Trans Mountain Pipeline ULC
Trans Mountain Expansion Project
NEB Hearing Order OH-001-2014
Responses to Information Request from
Adams Lake Indian Band (ALIB)

2.02.0 SURFACE WATER QUALITY ROUND 2 IRS

2.02.1 Remote pipeline segments and delays in aquatic spill/contamination response

Reference:

Trans Mountain 2013, Volume 7, Section 7.1.1.1.2, p 7-100; Trans Mountain Response to ALIB IR No. 1.2.1 (a) and (b)

Preamble:

TM has acknowledged that in the case of a pipeline spill in a remote area, emergency containment and mitigation response may be delayed (Trans Mountain, Volume 7, Section 7.1.1.1.2, p 7-100). TM has also stated that water body crossing sites that may fall into this "remote" category have not yet been identified (Trans Mountain response to ALIB IR No. 1.2.1 (a)) but do state that the Coquihalla Canyon area is a challenging pipeline segment in terms of access (Trans Mountain response to ALIB IR No. 1.2.1 (b)), but no further information is provided by TM to address this ALIB concern.

Request:

In a manner similar to the above noted discussion regarding the Coquihalla Canyon, please list all pipeline segments that will pose challenges for timely access in terms of an emergency containment and mitigation response in the case of a spill or other contamination/adverse impact to aquatic ecosystems.

Response:

Crossing sites that may experience some delay in response due to their relative remote locations have not yet been systematically identified. The locations of crossing sites are subject to final routing which has not yet been completed. Response times will be assessed as part of the Emergency Management Program review and update to reflect the requirements of the Project.

Kinder Morgan Canada Inc. (KMC) acknowledges the interest of intervenors to seek more information about the existing EMP documents and reference materials related to the Trans Mountain Pipeline system, which is why KMC filed a redacted copy of the existing Emergency Response Plans publicly (Filing ID A63573). In Ruling No. 50 (Filing ID A4G5I9), the NEB determined that it was "satisfied that sufficient information has been filed from the existing EMP documents to meet the Board's requirements at this stage in the process."

It is KMC's intent to continue to share unredacted versions of the EMP documents with agencies tasked with ensuring public safety. KMC's EMP is shared, tested and regularly

exercised with federal, provincial and local agencies. The EMP meets regulatory requirements and KMC works with emergency planners and emergency responders to maintain relationships and to ensure their awareness of KMC's system, as well as mutual awareness of joint exercises and programs.

KMC is willing to provide copies of the EMP documents to local, provincial and federal authorities who satisfy the following conditions:

- The authority has/is willing to participate in consultations with KMC;
- The authority could be called upon to respond to an event associated with the Trans Mountain Pipeline system within their jurisdiction;
- The authority has requested a copy and/or requires a copy by legislation; and
- The authority has signed a confidentiality agreement and/or has a method by which the document can be filed confidentially.

The Application, Volume 7, Section 4.8 outlines the process to enhance Kinder Morgan Canada's (KMC) existing emergency management programs (EMP) as they relate to the Trans Mountain Pipeline system to address the needs of the Project (Filing ID A3S4V5). The final programs will be developed in a manner consistent with the National Energy Board's (NEB or Board) draft conditions related to emergency response (Filing ID A3V8Z8).

Since the updated EMP depends upon the final detailed design of the Project, a process which will not be carried out unless the Project receives approval and until KMC has an opportunity to review the conditions of such approval, the updated EMP cannot be provided during the NEB's regulatory review of the Project. However, to ensure affected parties have the opportunity to express concerns and provide input which will inform the updated EMP, KMC will conduct a consultation program as part of developing the updated EMP as described in the NEB draft conditions related to emergency management.

