti-idling (SmartStart) technologies installed.
9	<p>Environment and Climate Change Canada Topic: Air Quality – Cargo Handling Equipment Emissions April 15, 2019 submission; CEAR Document #1637, pp. 29</p> <p>ECCC recommends that:</p> <ol style="list-style-type: none"> Where practicable, the Proponent should select equipment with low emissions that meet the latest applicable Canadian emissions standards and guidelines. The Proponent should not remove emission control technologies from off-road equipment. The Proponent should implement an emission control technology maintenance program, which may include combined use of individual equipment fuel usage indicators, equipment emission testing, and electronic diagnosis techniques to trigger maintenance. The Proponent should also provide employee training on minimizing off-road equipment idling and the importance of avoiding tampering with emissions control systems. The Proponent commit to meeting the most stringent emission standards and turn equipment over to electric as soon as feasible 	<ol style="list-style-type: none"> The Project will be built and operated with equipment meeting the applicable standards of the day. The VFPA has committed to measures for reducing air emissions from the Project, including all diesel-powered, cargo-handling equipment meeting or exceeding applicable emission standards at time of introduction in 2029 (i.e., Tier IV compliant engines or better) (Commitment #19). It is anticipated that electrified mobile equipment will be used at some point in the operational life of the Project. The VFPA has no intention of removing or tampering with cargo handling equipment emission control technologies. The VFPA is committed to continuously reducing air emissions from diesel-powered cargo handling equipment through its Non-Road Diesel Emissions Program, and is a participant in the Northwest Ports Clean Air Strategy, which includes voluntary targets such as 80% of cargo handling equipment meeting Tier IV interim emission standards or equivalent by 2020. The VFPA has committed to ensuring that all equipment and vehicles will be maintained, inspected, and operated during the construction and operation phases according to manufacturer specifications to ensure peak performance while minimizing air (and noise) emissions (Commitments #58 and #60). Prior to the start of construction and operation, the VFPA has committed to the development of Environmental Training Plans (Commitment #22) and Air Emission Management Plans (Commitment #19) to the satisfaction of a qualified professional(s). The VFPA has also committed to ensuring that a no-idling policy is developed prior to the start of construction (Commitment #57). Operation phase measures include, but are not limited to, all diesel powered cargo handling equipment meeting or exceeding existing emission standards at time of introduction (i.e., for 2029 when the Project could be operational, Canadian Tier 4 standard or better) (Commitment #19). The Project has been designed to be electrified to the extent possible and the VFPA has committed to ensuring that all diesel powered cargo handling equipment meet or exceed existing emission standards at time of introduction (Commitment #19). It is reasonable to assume that some 	Not Applicable

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		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
		mobile equipment, originally defined as being diesel-powered in 2011 based on uncertainties with technological advancements, may be electric by the time it is purchased.	
10	<p>Environment and Climate Change Canada Topic: Coastal Birds – Species at Risk April 15, 2019 submission; CEAR Document #1637, p. 42 ECCC recommends the Proponent:</p> <ul style="list-style-type: none"> Develop a plan, in consultation with the Government of British Columbia, Indigenous groups, and ECCC, that describes: <ul style="list-style-type: none"> The type(s) of physical barriers to be installed, locations, and maintenance regime. The number of nest boxes that would be installed and their locations in the LAA and RAA. Post-installation nest box effectiveness monitoring, to assess usage and productivity, for the duration of the Project. Annual reporting to assess mitigation effectiveness and any need for adaptive management measures. 	<ul style="list-style-type: none"> The VFPA has made several commitments with respect to nest boxes, as follows: The VFPA has committed to implementing a Terrestrial Vegetation and Wildlife Management Plan which considers both the construction and operation phases of the Project (Commitment #27). The plan will be developed in consultation with FLNRORD, the CEA Agency, ECCC, the Follow-up Advisory Committee, and Indigenous groups. The plan will include measures to mitigate effects to barn owls, including but not limited to the following (Commitment #61): <ul style="list-style-type: none"> Identifying, installing, and maintaining artificial nest structures (e.g., nest boxes) within the regional assessment area to enhance barn owl productivity as determined by a qualified professional(s) in potential conjunction with third party organization(s), with the installation of five nest boxes during the first year of construction; and Support the establishment / maintenance of barn owl foraging habitat close to barn owl nest sites through contribution to third party programs. The VFPA has committed to verify the effectiveness of the nest box mitigation measure, as part of the RBT2 Follow-up Program (Commitment #81) (Appendix C, Table C16). The Barn Owl Nest Box Follow-up Program element currently proposes monitoring six to eight times during the barn owl breeding period, years 1, 2, 4, and 5 during the construction period, and for up to five consecutive years post-Project construction. The VFPA has also committed to a Barn Owl Productivity Follow-up Program element to verify the predictions of Project effects on barn owl productivity with mitigation applied, to assist in verifying that the quantity of barn owl offsetting is sufficient to mitigate Project-related effects (Commitment #81) (Appendix C, Table C17). The VFPA will regularly report on the results of the Barn Owl Nest Box Follow-up Program element, and all other Follow-up Program elements, at a frequency corresponding to the monitoring timing. Moreover, the Follow-up Advisory Committee will also independently report on the RBT2 Follow-up Program. 	<p>The VFPA has not committed to physical barriers as mitigation. Since the submission of its response to IR9-01, the VFPA has reviewed again the technical and economic feasibility of installing a physical barrier along Deltaport Way and Roberts Bank Way within the LAA. The VFPA evaluated numerous artificial (non-vegetated) barriers (e.g., chain link fence, concrete wall, wooden fence, evenly spaced vertical poles). A 15 ft high chain link fence was determined to be the only feasible option. All other options required a very large base and footprint to ensure the barrier could withstand anticipated windloads.</p> <p>The VFPA will not be installing a artificial barrier (15 ft high chain link fence) for the following reasons:</p> <ul style="list-style-type: none"> Installing a 15 ft chain link fence is deemed feasible along the causeway but not technically feasible along the existing overpass as the overpass would not be able to support such a structure. Barn owls have been documented flying over the overpass; therefore, not applying mitigation to this area will make the overall measure only partially feasible and less effective. The installation of fencing close to intertidal mudflat habitat will likely increase the danger level of the adjacent mudflat habitat for foraging shorebirds as such a structure can be used by predators (e.g., peregrine falcons) to mask their approach. High risk/dangerous area are avoided by many shorebirds. Therefore, construction of a 15 ft high barrier could essentially remove the adjacent 200-300 m of mudflat habitat for foraging shorebirds. Fencing may also diminish the visual quality, which would have to be further evaluated. After thorough evaluation the VFPA deemed the recommendation mitigation of installation of a physical barrier as disproportionately costly in relation to its expected effectiveness and value to conserving barn owl populations in the RAA The VFPA continue to recommend vehicle speed management along the highway and the installation of barn owl nest boxes to be the most effective mitigation.
11	<p>Environment and Climate Change Canada Topic: Coastal Birds – Artificial Lighting April 15, 2019 submission; CEAR Document #1637, p. 44</p> <ul style="list-style-type: none"> ECCC recommends that a light mitigation and monitoring plan be developed that is specific to concerns regarding coastal and marine birds, that is also based on the most recent scientific literature and best management practices available. 	<ul style="list-style-type: none"> The VFPA has committed to reducing the light emitted from construction equipment and operation phase activities to reduce changes in sky glow and light trespass as part of the Light Management Plans for construction and operation (Commitment #24). The management plans outline several mitigation measures to avoid, reduce, and control light emissions on the terminal. The VFPA has committed to two light-associated Follow-up Program elements: <ul style="list-style-type: none"> The Avian Risk from Artificial Light Follow-up Program element will be designed to verify effects of Project effects on coastal bird population viability, including migratory birds and species at risk, within the local assessment area from artificial light (Commitment #81) (Appendix C, Table C19); and 	Not Applicable