Following receipt of a Certificate of Public Convenience and Necessity for the Project, KMC will file with the NEB a consultation plan related to KMC's EMP review that will include consultation scope, objectives, preliminary lists of regulatory authorities, communities, Aboriginal groups with whom KMC will engage, and a preliminary list of consultation locations and timing, as well as any other information that the NEB requires. The consultation plan will describe the methods that will be used to track commitments made during consultation and to incorporate them into KMC's EMP, including its Emergency Response Plans. As part of this program, KMC will periodically file reports with the NEB on progress of its EMP review, including summaries of interested parties consulted and how their comments were considered.

KMC will file with the NEB the revised Emergency Response Plan for the pipeline as part of the approval conditions for the Project. The plan will demonstrate KMC's ability to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type related to the Trans Mountain Pipeline system. Filing of the Emergency Response Plan will include, for the NEB's consideration, a final report on the consultation process as well as confirmation that an independent third party has reviewed and assessed the Emergency Response Plan and that

KMC has considered and incorporated the comments generated by the independent review and assessment into the plan.

Ultimately, updates to the EMP incorporating feedback from consultation activities must result in an EMP that continues to meet the requirements of the *National Energy Board Onshore Pipelines Regulations* (2013) (OPR). As it does for the existing system, the OPR provides lifecycle regulation for all aspects of the Project operation, including requirements for emergency response programs. KMC must maintain and update the EMP throughout the lifecycle of the expanded Trans Mountain Pipeline System. As well, throughout the life of the expanded system, NEB staff will continue to conduct emergency response exercise evaluations and emergency procedures manual reviews to verify that companies are prepared to anticipate, prevent, manage, and mitigate emergency situations.

The Application, Volume 7, Section 4.8 outlines the process to enhance Kinder Morgan Canada's (KMC) existing emergency management programs as they relate to the Trans Mountain Pipeline system to address the needs of the Project (Filing ID A3S4V5). The final programs will be developed in a manner consistent with the NEB's draft conditions 42, 52, 53 and 54 (Filing ID A3V8Z8).

2.02.2 Monitoring for surface and groundwater quality and limiting impacts if vulnerable aquifers are contaminated

Reference:

Trans Mountain 2013, Volume 5A, Section 6; Trans Mountain response to ALIB IR No. 1.2.2 (a) and (b)

Preamble:

Instances of groundwater contamination at existing TM terminals and pump stations have been documented (Trans Mountain, Volume 5A, Section 6, Table 6.1-10, p 6-42 and Table 6.1-11, p 6-46). In addition, TM has confirmed that hydrological connections do exist between the North Thompson River and aquifers that are vulnerable to contamination located underneath the Darfield Pump Station, and the new Black Pines Pump Station (Trans Mountain , Volume 5A, Section 6, Table 6.1-10, p 6-42 and Table 6.1-11, p 6-46; Response to ALIB IR No. 1.2.2 (a)).

TM has stated that contamination of surface water resulting from aquifer contamination is unlikely to occur because the contaminated groundwater must reach the ground or seep directly into a waterbody (response to ALIB IR No. 1.2.2 (b)). Given that:

- groundwater contamination has occurred at two TM pump stations and two TM terminals;
- the aquifers underlying the two pump stations at Darfield and Black Pines are classified as vulnerable to contamination;
- and TM has confirmed that groundwater in these aquifers can reach the North Thompson River through existing hydrological connections,

then TM has not yet provided adequate evidence to show that contamination of surface waters is unlikely.

TM stated that the safety of Project facilities will be assured during operation through proper engineering design, material specification and selection, and application of Kinder Morgan's Facility Integrity Management Program. However, TM has not provided information regarding the instances of past groundwater contamination at its pump stations and terminals. Additionally, TM provides no information about groundwater and surface water monitoring plans at the Darfield and Black Pines pump stations. It is therefore not possible to determine whether groundwater contamination would be identified in a timely manner in order to avoid subsequent surface water contamination. Also, TM has not provided details regarding mitigation options for groundwater contamination.