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
		<ul style="list-style-type: none"> The Light Trespass and Sky Glow Follow-up Program element will be designed to verify predictions of Project-related changes in light trespass and sky glow and the corresponding Environmental Light Classification Zones at select points of reception (Commitment #81) (Appendix C, Table C20). 	
12	<p>Environment and Climate Change Canada Topic: Wetlands and Wetland Functions April 15, 2019 submission; CEAR Document #1637, p. 48 ECCC offered recommendations in review of the Proponent's response to the Review Panel's IR11-21 and IR13-17 (see CEAR Document #1454). ECCC recommends the Proponent:</p> <ul style="list-style-type: none"> Update the WFA to incorporate ECCC's aforementioned recommendations. Complete a wetlands cumulative effects assessment. Incorporate the following into an updated Offsetting Plan : <ul style="list-style-type: none"> The results of the updated WFA. The results of a cumulative effects assessment. A minimum 4:1 offsetting ratio to address time lags and technical limitations with offsetting wetland habitats generally, and intertidal mud flat and intertidal and shallow subtidal sand flats in particular. That effectiveness monitoring of offsetting sites be carried out for the duration of the Project. 	<ul style="list-style-type: none"> The VFPA is committed to developing a final Offsetting Plan, which will be included in the application to DFO for a <i>Fisheries Act</i> Authorization (Commitment #40). The plan will identify the following: <ol style="list-style-type: none"> The means by which the ongoing productivity of the Roberts Bank ecosystem, and each of the marine biophysical valued components identified in the EIS, is maintained; and The means by which no-net-loss of wetland function will be achieved for the wetland types identified in the Wetland Functions Assessment (IR11-21 of CEAR Document #934), meeting the intent of the <i>Federal Policy on Wetland Conservation</i> on Federal lands (Government of Canada 1991 or as amended or replaced from time to time). The Offsetting Plan at a minimum will describe: <ul style="list-style-type: none"> the anticipated residual losses to wetland function as a result of the Project; the offsetting measures to be implemented, including the amount and type of offsets required, the selection of offsetting sites, including consideration of Indigenous priorities, and a schedule/timeline for implementation of offsetting measures; how the offsetting will be monitored for effectiveness, as well as for invasive species; the triggers for implementing adaptive measures; contingency measures that will be put into place if the offsetting measures are not successful; and the content and schedule of reporting to agencies and Indigenous groups. The plan will be developed in consultation with regulators, and Indigenous groups. In addition to monitoring requirements that will be met through the Fisheries Act Authorization, the VFPA has committed to verify the effectiveness of the offsetting measures through the Follow-up Program. The Follow-up Program will be developed in consultation with DFO, ECCC, the Follow-up Program Advisory Committee, and interested Indigenous groups. (Commitment #81) (Appendix C, Tables C5, C6, C10). 	<ul style="list-style-type: none"> The VFPA has not committed to update the WFA, or to assess cumulative effects on wetlands. <ul style="list-style-type: none"> The WFA was prepared in accordance with the <i>Federal Policy on Wetland Conservation</i>, and the provincial Wetlands of British Columbia Information Guide. The WFA was conservative in that it assessed wetlands down to 0m CD (equal to mean water depth of 3.1 m and deeper than ECCC's recommendation of 2 m mean) Mean water depth at -2 m CD is 5.1 m. Habitats at these depths are subtidal lower productivity sandy habitat and do not meet the definition of a wetland. The VFPA has sufficiently captured cumulative effects within the WFA A cumulative effects assessment is not required because there is no loss of residual wetland function The VFPA has not committed to incorporate the recommended approaches into the Offsetting Plan, which will be developed in consultation with ECCC. <ul style="list-style-type: none"> While the Offsetting framework does incorporate the results of the WFA, it also incorporates the results of the effects of non-wetlands (such as the subtidal sand area directly affected by the Project). The final Offsetting Plan will take into account effects to wetland and non wetland habitat types. The VFPA does not agree that large offsetting ratios are appropriate for the RBT2 Project. The proposed offsetting presented within the offsetting framework is based on the productivity of the ecosystem using the best available science.
13	<p>Environment and Climate Change Canada Topic: Coastal Birds – Spill Response April 15, 2019 submission; CEAR Document #1637, p. 53 ECCC recommends that:</p> <ul style="list-style-type: none"> A Wildlife Emergency Response Plan be developed that includes the following information (i.e., oil spill response strategy): <ul style="list-style-type: none"> Information (such as population, life cycle and habitat requirements) on the migratory birds and/or species at risk in the Project area, including areas that could be potentially impacted by an oil spill; Information concerning the most appropriate strategy for 	<ul style="list-style-type: none"> The VFPA has committed to incorporate wildlife information (such as species, populations, and spatial and temporal distribution) in the construction and operation Spill Preparedness and Response Plans and measures and strategies required to report, respond, and monitor to spill emergencies (Commitment #26). Since Transport Canada is the lead regulatory agency managing Canada's Marine Oil Spill Preparedness and Response Plan Regime, and the marine shipping area is outside of the VFPA's navigational jurisdiction, it would be inappropriate for the VFPA to make commitments on behalf of Transport Canada with respect to the contents of emergency response plans for the marine shipping area. 	Not Applicable

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	<p>assessing the extent of risk or impact to migratory birds, species at risk, and their habitats;</p> <ul style="list-style-type: none"> o Information on locations and inventories of response equipment, facilities, and personnel that would be accessed to support wildlife response activities; o Information concerning the most appropriate (regionally- and temporally-specific) response strategies for preventing more migratory birds, species at risk, and their habitats from becoming affected; o Information concerning the appropriate response strategies for the treatment of affected migratory birds, species at risk, and their habitats; and o The type and extent of monitoring that would be conducted in relation to various events (e.g., spill event at a marine terminal or along the shipping lane), including information that would be collected prior to, during, and following an event such as an oil spill. 		
14	<p>Fisheries and Oceans Canada Recommendation #1: Fish and Fish Habitat – Water Quality and Sediment April 15, 2019 submission (updated May 19); CEAR Document #1630¹⁴⁶⁶, p. 19</p> <ul style="list-style-type: none"> • Design of any future offsetting habitat concepts should consider potential eutrophication/anoxia and changes in water drainage that could occur as a result of Project construction. 	<ul style="list-style-type: none"> • The VFPA has committed to a final Offsetting Plan (Commitment #40), which will include a description of how the design of offsetting habitat has considered concerns regarding potential eutrophication/anoxia and changes in water drainage. • The VFPA has also committed to developing and implementing a Coastal Geomorphology Follow-up Program element to verify effects predictions on Project-related changes to geomorphic features, sediment erosion and deposition, and eutrophication (Commitment #81) (Appendix C, Table C2). 	Not Applicable
15	<p>Fisheries and Oceans Canada Recommendation #2: Fish and Fish Habitat – Water Quality and Sediment April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 19</p> <ul style="list-style-type: none"> • Monitoring of sediment, and organic and redox indicators is recommended to be included in the follow-up monitoring program to verify the accuracy of the environmental effects predictions. Monitoring should include various spatial and temporal scales specific to 1) both near- and farfield scales; 2) sensitive and critical habitats (e.g. eelgrass habitats, Dungeness Crab nursery); 3) sedimentary provinces; 4) predicted zones of deposition; 5) drainage channels, etc.). 	<ul style="list-style-type: none"> • The VFPA has committed to developing and implementing a Coastal Geomorphology Follow-up Program element to verify effects predictions on Project-related changes to geomorphic features, sediment erosion and deposition, and eutrophication (Commitment #81) (Appendix C, Table C2). The Follow-up Program element has been preliminarily designed to include near- and farfield scales. The program will include monitoring of surface sediment grain size and organic carbon content. The currently proposed design considers the following: <ul style="list-style-type: none"> o Using ortho-rectified aerial photographs to monitor for changes to sensitive habitat types and tideflat characteristics, while using LIDAR and bathymetric surveys to monitor zones of predicted sediment erosion and deposition; and o Planning the spatial and temporal scale of the surveys to account for the differences in nearfield and farfield spatial and temporal effects predicted. • The VFPA has committed to consult with DFO, the Follow-up Advisory Committee, Natural Resources Canada, and interested Indigenous groups. 	Not Applicable
16	<p>Fisheries and Oceans Canada Recommendation #3: Fish and Fish Habitat – Salinity</p>	<ul style="list-style-type: none"> • The VFPA has addressed this recommendation. As part of Undertaking #34, the VFPA provided additional analysis of salinity modelling to 	Not Applicable

¹⁴⁶⁶ CEAR Doc 1630 DFO written submission.

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	<p>April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 21</p> <ul style="list-style-type: none"> To remove sources of uncertainty in the salinity model, the Proponent should conduct new simulations to compare with the data based on the actual Fraser River discharge for the years in which the data were gathered. Also, modelled salinity changes due to the Project over the intertidal zone should be calculated for early spring, the seasonal period of greatest concern. 	<p>compare the 2016 and 2017 monitoring to modelling outputs to evaluate the salinity model effectiveness (CEAR Document #1893¹⁴⁶⁷).</p>	
17	<p>Fisheries and Oceans Canada Recommendation #4: Fish and Fish Habitat – Salinity April 15, 2019 submission (updated May 19); CEAR Document #1630, p.21</p> <ul style="list-style-type: none"> The Proponent should quantify the magnitude of the changes in salinity due to the Project based on simulations with the following river discharges: (i) average river discharge (i.e., a discharge based on the long-term mean), (ii) above average discharge (long-term plus one standard deviation) and (iii) below average discharge (long-term mean minus one standard deviations). 	<ul style="list-style-type: none"> The VFPA has committed to verifying salinity predictions through a Follow-up Program element (Commitment #81) (Appendix C, Table C15), wherein modelled predictions of salinity changes in the intertidal water column will be evaluated during and following Project construction. The Follow-up Program will be developed in consultation with the Follow-up Advisory Committee, DFO, MFLNRORD, and interested Indigenous groups. 	<ul style="list-style-type: none"> The VFPA assessed Roberts Bank ecosystem model sensitivity to salinity for the high and low Fraser River flow scenarios, as presented in EIS Appendix 10-C. The VFPA has not committed to run average flow scenarios. Running an average flow scenario would require creation of a ‘synthetic’ year, which would also require ‘synthetic’ discharge assumptions from the major contributing tributaries. The model would therefore be assessing entirely theoretical conditions, thus diminishing the accuracy of the outcome.
18	<p>Fisheries and Oceans Canada Recommendation #5: Fish and Fish Habitat – Avoidance Measures April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 23</p> <ul style="list-style-type: none"> Additional mitigation measures, in addition to timing of work, should be considered in the Proponent’s construction mitigation plans in order to ensure harm or mortality is minimized as much as possible. 	<ul style="list-style-type: none"> In addition to applying DFO’s Least Risk Timing Windows for gravid crab (Commitment #49) and juvenile salmon (Commitment #53), the VFPA has committed to a number of relevant environmental management plans, as part of the RBT2 Construction Environmental Management Plan, that will have mitigation measures to reduce Project-related effects; examples listed below: <ul style="list-style-type: none"> Construction Compliance Management Plan (Commitment #18); Environmental Training Plan (Commitment #22); Indigenous Monitors Plan (Commitment #31); Dredging and Sediment Discharge Plan (Commitment #30); Light Management Plan (Commitment #24); Marine and Terrestrial Invasive Species Management Plan (Commitment #35); Marine Species Management Plan (Commitment #34); Sediment and Erosion Control Plan (Commitment #36); Spill Preparedness and Response Plan (Commitment #26); Underwater Noise Management Plan (Commitment #37); Waste and Hazardous Materials Management Plan (Commitment #28); Water Quality Management Plan (Commitment #29); and Wetland Management Plan (Commitment #39); The VFPA has also committed to species specific mitigation measures to minimize harm or mortality; examples listed below: <ul style="list-style-type: none"> Ensuring that the caisson face, as part of the terminal structure, is designed to include fish refuge habitat (Commitment #8); Minimizing handling of crab, and to working with Indigenous groups, in implementation of crab salvage mitigation (Commitment #51); and Deploying hydroacoustic technologies to detect in real time and guide dredging activities away from schools of migrating eulachon 	<p>Not Applicable</p>

¹⁴⁶⁷ CEAR Document #1893 Undertaking #34: From the Vancouver Fraser Port Authority - Salinity Modelling Results Verification.

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
		(Commitment #45); and <ul style="list-style-type: none"> In addition, the VFPA has committed in the Marine Species Management Plan to provide a description of potential effects to marine species and identification of sensitive life phases (Commitment #34). 	
19	<p>Fisheries and Oceans Canada Recommendation #6: Fish and Fish Habitat – Avoidance Measures April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 23</p> <ul style="list-style-type: none"> The Proponent should monitor the effectiveness of use of timing windows to avoid Project interactions with juvenile salmon and gravid female Dungeness Crabs during Project construction. Contingency measures should be identified and employed if identified least risk timing windows are found to not be effective. 	Not Applicable	<ul style="list-style-type: none"> The VFPA has not committed to monitor the presence of sensitive life stages when construction work is occurring. The VFPA is confident that its commitments for fish and invertebrates mitigation are sufficient. The VFPA is committed to describing in the Marine Species Management Plan potential effects to marine species and sensitive life phases that may be present in the Project area during the least risk timing windows (Commitment #34). This will in turn inform, direct and apply mitigation measures to consider sensitive life phases of fish and invertebrates, essentially absolving the need to monitor the effectiveness of least risk timing windows. During the least risk timing windows, the VFPA is committed to a number of relevant Environmental Management Plans, as part of the RBT2 Construction Environmental Management Plan, that will describe mitigation measures to reduce Project-related effects on marine species and sensitive life phases (for plan examples, see list above for DFO Recommendation #5). The VFPA is also committed to consulting with Indigenous groups, appropriate agencies, and specific stakeholder groups on the development of the Construction Environmental Management Plan during the Project's permitting phase. Additionally, as part of the Marine Species Management Plan, the VFPA is committed to describing the standard processes and procedures, including details on the timing to salvage and relocate marine species, prior to infilling of all containment dykes (i.e., terminal and causeway). Project construction activities that will be occurring outside containment dykes, in particular dredging at the dredge basin, will occur at depths of approximately –20 m CD that do not overlap with the distribution of out-migrating juvenile salmon, which typically occupy surface waters (0 to –5 m CD) when rearing at Roberts Bank. Outside the fisheries-sensitive window for gravid Dungeness crab, the VFPA is confident that gravid Dungeness crab will not be present in the dredge basin, leading to no interaction with and no injury or mortality as a result of Project-related dredging. The length of the fisheries-sensitive window for crab is conservative, equal to 5.5 months, providing adequate buffer to account for annual variability in the timing and duration of brooding.
20	<p>Fisheries and Oceans Canada Recommendation #7: Fish and Fish Habitat – Avoidance Measures April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 23</p> <ul style="list-style-type: none"> Detailed construction mitigation plans should be developed with consideration to sensitive life phases of fish and invertebrates that are not protected by the identified least risk timing windows. 	<ul style="list-style-type: none"> The VFPA has committed in the Marine Species Management Plan to a description of potential effects to marine species and identification of sensitive life phases (Commitment #34), which will in turn inform, direct and apply mitigation measures to consider sensitive life phases of fish and invertebrates. 	Not Applicable
21	<p>Fisheries and Oceans Canada Recommendation #8: Fish and Fish Habitat – Mitigation for</p>	<ul style="list-style-type: none"> The VFPA has committed to a Marine Species Management Plan (Commitment #34), which will include the standard processes and 	Not Applicable

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	Injury and Direct Mortality April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 25 <ul style="list-style-type: none"> To maximize the effectiveness of fish and crab salvage mitigation, salvage should be conducted immediately prior to construction-related disturbance. 	procedures, including details on timing to salvage and relocate marine species. Moreover, the VFPA has committed to consult on the draft plan with CEA Agency, DFO, and Indigenous groups.	
22	Fisheries and Oceans Canada Recommendation #9: Fish and Fish Habitat – Mitigation for Changes in Acoustic Environment April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 25 <ul style="list-style-type: none"> The Construction Compliance Monitoring Plan should detail contingency measures that would be employed should monitoring reveal that mitigation measures are not effectively reducing underwater noise to levels that would prevent injury and mortality of fish. 	<ul style="list-style-type: none"> The VFPA has committed to a construction Compliance Management Plan (Commitment #18), which will describe the monitoring and reporting framework to verify compliance with regulatory requirements, the Construction Environmental Management Plan and sub-plans. The plan will describe the roles and responsibilities of the four-party compliance management team with regards to planning, implementing measures, monitoring compliance, and implementing corrective actions, if required. In the case of underwater noise, the VFPA will develop an Underwater Noise Management Plan (Commitments #37 and #38) to the satisfaction of a qualified professional(s) and in consultation with DFO, for implementation during construction. The plan will also consist of procedures in cases of sound exceedances, and mitigation measures that will prevent injury to marine fish and hearing injury and behavioural change to marine mammals during impact pile driving, including but not limited to sound reduction or dampening methods or technologies. 	Not Applicable
23	Fisheries and Oceans Canada Recommendation #10: Fish and Fish Habitat – Offsetting April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 29 <ul style="list-style-type: none"> In developing the final offsetting plan, the Proponent should use more than one approach to assess the benefits of offsetting. 	<ul style="list-style-type: none"> As part of the final Offsetting Plan (Commitment #40), the VFPA has committed to including more than one approach to assessing the benefits of offsetting, which could include, for example, estimating the production per functional group per habitat type. 	Not Applicable
24	Fisheries and Oceans Canada Recommendation #11: Fish and Fish Habitat – Offsetting April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 29 <ul style="list-style-type: none"> Additional offsite opportunities within the Fraser River estuary to remediate, create, or enhance fish and invertebrate habitats should be included in the final offsetting plan. 	<ul style="list-style-type: none"> The VFPA has committed enhancing its proposed offsetting for the final Offsetting Plan, in collaboration with Indigenous groups. The enhanced proposed offsetting will be focused on priority species, such as Chinook salmon, and priority habitats, including potential offsite opportunities (Commitment #41). 	Not Applicable
25	Fisheries and Oceans Canada Recommendation #12: Fish and Fish Habitat – Offsetting April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 29 <ul style="list-style-type: none"> The final offsetting plan should be developed in consultation with potentially affected Indigenous groups and DFO to be consistent with DFO's offsetting policy. 	<ul style="list-style-type: none"> The VFPA has committed to develop the final Offsetting Plan in consultation with Indigenous groups and regulators such as DFO (Commitment #40). The VFPA has also committed to enhancing the proposed offsetting in consultation with Indigenous groups (Commitment #41). 	Not Applicable
26	Fisheries and Oceans Canada Recommendation #13: Fish and Fish Habitat – Characterization of Residual Effects to Fish and Invertebrates April 15, 2019 submission (updated May 19); CEAR Document	<ul style="list-style-type: none"> The VFPA has committed to three Follow-up Program elements designed to evaluate the Roberts Bank ecosystem model forecasts and verify the effects predictions, including indirect effects, which are linked to fish, invertebrates, and their habitats (Commitment #81). These are listed below: 	Not Applicable

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	<p>#1630, p. 33</p> <ul style="list-style-type: none"> The follow-up monitoring program should be designed to verify the environmental effects predictions related to indirect effects of the Project on fish, invertebrates and their habitats including the predicted positive indirect effects on juvenile salmon habitat and prey. 	<ul style="list-style-type: none"> Roberts Bank Ecosystem Model Marine Vegetation Follow-up Program element (Appendix C, Table C3), including eelgrass and tidal marsh habitats which are juvenile salmon habitats; Roberts Bank Ecosystem Model Infauna Follow-up Program element (informed by element described in Appendix C, Table C14), which are juvenile salmon prey; and Roberts Bank Ecosystem Model Rockfish and Lingcod Follow-up Program element (informed by element described in Appendix C, Table C14). 	
27	<p>Fisheries and Oceans Canada Recommendation #14: Fish and Fish Habitat – Characterization of Residual Effects to Fish and Invertebrates April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 33</p> <ul style="list-style-type: none"> The final offsetting plan should include habitats that support productivity of Pacific salmon and be developed in consultation with potentially affected Indigenous groups and DFO to be consistent with DFO's offsetting policy. 	<ul style="list-style-type: none"> The VFPA will consider habitats that support productivity of Pacific salmon, as part of the selection of final offsetting habitats. The offsetting concepts proposed within the offsetting framework include habitats that support Pacific salmon, notably eelgrass and intertidal marsh. The VFPA has also committed to enhancing offsetting focused on priority species, such as Chinook salmon, and priority habitats (Commitment #41), as identified through planned future consultation with Indigenous groups and DFO. The VFPA has committed to developing the final Offsetting Plan in consultation with Indigenous groups and regulators, such as DFO (Commitment #40). 	Not Applicable
28	<p>Fisheries and Oceans Canada Recommendation #15: Fish and Fish Habitat – Characterization of Residual Effects to Fish and Invertebrates April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 33</p> <ul style="list-style-type: none"> To verify predictions of potential effects of terminal placement on the ability of juvenile salmon to access important feeding and rearing grounds in the inter-causeway area, follow up monitoring should include monitoring of distribution of juvenile salmon across Roberts Bank following terminal placement. 	<ul style="list-style-type: none"> The VFPA has committed to evaluate the feasibility of developing a Juvenile Salmon Density Follow-up Program element to verify effects predictions of Project effects on productivity of juvenile salmon, including chum and Chinook productivity, using as monitoring targets juvenile salmon distribution and density north and south of the Roberts Bank causeway (Commitment #81) (Appendix C, Table C9). The VFPA has further committed that, if it is determined that it is not reasonable to attribute detectable change in juvenile salmon density to the Project, alternatives to the Follow-up Program element will be considered at that time, including potentially additional offsetting (CEAR Document #1906¹⁴⁶⁸). 	Not Applicable
29	<p>Fisheries and Oceans Canada Recommendation #16: Fish and Fish Habitat – Characterization of Residual Effects to Fish and Invertebrates April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 34</p> <ul style="list-style-type: none"> Development of construction mitigation plans should consider the potential presence of spawning Herring during construction. 	<ul style="list-style-type: none"> The VFPA has committed to providing a description of potential effects to marine species and identification of sensitive life phases, such as herring spawning as part of the Marine Species Management Plan (Commitment #34). The plan will also identify measures to reduce effects to sensitive life phase, such as those listed below: <ul style="list-style-type: none"> The juvenile salmon timing window for waters shallower than -5 m CD, whereby no in-water construction activities will occur between March 1 and August 15 covering much of the herring peak migration which occurs in March (Commitment #53); and Monitoring for the potential presence of spawning herring during construction activities outside the juvenile salmon timing window, in mid- to late February, in areas that spatially overlap with herring spawning habitats (e.g., native eelgrass) (Commitment #50). 	Not Applicable
30	<p>Fisheries and Oceans Canada Recommendation #17: Fish and Fish Habitat – Characterization of Residual Effects to Fish and</p>	<ul style="list-style-type: none"> The VFPA has committed to provide a description of potential effects to marine species, such as eulachon, and the identification of sensitive life phases as part of the Marine Species Management Plan (Commitment 	Not Applicable

¹⁴⁶⁸ CEAR Document #1906 Hearing Transcript volume 18: June 12, 2019.

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	<p>Invertebrates</p> <p>April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 35</p> <p>Development of construction mitigation plans should consider the potential presence of Eulachon during construction.</p>	<p>#34).</p> <ul style="list-style-type: none"> The VFPA has committed, as part of the Dredging and Sediment Discharge Plan, to measures related to the protection of marine species (Commitment #30). The VFPA has committed to develop eulachon-specific mitigation that will be used during dredging activities that have the potential to disturb returning eulachon. The VFPA will undertake a hydroacoustic pre-construction test/study in the Project area, to aid in reconnaissance, testing, and effectiveness of deploying hydroacoustic technologies (e.g., split-beam echosounder) to detect eulachon. During the month of April, and prior to and during dredging in the dredge basin, the VFPA will deploy hydroacoustic technologies (e.g., split-beam echosounder) to detect eulachon in real time and guide dredging activities away from schools of migrating eulachon (Commitment #45). 	
31	<p>Fisheries and Oceans Canada</p> <p>Recommendation #18: Fish and Fish Habitat – Characterization of Residual Effects to Fish and Invertebrates</p> <p>April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 36</p> <ul style="list-style-type: none"> For the protection of Sand Lance, terminal lighting should not result in lighting of 100 lux or greater near the sea bed. 	<ul style="list-style-type: none"> As part of the Operation Environmental Management Plan, the VFPA will develop and implement a Light Management Plan, which includes the commitment to ensure that nighttime terminal lighting does not exceed 100 lux or greater on the adjacent sea bed, within 50 m of the terminal (Commitment #24). The VFPA has also committed to a Light Trespass and Sky Glow Follow-up Program element to verify effects predictions and mitigation effectiveness. The Follow-up Program element will verify that the light mitigation measures at the terminal achieve light levels less than 100 lux on the adjacent sea bed, during nighttime, within 50 m of the terminal (Commitment #81 and Appendix C, Table C20). 	Not Applicable
32	<p>Fisheries and Oceans Canada</p> <p>Recommendation #19: Fish and Fish Habitat – Characterization of Residual Effects to Fish and Invertebrates</p> <p>April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 36</p> <ul style="list-style-type: none"> The final Dredging and Sediment Discharge Management plan should include measures to reduce the potential direct mortality of Sand Lance during dredging activities. 	<ul style="list-style-type: none"> The VFPA has committed, in the Marine Species Management Plan, to provide a description of potential effects to marine species, such as Pacific sand lance, and the identification of sensitive life phases (Commitment #34). The VFPA has committed, as part of the Dredging and Sediment Discharge Plan, to measures related to the protection of marine species (Commitment #30). Measures to reduce effects to the species include the following: <ul style="list-style-type: none"> The gravid Dungeness crab timing window for waters deeper than -5 m CD, whereby no in-water construction activities will be scheduled between October 15 and March 31, thus protecting prolonged periods of burying in suitable sediments by overwintering Pacific sand lance (Commitment #49), as per the Marine Species Management Plan (Commitment #34); Applying gradual start-up or ramping of construction activities, such as dredging, to allow marine species to habituate or temporarily leave the area, as per the Underwater Management Plan (Commitment #37); and Site-specific water quality objectives and thresholds based on either turbidity or TSS models, criteria for the location of real-time monitoring of turbidity, and criteria, protocol, and procedures to stop construction activities to address non-compliances, as part of the Dredging and Sediment Discharge Plan (Commitment #30). 	Not Applicable
33	<p>Fisheries and Oceans Canada</p> <p>Recommendation #20: Fish and Fish Habitat –</p>	<ul style="list-style-type: none"> The VFPA has committed to several measures to address potential effects on access to Dungeness Crab harvesting areas by Indigenous groups. 	Not Applicable

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	<p>Characterization of Residual Effects to Fish and Invertebrates</p> <p>April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 38</p> <ul style="list-style-type: none"> Potential impacts on access to the Dungeness Crab fishery resource by Indigenous groups should be addressed by the Proponent. 	<p>This consultation will include the timing of implementation and spatial area (including configuration) of the proposed expansion of the area closed to commercial and recreational crabbing (Commitment #62). The VFPA has also committed to specific consultation with Tsawwassen First Nation and Musqueam First Nation, and other Indigenous groups (as appropriate), and DFO on the terms of licencing to use the navigational closure areas for domestic or FSC crab harvesting purposes (Commitment #73).</p> <ul style="list-style-type: none"> The VFPA will continue to support access for Indigenous crabbing for domestic or food, social or ceremonial purposes within the area closed to commercial and recreational crabbing (Commitment #74). Further, prior to the start of construction and operation, the VFPA will develop communication protocols for the relevant phase in collaboration with Indigenous groups to ensure Indigenous groups have current information about planned and unplanned construction and operation activities and procedures for maintenance of safety that may impact Indigenous groups' Current Use access or quality of experience, and to identify additional measures where necessary (Commitment #75). The VFPA also commits to abiding by the existing memorandum of agreement with Tsawwassen First Nation, (Commitment #70), and to negotiate in good faith with Musqueam First Nation on the development of a mutual benefit agreement (Commitment #71). The VFPA will also abide by mutual benefit agreements that are in place, and will continue to negotiate in good faith with identified Indigenous groups towards mutual benefit agreements that are in development (Commitment #72) 	
34	<p>Fisheries and Oceans Canada</p> <p>Recommendation #21: Marine Mammals – Southern Resident Killer Whale</p> <p>April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 42</p> <ul style="list-style-type: none"> A context-specific analysis of acoustic impacts on SRKW should be undertaken. 	Not Applicable	<ul style="list-style-type: none"> The VFPA is confident that the analysis undertaken to assess potential acoustic impacts to SRKW incorporated context. The VFPA's analysis to assess potential effects on SRKW from underwater noise was highly conservative and used the best available science from U.S. and Canadian sources, under the advisement of the TAG. For example, to be conservative it was assumed that any behavioural response or acoustic masking that occurred would result in a total loss of foraging success (i.e., the VFPA assumed that SRKW were foraging 100% of the time, when, in reality, it is 40-67%). The VFPA developed killer whale-specific behavioural effects thresholds that captured the most important aspects of context. This was achieved by analyzing TAG-recommended datasets. The dose-response functions used in the assessment of potential behavioural effects of underwater noise on SRKW was the most supported methodology by the SRKW TAG participants, and is a leading approach used by marine mammal scientists to assess potential effects of underwater noise on at-risk marine mammals. DFO CSAS stated that the specific behavioural effect thresholds developed for this assessment were a "superior approach" to previously used thresholds in environmental assessments in Canada, and "the severity of killer whale behaviour responses are based on the 2007 Southall et al. severity scores that were developed by international marine mammal experts and are the best available."¹⁴⁶⁹ For these reasons, VFPA is confident that "context" was adequately

¹⁴⁶⁹ CEAR Doc #919. DFO Canadian Science Advisory Secretariat. Technical Review of Roberts Bank Terminal 2 Environmental Impact Statement and Marine Shipping Supplemental Report: Effects on Marine Mammals. At p.10.

#	Agency Recommendation	VFPA Response	
		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
			considered within the assessment.
35	<p>Fisheries and Oceans Canada Recommendation #22: Marine Mammals – Southern Resident Killer Whale April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 45</p> <ul style="list-style-type: none"> No noise generating activities should be conducted at night or during fog unless alternate technologies are proven effective and can be implemented to improve detection of SRKW during these activities. 	Not Applicable	<ul style="list-style-type: none"> The VFPA is confident that monitoring will effectively detect SRKW during nighttime, foggy, or low visibility conditions. As presented within the EIS, impact pile-driving is the only potential Project construction activity that has the potential to produce sound that could cause hearing injury to SRKW. The VFPA has committed to developing and implementing Marine Mammal and Underwater Noise Management Plans as part of the Construction Environmental Management Plan. These plans will describe the mitigation measures to be applied during construction, to monitor and mitigate potential effects to marine mammals related to Project construction activities, including the roles and responsibilities for Marine Mammal Observers, and underwater noise monitoring requirements to ensure construction activities are within appropriate underwater noise levels, and establishing and maintaining a buffer zone wherein certain construction activities will cease in the event that a marine mammal is present. The VFPA is confident that the monitoring efforts will effectively detect SRKW during nighttime, foggy, or low visibility conditions. DFO agreed with the VFPA that, during construction, with the use of appropriate mitigation measures, "there is a good opportunity that there is no residual impact, understanding that not all mitigation measures completely remove all risk." To be conservative, the VFPA has committed to limiting pile driving (both impact and vibratory) to only occur during daylight hours (Commitment #33). In addition, the VFPA has committed to monitoring developments in the emerging technologies (i.e., RADAR, active sonar, and thermal IR) that could potentially be used during periods of darkness or poor visibility, if feasible (Commitment #33). With mitigation, Project construction is not expected to result in adverse residual underwater noise-related effects to marine mammals, including SRKW. The VFPA is confident that Project construction will not contribute to the underwater acoustic environment such that SRKW are unable to carry out their life functions.
36	<p>Fisheries and Oceans Canada Recommendation #23 and #27: Marine Mammals – Southern Resident Killer Whale April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 46, p. 57</p> <ul style="list-style-type: none"> Continued evaluation of mitigation options such as vessel slow down and lateral displacement within the context of the overall Project-related vessel noise is required to determine the effectiveness of these as mitigation measures. Modelling studies would be needed to assess the efficacy of the potential mitigation measures using noise metrics (broadband level noise, communication masking noise, and echolocation masking 	<ul style="list-style-type: none"> Given the results of the 2018 Mercator Report (CEAR Document #1362¹⁴⁷⁰), rather than 260 additional vessels being associated with the Project annually, it is predicted that there will be no additional ships in the marine shipping area compared to the future condition without the Project. In the future with the Project, 104 vessels will be diverted to Roberts Bank annually. Those ships are not expected to produce more noise or air emissions (Undertaking #36, CEAR Document #1900¹⁴⁷¹). The VFPA, outside of the RBT2 Project, will continue to support regional initiatives that are underway to evaluate effectiveness of measures to reduce regional marine shipping underwater noise, such as vessel slow down and lateral displacement, as the lead on the ECHO Program (Appendix B, Table B2). 	Not Applicable

¹⁴⁷⁰ CEAR Document #1362 From the Vancouver Fraser Port Authority to the Review Panel re: 2018 Container Vessel Call Forecast Study and Ship Traffic Information Sheet.

¹⁴⁷¹ CEAR Document #1900 Undertaking #36: From the Vancouver Fraser Port Authority - Vessel Class Descriptions.

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		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	<p>noise).</p> <ul style="list-style-type: none"> Efforts to address increased shipping noise, such as those provided through the current ECHO program, should be continued and analysis should be undertaken to ensure that Project-related noise increases are mitigated. 	<ul style="list-style-type: none"> The VFPA, outside of the RBT2 Project, has entered into a <i>Species at Risk</i> section 11 conservation agreement with the Government of Canada. The aim of this first of its kind agreement is to reduce the acoustic and physical disturbance to SRKW by commercial vessels in Pacific Canadian waters (Appendix B, Table B2). The VFPA is committed to actively participate as a key stakeholder in the OPP Working Group and other relevant federal initiatives, and to be involved in consultation and collaboration with Indigenous groups, other regulatory agencies, and stakeholders, as relevant to marine shipping associated with the Project (Appendix B, Table B1, Commitment #2). Table B2 of Appendix B outlines certain regional initiatives and programs that have the potential to reduce adverse effects of marine shipping. 	
37	<p>Fisheries and Oceans Canada Recommendation #24: Marine Mammals – Humpback Whale April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 49</p> <ul style="list-style-type: none"> Ship strike likelihood (lethal and non-lethal) based on updated and effort-corrected information on Humpback Whale density in the area affected by Project-related vessels should be evaluated. 	Not Applicable	<ul style="list-style-type: none"> The VFPA has not committed to reassessing the likelihood of ship strikes based on updated Humpback whale density information. The VFPA is confident in its assessment conclusions that ship strike likelihood with humpback whale is not significant. Container ships travel slowly from international shipping lanes under the care and control of a marine pilot. By the time the container vessels enter the VFPA's jurisdiction, they are travelling at a speed of approximately 6 knots; the chances of a vessel strike occurring at this speed are very low. As presented within the EIS, reported humpback-vessel strike incidents in B.C. waters have mainly involved small vessels (less than 10 m long), typically capable of speeds up to 25 to 30 knots (46 to 55 km/hr). While impacts to individual whales can be severe, current population growth trends for humpback whales and apparent frequency of vessel strikes in B.C. indicate that vessel strikes are not affecting overall population viability at this time and risk to the population is low, and determined to be negligible. Based on the 2018 Mercator Report, there will be no additional container ship traffic in the marine shipping area if RBT2 is built. The VFPA determined that it is not possible to undertake a quantitative strike risk analysis as there is insufficient data relating to humpback whales' presence in the marine shipping area. DFO agreed with this determination. Nevertheless, the VFPA completed a qualitative assessment of the risk of vessel strikes to humpback whales in the marine shipping area, which concluded that incremental effects of vessel strikes from RBT2-associated vessel traffic were determined to be not significant, occurring infrequently above and beyond strikes occurring during existing conditions. However, as stated above, more recent data per the 2018 Mercator Report predicts no increase in number of vessels transiting the marine shipping area, further confirming that the strike risk is unlikely to significantly increase from existing conditions. In addition, when the Project is anticipated to be fully operational (i.e., 2035), the speed of larger vessel classes transiting the marine shipping area are expected to be the same or lower than those transiting today because newer vessels in each size class generally have smaller main engines than other vessels of the same size class, and, smaller main engines are typically associated with slower maximum design speeds. The increased vessel size expected to call at Roberts Bank does not change the VFPA's assessment of the potential for vessel strikes with marine mammals. While increasing vessel size can increase risk with

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			<p>respect to vessel strikes, the difference between the size of container ships calling at Roberts Bank during existing conditions and in the future (i.e. 2035) is immaterial with respect to the risk of a serious injury or death to a marine mammal from a vessel strike, because the speed at which they will be travelling is expected to be the same or lower than those transiting today.</p> <ul style="list-style-type: none"> The VFPA is confident that the vessel strike risk would not increase from existing conditions with increased container vessel size. The VFPA share the concerns for marine mammals and acknowledge their importance to the Salish Sea, the public, and Indigenous groups. As a dedicated steward of the Fraser River Estuary, and aligned with its aspiration to become the world's most sustainable port, the VFPA has committed to supporting initiatives that focus on the effective management of marine mammals, such as OPP, the Whale Initiative, and the VFPA-led ECHO Program. For example, through the ECHO Program, the VFPA has been supporting DFO on a project using aerial surveys to evaluate the distribution and habitat of large baleen whales, and evaluating the potential for vessel strikes along shipping lanes off the west coast of Vancouver Island. In addition, the VFPA believes education and awareness supports the broader suite of mitigation measures that will eliminate, reduce, or control effects. For example, the VFPA is committed to continued distribution of <i>The Mariner's Guide to Whales, Dolphins and Porpoises of Western Canada</i> to marine pilots working within VFPA jurisdiction, which is intended as a mitigation measure for reducing strike risk of cetaceans by raising awareness of marine mammals that utilise Roberts Bank and the surrounding areas to encourage marine pilots to modify behaviour, when safe to do so, thereby reducing the potential interactions between whales and vessels.
38	<p>Fisheries and Oceans Canada Recommendation #25: Marine Mammals – Humpback Whale April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 50</p> <ul style="list-style-type: none"> Further measures to reduce ship collision risk, such as reduction in vessel speeds, should be evaluated for possible implementation. 	<ul style="list-style-type: none"> The VFPA is committed to actively participate as a key stakeholder in the OPP Working Group or other federal initiatives, and to coordinate the VFPA's own consultation with Indigenous groups on Project-associated marine shipping, in alignment with those initiatives (Appendix B, Table B1, Commitment #2). Table B2 of Appendix B outlines certain regional initiatives and programs that have the potential to reduce adverse effects of marine shipping. 	Not Applicable
39	<p>Recommendation #26: Marine Mammals – Southern Resident Killer Whale April 15, 2019 submission (updated May 19); CEAR Document #1630, p. 56</p> <ul style="list-style-type: none"> To estimate the effects of acoustic disturbance to SRKW critical habitat associated with construction and operation of the Project, areas of high SRKW use and model noise maps should be used to estimate the area that will be, at least temporarily, degraded by acoustic disturbance during construction and operation of the Project. 	Not Applicable	<ul style="list-style-type: none"> The VFPA has not committed to model potential effects of acoustic disturbance associated with areas of high SRKW use. Based on the 2018 Mercator Report, the VFPA has assessed and modelled the anticipated noise footprint associated with project construction and terminal operation. As presented in the VFPA's response to IR5-48, underwater noise and the presence of SRKW is dynamic in space and time, and therefore it is not possible to determine an absolute area where SRKW could experience acoustic disturbance. Modelling was used to inform the EIS assessment of predicted underwater noise for in-water construction activities, and contour maps of underwater noise and areas of potential behavioural and hearing effects to SRKW were presented in the EIS. The EIS represents a highly conservative scenario, of which the predicted annual average incremental contribution of Project terminal operation to the acoustic environment was 4.8 dB at the proposed terminal (i.e. the

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			<p>Roberts Bank station).</p> <ul style="list-style-type: none"> Using the more realistic scenario based on the 2018 Mercator Report projections, the VFPA re-assessed and re-modelled the anticipated noise footprint associated with Project terminal operation. The resultant incremental annual average contribution of Project terminal operation to the existing underwater acoustic environment has been reduced to 1.8 dB at the proposed terminal. The VFPA has committed to a Follow-up Program element to verify effects predictions on Project-related changes to underwater noise during terminal operation. The Follow-up Program will be designed within an adaptive management framework in consultation with the Follow-up Advisory Committee, DFO, and Indigenous groups. If the results of the monitoring program indicate material departure from the prediction, and if evaluation/diagnosis has confirmed that the cause is Project-related, corrective management action will be initiated. The VFPA remains confident that the incremental contribution of terminal operations will not contribute to the underwater acoustic environment such that SRKW are unable to carry out their life functions, and will not jeopardize the survival or the recovery of the population.
40	<p>Health Canada Recommendation #3.1-1: Air Quality April 15, 2019 submission (CEAR Document #1608¹⁴⁷²), p. 6</p> <ul style="list-style-type: none"> Assess the potential for Indigenous peoples to be exposed to higher levels of air pollutants over water during Project construction and operation, and investigate additional mitigation measures. Investigate additional mitigation measures to minimize the concentration of air pollutants, such as NO₂ and PM_{2.5} resulting from Project activities, and acknowledge that there are no safe levels of exposure (e.g., to NO₂ and PM_{2.5}). 	<ul style="list-style-type: none"> The potential for Indigenous harvesters to be exposed to air emissions has been assessed, as reflected in the EIS, and subsequent information requests in package 6, package 12, package 13, and package 14 (CEAR Document #934¹⁴⁷³). The VFPA has committed to an additional measure that will serve to reduce exposure to air emissions. Access to marine areas near construction activities will be restricted for the safety of all non-construction related marine users (Commitment #66). The restricted area will include the waters between the Project footprint and Westshore Terminals, and will be defined in the Land and Marine Traffic Management Plan (Commitment #32). The restriction will be developed in consultation with Indigenous groups and be communicated in accordance with the construction Communications Plan (Commitment #21). The Air Emission Management Plan (Commitment #19) for construction and operation phases will include a suite of standard emission control measures for both phases, including dust suppression, and use of Tier 4 equipment. Adaptive mitigation measures, such as activity reductions, may also be implemented as part of the air quality follow-up program for human health. 	Not Applicable

¹⁴⁷² CEAR Doc 1608, Health Canada written submission.

¹⁴⁷³ CEAR Doc 934, VFPA compilation of IRs.

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41	<p>Health Canada Recommendation #3.1-2: Air Quality April 15, 2019 submission (CEAR Document #1608), p. 8-9</p> <ul style="list-style-type: none"> Monitor air quality over the life of the project as a means of confirming model predictions, with (future) station location(s) to be determined in consultation with local Indigenous and non-Indigenous communities near the proposed terminal and along the marine shipping route (within the 12 nautical mile limit) of Canada's territorial sea). 	<ul style="list-style-type: none"> The VFPA has committed to an air quality monitoring program as part of the Air Emission Management Plans for construction and operation (Commitment #19). Monitoring will be conducted in the local study area pre-construction, during construction, and during operation, with the specific duration and frequency of monitoring and reporting to be established during the development of the Air Emission Management Plans, in consultation with Indigenous groups, municipalities, and regulators 	<ul style="list-style-type: none"> The VFPA has not committed to air quality monitoring for the life of the Project. Durations of the monitoring programs will be developed in consultation, and it may not be practical to continue monitoring beyond the point of maximum Project operations, once the worst case operation emissions have been recorded. The VFPA has not committed to additional permanent air quality monitoring stations. Station T39 provides representative data and captures emissions from the Roberts Bank terminals, as outlined in response to IR6-09. The VFPA has not committed to monitoring along the marine shipping route. Transport Canada is the lead regulator of marine shipping, and the responsibility for monitoring in the marine shipping area rests with federal agencies (e.g., ECCC). There are projected to be no additional vessels transiting the marine shipping area in the future with or without the Project.
42	<p>Health Canada Recommendation #3.1-3: Air Quality April 15, 2019 submission (CEAR Document #1608), p. 9</p> <ul style="list-style-type: none"> Use the most stringent, applicable, air quality criteria (e.g., CAAQS) as an indicator to inform the results of the air quality monitoring program. Present details regarding how air quality mitigation, including triggers for implementing adaptive management measures, would be implemented prior to Project construction. 	<ul style="list-style-type: none"> The VFPA has committed to developing the Air Emission Management Plan in consultation with regulators (as listed in Commitment #19) and Indigenous groups, and to providing the details of environmental management plans, including the Air Emission Management Plan, to the parties for review 90 days prior to construction. The draft plans will include details on mitigation and triggers for adaptive management measures. The Follow-Up Program for human health related to air quality (Table C21) indicates that monitoring data for air quality will be compared to applicable air quality criteria. 	Not Applicable
43	<p>Health Canada Recommendation #3.2-1: Traditional Foods April 15, 2019 submission (CEAR Document #1608), p. 12</p> <ul style="list-style-type: none"> Develop a monitoring program for traditional marine foods, in consultation with Indigenous peoples harvesting from the Project area, to assess the potential risk to human health before, during and after Project construction The monitoring program should verify baseline human health risks from consuming crab tissues and other traditional foods identified by Indigenous groups prior to construction, through the assessment of a more complete set of COPCs, including: the trace elements used to assess bivalves in the EIS, PCB congeners (coplanar and non-coplanar), PCDD/PCDF congeners, PAHs, and formaldehyde; The monitoring program should be informed by the predicted locations of construction-generated sediment plumes and total suspended sediment levels expected during dredging and supernatant discharge, as well as harvesting locations to ensure that traditional foods sampling occurs in appropriate areas. Use the results of the monitoring program to inform ongoing communications with Indigenous groups and others regarding the potential contamination of marine foods. 	Not Applicable	<ul style="list-style-type: none"> The VFPA has not proposed a traditional foods monitoring program because a) the VFPA is confident in the prediction of a negligible Project-related effect on health for shellfish consumers at Roberts Bank; b) the existing conditions assessment has demonstrated low risk to shellfish consumers from coal-related contaminants, and additional analysis would not change this conclusion; and c) Project-specific monitoring cannot address the broader regional concerns about shellfish contamination. The VFPA has implemented mitigation specified in the EIS by sharing the results of EIS and additional shellfish studies with Indigenous groups, including the analyses of black crab and crab hepatopancreas. In recognition of the interests of multiple groups in advancing the understanding of shellfish quality in the region, the VFPA has additionally committed to participate in discussions with interested regulators and Indigenous groups on a collaborative approach to improving the understanding of shellfish quality at Roberts Bank (Commitment #67).

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44	<p>Health Canada Recommendation #3.2-2: Traditional Foods April 15, 2019 submission (CEAR Document #1608), p. 13-14</p> <ul style="list-style-type: none"> Consult with local Indigenous communities to confirm the appropriateness of traditional food consumption rates (e.g., 51 g/day for shellfish and 4.3 g/day for crab hepatopancreas) prior to construction Consult with local Indigenous communities to verify whether consumption of other marine foods harvested from the Project area may contribute to COPC exposure, and whether such foods should be considered for future monitoring. 	Not Applicable	<ul style="list-style-type: none"> The VFPA has not committed to further efforts to confirm consumption rates with Indigenous groups. Verification of consumption rates of shellfish from Roberts Bank would not change the assessment conclusion of no measurable potential effect on shellfish contamination as a result of the Project. The response to IR12-02 incorporates information provided by Indigenous groups on shellfish consumption rates, and provides a sensitivity analysis of existing health risks associated with a wide range of consumption rates.
45	<p>Health Canada Recommendation #3.3-1: Noise April 15, 2019 submission (CEAR Document #1608), p. 15</p> <ul style="list-style-type: none"> Employ noise mitigation during construction and operational phases to ensure sound levels do not exceed 50 dBA outdoors around schools during periods where students occupy classrooms. 	<ul style="list-style-type: none"> The VFPA has committed to a follow-up program element for human health related to noise and vibration (Commitment #81, Appendix C, Table C22). The VFPA's commitment is to monitor noise continuously, and as part of the Follow-Up Program, investigate possible exceedances for Project-related sources, and implement adaptive management measures if confirmed. Specific thresholds for adaptive mitigation will be established during Follow-up Program development, in consultation with Health Canada. 	<ul style="list-style-type: none"> The VFPA has not adopted a monitored noise level of 50 dBA as a trigger for adaptive mitigation. Given the dynamic noise environment, if there is an exceedance the source of the exceedance of the would need to be confirmed through further investigation.
46	<p>Health Canada Recommendation #3.3-2: Noise April 15, 2019 submission (CEAR Document #1608), p. 16</p> <ul style="list-style-type: none"> Provide mitigation measures for receptor locations where the 60 dBA (Lmax) outdoor threshold for individual noise events is exceeded, and/or where the indoor Lmax exceeds 45 dBA. 	<ul style="list-style-type: none"> The VFPA has committed to adaptive management of noise where threshold exceedances are shown to be Project-related, as part of the Human Health Noise Follow-up Program element (Commitment #81 and Appendix C, Table C22). 	Not Applicable
47	<p>Health Canada Recommendation #3.3-3: Noise April 15, 2019 submission (CEAR Document #1608), p. 17</p> <ul style="list-style-type: none"> Apply specific mitigations to prevent any project-related increase in LFN in areas where the Proponent has already been made aware of an existing LFN problem, in addition to areas where calculated changes in LFN exceed 70 dB. Use 60 dBC as an action level for further monitoring and investigation of LFN; however, if public concerns are expressed, commit to implementing additional mitigation measures even if this action level has not been exceeded. Work with TFN members to participate in further study to support the development of additional mitigations, including those for LFN. 	<ul style="list-style-type: none"> The VFPA has committed to incorporating the 65 dBC noise level as an indicator for further investigation of LFN. Depending on the findings of additional investigation, adaptive mitigation may be implemented as part of the Follow-up Program (Commitment #81, Appendix C, Table C22). The VFPA has committed to ongoing noise monitoring, and to ongoing consultation with TFN. Further, the VFPA has committed to including TFN in an advisory role in the governance of the Follow-up Program (CEAR Doc 2001, p. 14), including the human health Follow-up Program element for noise and vibration. 	<ul style="list-style-type: none"> The VFPA has not committed to mitigation to prevent any project-related increase in LFN, as it is not technically feasible to do so. As described in the EIS and in response to IR12-07, the Project is anticipated to result in a minor contribution to overall levels of LFN in the community. The VFPA has not committed to rely on the noise level of 60 dBC as an action level. As described in the response to IR12-06, this level is appropriately used in quiet suburban areas, whereas the assessment area is a mixed use area.
48	<p>Health Canada Recommendation #3.3-4: Noise April 15, 2019 submission (CEAR Document #1608), p. 18</p> <ul style="list-style-type: none"> Ensure that a complaint resolution process is in place for the duration of the Project, and provide information on the 	<ul style="list-style-type: none"> The VFPA has committed to implementing a Follow-up Program element for human health effects related to noise (Commitment #81 and Appendix C, Table C22). This includes investigating noise complaints to identify noise sources and investigate mitigation approaches. The complaint resolution process, implemented on a case-by-case basis as described in the response to IR12-06, is anticipated to be in place for the 	Not Applicable

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	<p>complaint investigation process to potentially impacted residents and communities.</p> <ul style="list-style-type: none"> Provide a commitment to addressing project impacts on a case-by-case basis through community consultation, including additional noise monitoring. Provide a commitment to undertake noise mitigation measures <i>at specific receptor locations</i>, if all other forms of mitigation prove ineffective. 	<p>duration of the Project.</p> <ul style="list-style-type: none"> As part of the Follow-up Program, the VFPA would prioritize mitigation at the noise source, and would also consider mitigation measures at specific receptor locations, if necessary. 	
49	<p>Natural Resources Canada (NRCan) Topic: Sea Level Rise April 15, 2019 submission (CEAR Document #1627¹⁴⁷⁴), p. 8</p> <ul style="list-style-type: none"> As noted in NRCan's February 7, 2019 submission (CEAR Document #1444¹⁴⁷⁵), the Proponent's responses indicated a plan to design to a level of 50 cm, which would correspond to the year 2050 according to the BC Guidelines, but the responses did not specify the amount of land subsidence expected during that time. NRCan recommends that the Proponent's adaptive management plan incorporate land subsidence. 	<ul style="list-style-type: none"> As summarized in Undertaking #11 (CEAR Doc #1837, the VFPA has designed the terminal to accommodate 1.46 m of relative sea level rise by Year 2100 with modifications. The 1.46 m accounts for 1 m global sea level rise by Year 2100 and 0.46 m (456 mm) of total expected long-term settlement considered in the Project design by Year 2100. The factors that contribute to long-term settlement include 250 mm of total post-construction settlement and 206 mm plus or minus 46 mm of total isostatic effect of the seaward edge of the Fraser River delta. The current terminal and causeway designs allow for adaptive measures to be implemented as required further along in the Project life. Examples of adaptive measures are outlined in the VFPA's response to IR13-28. 	Not Applicable
50	<p>Parks Canada Topic: Wave Environment April 15, 2019 submission (CEAR Document #1664), p. 20. Recommendation:</p> <ul style="list-style-type: none"> VFPA, in consultation with Parks Canada, will establish an erosion monitoring program for coastal archaeological sites and areas of archaeological potential on federal lands in the zones of influence. This program will establish a baseline by documenting the condition of previously known archaeological sites and by assessing areas of archaeological potential, prior to or during RBT2 construction. Following the commencement of marine shipping, this program will document any changes to a respective sample of archaeological sites or areas of archaeological potential within the next four years. If any archaeological resources are exposed during the course of the monitoring program, the findings will be documented and collected, if applicable. 	Not Applicable	<ul style="list-style-type: none"> Shoreline processes in the marine shipping area are dominated by wind-generated waves, and vessels calling at RBT2 will not contribute additional wake waves to the existing wave climate. There are projected to be no additional vessels calling in the future with or without the Project. The Project will not influence shoreline erosion processes and no measurable effects to shoreline structures and sites of physical and cultural heritage importance are predicted; and Natural Resources Canada (CEAR # 1627) stated that "predicted wave heights generated by vessels are well within the range of natural wave conditions and would not have a significant cumulative impact on shoreline erosion." As a result, the VFPA submits that an erosion monitoring program for coastal archaeology sites and areas of archaeological potential is unnecessary.
51	<p>Parks Canada Topic: Spills April 15, 2019 submission (CEAR Document #1664), p. 22. Recommendation:</p> <ul style="list-style-type: none"> Should a fuel spill occur, VFPA will identify archaeological sites and areas of archaeological importance, as identified through the erosion monitoring program in Recommendation 4.2.3 	<ul style="list-style-type: none"> As part of the construction and operation Spill Preparedness and Response Plans (Commitment #26), the VFPA has committed to working in confidence with Western Canada Marine Response Corporation and Indigenous groups to implement the plan in consideration of identified archaeological sites of importance from information provided by appropriate agencies and Indigenous groups. 	<ul style="list-style-type: none"> The established risk mitigation practices in place for marine shipping accidents or malfunctions described in MSA Section 10.4 have been established to reduce both the likelihood of a spill occurring and the severity of a spill, if one were to occur. Transport Canada oversees Canada's Marine Oil Spill Preparedness and Response Regime, under the authority of the Canada Shipping Act, 2001.1476 As the Transport Canada-certified marine response

¹⁴⁷⁴ CEAR Doc 1627, NRCan written submission.

¹⁴⁷⁵ CEAR Doc 1444, NRCan comments on the sufficiency of information.

¹⁴⁷⁶ CEAR Doc 1303, Transport Canada, Canada's Marine Safety and Security System document.

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		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	[Wave Environment, above], to response crews, in accordance with the RBT2 Spill Response Protocol		organisation on Canada's west coast, Western Canada Marine Response Corporation supports this regime. WCMRC's mandate is to ensure there is a state of preparedness in place when a marine spill occurs and to mitigate potential impacts on B.C.'s coast in the event of a spill. This includes the protection of wildlife, economic and environmental sensitivities, and the safety of both responders and the public. Other entities, such as municipal, provincial, and federal governments and authorities (including the VFPA), and Indigenous groups play a role in supporting these initiatives.
52	<p>BC Agricultural Land Commission Topic: Zoning and Land Use April 15, 2019 submission (CEAR Document #1595), p. 3</p> <ul style="list-style-type: none"> The ALC suggests that the Panel consider mitigation measures for both the construction and post-construction phases of the Project to offset any negative impacts. Appropriate mitigation measures may include (but are not limited to): invasive plant species control; management of topsoil and subsoil; provision of alternate water supplies for irrigation; maintenance and re-commissioning of drain and irrigation lines; restrictions to public access; cleaning of equipment to eliminate threats of pest and disease transfer; observation of agricultural biosecurity protocols; and compensation for unavoidable effects or those that cannot be mitigated. 	<p>As part of the Construction Environmental Management Plan (Commitment #14), the VFPA has committed to developing and implementing the following sub-plans (in consultation with the parties, as identified) which will address several of the concerns raised by the ALC:</p> <ul style="list-style-type: none"> Construction Compliance Management Plan (Commitment #18); Communications Plan (Commitment #21); Environmental Training Plan (Commitment #22); Spill Preparedness and Response Plan (Commitment #26); Terrestrial Vegetation and Wildlife Management Plan (Commitment #27); Waste and Hazardous Materials Management Plan (Commitment #28); Land and Marine Traffic Management Plan (Commitment #32); Marine and Terrestrial Invasive Species Management Plan (Commitment #35); and Sediment and Erosion Control Plan (Commitment #36). 	<ul style="list-style-type: none"> As presented in EIS Section 26.6, the Project footprint does not generally overlap with agricultural land and terminal and causeway construction and operations are not anticipated to constrain nearby agricultural activities and uses, including crop production and management, and farm facility activities or sub-surface drainage and irrigation lines. As described in Undertaking #2, in 2018, the VFPA acquired a parcel of ALR land along the Roberts Bank railway corridor from BC Rail (Lot 3). While Lot 3 was designated as agricultural, none of the land required for the rail right-of-way was or is currently being used for agricultural purposes, and the VFPA's acquisition of Lot 3 will not affect existing farmers. Based on the above, the Project is not anticipated to adversely affect ALR properties adjacent to Project lands.
53	<p>BC Ministry of Health Topic: Human Health – Monitoring and Mitigation April 15, 2019 submission (CEAR Document #1601), pg. 6</p> <ul style="list-style-type: none"> The validation of calculated contaminant concentrations in biota and monitoring of contaminant concentrations in biota during Project phases could not be found in the Proponent's responses. Air quality is proposed for monitoring during the Project's construction and operation phases. Monitoring the quality of country foods should also be conducted due to the uncertainty surrounding the marine biota tissue contaminant concentrations and the concern from Indigenous groups regarding harvesting in the area and the perception of risk. Monitoring tissue concentrations should be focused on the Project's construction phase, when there is the greatest potential for sediment disturbance and subsequent uptake of contaminants by marine biota. Despite the existing marine biotoxin and sanitary contamination closures for shellfish harvesting at Roberts Bank (Sub-area 29-7), perhaps a country foods monitoring plan should be developed in consultation with Indigenous groups given they appear to be harvesting and consuming marine country foods along this coastline (as reported in Table IR12-01-A1 in the response to IR Package 12, consolidated in CEAR document #934). Details on this IR are provided in MoH-12 in Appendix B. 	Not applicable	<ul style="list-style-type: none"> The VFPA has not proposed a traditional foods monitoring program because a) the VFPA is confident in the prediction of a negligible Project-related effect on health for shellfish consumers at Roberts Bank; b) the existing conditions assessment has demonstrated low risk to shellfish consumers from coal-related contaminants, and additional analysis would not change this conclusion; and c) Project-specific monitoring cannot address the broader regional concerns about shellfish contamination. The VFPA has implemented mitigation specified in the EIS by sharing the results of EIS and additional shellfish studies with Indigenous groups, including the analyses of black crab and crab hepatopancreas. In recognition of the interests of multiple groups in advancing the understanding of shellfish quality in the region, the VFPA has additionally committed to participate in discussions with interested regulators and Indigenous groups on a collaborative approach to improving the understanding of shellfish quality at Roberts Bank (Commitment #67).
54	<p>Metro Vancouver Topic: Air Quality Assessment</p>	<ul style="list-style-type: none"> The VFPA has committed to Air Emission Management Plans for construction and operation (Commitment #19). The plans will outline monitoring programs to be implemented in each phase, including the 	Not Applicable

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	<p>April 15, 2019 submission (CEAR Document #1616¹⁴⁷⁷), p. 7</p> <ul style="list-style-type: none"> If the project is approved, it is recommended that a comprehensive air quality monitoring program be implemented to ensure that emissions from the project are not causing exceedances of relevant air quality objectives. 	<p>following:</p> <ul style="list-style-type: none"> Contaminants of potential concern to be monitored and reported on; Monitoring locations and equipment to obtain air quality concentrations and meteorological data; Monitoring details, including frequency of data analysis and reporting requirements; Quality assurance / quality control measures; Air quality thresholds; and Adaptive management measures to be implemented if contaminant levels approach pre-determined levels; and <ul style="list-style-type: none"> The VFPA has committed to a Follow-up Program element for human health related to air quality (Commitment #81 and Appendix C, Table C21), informed by the monitoring results and including comparison to pre-determined health effect thresholds to be developed in consultation with appropriate authorities. 	
55	<p>Canadian Environmental Assessment Agency Topic: Governance</p> <p>April 15, 2019 submission (CEAR Document #1614), p. 4</p> <p>The Government of Canada heard concerns from some Indigenous groups regarding governance issues in relation with the proposed Project including: .</p> <ul style="list-style-type: none"> the misuse of Indigenous Knowledge (IK) the lack of consideration from Indigenous Laws in the EA process interest in involvement in monitoring activities and/or advisory committees. <p>Based on the information provided by Indigenous groups, to date, both on the record to the panel and through consultation activities and the analysis provided by the proponent, the Agency has noted that there are potential gaps in the consideration of impacts to Indigenous governance associated with the proposed Project.</p>	<ul style="list-style-type: none"> Prior to the start of construction, the VFPA is committed to working collaboratively with Indigenous groups to develop and implement the IAC as a communication mechanism to support dialogue and issue resolution between the VFPA and Indigenous groups during construction and operation (Commitment #76). The VFPA has committed to providing environmental (biophysical) monitoring and Follow-up Program results to Indigenous groups throughout construction and during the follow-up phases of operation, and will consult on results through the IAC and with individual Indigenous groups, where requested (Commitment #77). The VFPA has committed to including two Indigenous group nominee representatives from Tsawwassen First Nation and Musqueam First Nation, as part of the Follow-up Program Advisory Committee (CEAR Doc 2001, p.14). The VFPA has committed to developing and implementing an Indigenous Monitors Plan as part of the Construction Environmental Management Plan (Commitment #31). Prior to the start of construction, the VFPA will collaborate with Indigenous groups to develop an Indigenous Monitors Plan. The plan will provide an overview of the approach to effectively incorporate Indigenous monitors into the construction monitoring framework for biophysical components (e.g., purpose/objectives, roles/responsibilities, funding, and training) and for engaging with each Indigenous group regarding the development of group-specific Terms of Engagement. The Terms of Engagement will outline the role of each group's monitor(s), including at a minimum training, communication, and inspection frequency and focus. 	Not Applicable
56	<p>B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development Topic: Sturgeon</p> <p>May 15, 2019, p. 8, oral presentation slide 12; CEAR Document #1751¹⁴⁷⁸</p>	<ul style="list-style-type: none"> The VFPA is confident in its assessment conclusion that with mitigation, Project-related change in the productivity of white sturgeon will be negligible, as represented by Pacific salmon. Sturgeon perform critical life functions, such as spawning, rearing, and overwintering in the lower Fraser River upstream of the river mouth outside the RBT2 local assessment area. Any marine excursions are undertaken by individual sub-adult and adult fish, for a brief period, in 	Not Applicable

¹⁴⁷⁷ CEAR Doc 1616, Metro Vancouver written submission.

¹⁴⁷⁸ CEAR Doc 1751, FLNRORD oral presentation and written submission.

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		VFPA Commitments ¹⁴⁶³ that Align with Recommendation	Aspects of Recommendation Not Supported, and Rationale
	<ul style="list-style-type: none"> Mitigation monitoring using ultra high resolution side scan sonar assessments of the project and adjacent area during expected high and low use periods pre and post construction. Stringent monitoring by a qualified professional biologist during construction, including ultra high resolution side scan sonar if appropriate. 	<p>spring and summer.</p> <ul style="list-style-type: none"> The VFPA has committed to develop eulachon-specific mitigation that will be used during dredging activities that have the potential to disturb returning eulachon. The VFPA will undertake a hydroacoustic pre-construction test/study in the Project area, to aid in reconnaissance, testing, and effectiveness of deploying hydroacoustic technologies (e.g., split-beam echosounder) to detect eulachon. During the month of April, and prior to and during dredging in the dredge basin, the VFPA will deploy hydroacoustic technologies (e.g., split-beam echosounder) to detect in real time and guide dredging activities away from schools of migrating eulachon (Commitment #45). It is anticipated that this mitigation measure will benefit sturgeon, as these hydroacoustic technologies will also detect sturgeon, should sturgeon be found in the Project area feeding on returning eulachon (Commitment #45). The VFPA has also committed to a four-party approach to compliance management approach for the Project. The four-party approach is the collaboration between the VFPA, the Contractor, the Indigenous Monitors, and the Independent Environmental Monitor for jointly providing environmental oversight of the Project during construction and providing assurance that the Project is being built in compliance with regulatory requirements, the Construction Environmental Management Plan, sub-plans, and Contractor's Environmental Protection Plans (Commitment #14, #18). This includes ensuring that appropriately qualified and skilled individuals are completing the work. 	
57	<p>B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development Topic: Sturgeon May 15, 2019, oral presentation slide 12 and written submission p. 8; CEAR Document #1751</p> <ul style="list-style-type: none"> The BC MFLRORD recommends support for fixed acoustic telemetry monitoring station(s) deployed at or adjacent to the project area to monitor for acoustic tagged sturgeon or other acoustic tagged fish use. The BC MFLRORD recommends funding support towards ongoing and additional sturgeon studies to be conducted in the lower reaches and of the lower Fraser River and its' estuary. The BC MFLRORD recommends funding support towards ongoing and additional eulachon studies to be conducted in the lower reaches and of the lower Fraser River and its estuary. 	<ul style="list-style-type: none"> The VFPA has committed to funding programs or studies, up to \$500,000, that build on recent and ongoing work related to eulachon and sturgeon in the lower Fraser River, following Project approval. Such programs or studies will be conducted in partnership with Tsawwassen First Nation and Musqueam First Nation (Commitment #52). 	Not Applicable
58	<p>B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development Topic: Roberts Bank Wildlife Management Area May 15, 2019, written submission; CEAR Document #1751, p. 7</p> <p>Submitted the advice that the following additional information will provide baseline data for future monitoring as well as suggested monitoring methods.</p> <ol style="list-style-type: none"> Present-day baseline data collection of ecosystem extent and composition in the area around the terminal 	<ul style="list-style-type: none"> The VFPA has committed to a comprehensive RBT2 Follow-up Program with 24 Follow-up Program elements, many of which will depend on detailed collection of physical and biological data within Roberts Bank. For example, the VFPA has committed to a Roberts Bank Ecosystem Model Marine Vegetation Follow-up Program element (Commitment #81 and Appendix C, Table C3), including collecting baseline and post-project data on eelgrass and intertidal marsh habitats. The VFPA has also committed to implementing a Coastal Geomorphology Follow-up Program element to verify effects predictions on Project-related changes to geomorphic features, sediment erosion and deposition, and 	Not Applicable

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	<p>a. The VFPA has been collecting salinity data around Roberts Bank for the EA; they have offered to share these data with the Ministry, which will be a valuable contribution to the ongoing investigation into tidal marsh recession throughout the Fraser River delta front.</p> <p>b. While there has been a gain in eelgrass since Deltaport was originally constructed; this could be temporary and the lack of sedimentation could compromise the eelgrass capacity to adapt to rising sea levels</p> <p>2. There is a need to map tidal marsh extent, composition, and elevation throughout the Brunswick Point and Tsawwassen tidal marshes to establish an updated ecological baseline before anticipated increases of sea level begin to drown out these ecosystems.</p> <p>a. The southern portion of the Brunswick Point marsh has largely receded since the late 1980's though we have yet to calculate the extent of the marsh loss.</p> <p>b. High-resolution multispectral imagery of the tidal marshes will enable us to map marsh extent, vegetation community composition, and elevation. Such data can be collected by drones equipped with a multispectral camera and lidar unit.</p> <p>c. This will enable us to establish an ecosystem baseline to compare to (i) historical states of the marshes and (ii) future changes to the marsh (that may be a result of port expansion and sea-level rise). d. Smart Shores is a company with the capacity and expertise to take on such a task.</p> <p>3. Determination of changes in sedimentation on the Roberts Bank foreshore.</p> <p>a. We do not have a good understanding of historic rates and patterns of sedimentation throughout the Brunswick Point and Deltaport foreshore.</p> <p>i. Sediment cores collecting samples to approximately 1 m depth can be used for (i) sediment grain size analysis and (ii) Cs-137 and Pb-210 dating analysis to enable us to determine how sedimentation has changed over time, possibly as a result of previous port development.</p> <p>ii. Understanding historic rates and patterns of sedimentation in the area adjacent to the proposed port development will help us to determine (i) the capacity of these intertidal and subtidal ecosystems to persist with sea-level rise, (ii) the effect of past port development on local sedimentation, and (iii) the anticipated effect on sedimentation of proposed port development.</p>	<p>eutrophication (Commitment #81 and Appendix C, Table C2).</p> <ul style="list-style-type: none"> The VFPA, outside of the RBT2 Project, intends to continue to work with B.C. Ministry of FLNRORD and ECCC on studying Sturgeon Bank. 	
59	<p>B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development</p> <p>Topic: Roberts Bank Wildlife Management Area</p>	<p>The VFPA has committed to funding programs or studies, up to \$500,000, that build on recent and ongoing work related to eulachon and sturgeon in the lower Fraser River, following Project approval. Such programs or studies will be conducted in partnership with Tsawwassen First Nation and Musqueam</p>	Not Applicable

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	May 15, 2019, written submission; CEAR Document #1751, p. 7 <ul style="list-style-type: none"> Undertake fish-related studies through the RBT2 legacy benefits. 	First Nation (Commitment #52).	