Request:

a) Please confirm that groundwater, including contaminated groundwater, from the aquifers in question (#283 and #293) can and will reach the North Thompson River via existing hydrological connections.

b) Does TM plan to restrict contaminated groundwater in the aquifers identified above in 2.2a) from entering surface waters? If so please provide a detailed explanation of the methods that will be used to achieve this.

c) Please indicate specifically how the design, materials and operating program standards that will be used by TM for the Darfield and Black Pines pump stations and the Project generally are an improvement on past TM standards, under which groundwater contamination did occur.

d) Please provide details of groundwater and surface water monitoring plans, including the locations and sampling frequency of sample sites, and how monitoring data will be used to detect groundwater and surface water contamination at the Darfield and Black Pines pump station sites.

e) Please provide details regarding planned mitigation methods for groundwater contamination at these sites.

Response:

a) Groundwater from aquifers #283 and #293 can reach the North Thompson River because the river flows through the alluvial aquifer material surrounding the river. However, it is not a foregone conclusion that the contamination will reach the river; that depends on amount of contaminant, groundwater flow rates, the type of material present in the aquifer, contaminant properties that influence its fate and transport (*e.g.,* sorption properties that retard migration, degradation characteristics, solubility, vapour pressure, *etc.*).

b) Trans Mountain is fully committed to avoid any groundwater contamination and is required by law to prevent contamination from impacting the environment. If there is in fact a significant risk of contaminated groundwater reaching the river, Trans Mountain would implement mitigation measures and management efforts to eliminate this risk. One example of a mitigative measure includes active hydraulic controls to capture and treat contaminated groundwater before it reaches the river; in-situ remedial efforts (e.g. chemical oxidation) to degrade contaminants in the groundwater.

The mitigative actions for groundwater contamination impacts are highly dependent on the conditions under which the spill occurred, including but not limited to the amount of the spill, duration of the spill, the aquifer materials, the materials of any overlying confining layer, the hydrogeological properties of the aquifer and contaminated horizons, the direction and rate of groundwater flow, as well as the effects on the flow by pumping of groundwater.

The last part of the response to Waterwealth IR No. 1.Vs (Filing ID A3Y3W1) states, "Should oil be released from a pipeline especially over an unconfined aquifer, cleanup options would be evaluated and approved by the Unified Command, and would be very dependent on the nature of the specific site conditions. Spill response efforts would “aim to reduce potential for groundwater contamination by removing pooled oil and affected

surface materials as quickly as possible, and as deeply as needed to remove contamination so that aquifers are not affected." (Vol. 7, S6.2.2.1 [Filing ID. A3S4V6])."

c) Information on design, materials, and construction for pump stations, including some information on standards, is provided in Section 3.3, Volume 4A of the Facilities Application, pages 57-73 (Filing ID A3S0Y8). Information on operating programs and procedures, including some information on standards, is provided in Sections 2.0 to 10.0, Volume 4C of the Facilities Application (Filing ID A3S1L1).

Trans Mountain has continuously improved the design principles for pump stations over the years, based on knowledge gained with respect to past occurrences of ground water contamination. Some of the modern design features include:

- Pump station piping is situated above ground, to the greatest extent practical, to be accessible for visual inspection.
- Waste oil sump tanks, which typically need to be underground, are fabricated from fibreglass (or a similar composite material) and the tanks have double wall construction allowing for detection of leaks in the inner wall and eliminating the possibility of a release to the surrounding soils.
- Relief tanks have a continuous automatic level measurement instrument and an independent point level switch, to meet the requirements for tank over-fill protection. They are also situated within a secondary containment area with an impermeable liner, to eliminate the possibility of ground water contamination in the unlikely event of a leak.
- Pump station sites are carefully graded to direct stormwater and any oil, in the ulikely event of a release, to a catchment area constructed with an impermeable liner and a hydrocarbon detector. The catchment discharge valve is kept closed until it is confirmed by observation that there is no oil present, at which time stormwater can be quickly released and the valve closed again.

Facility integrity management is described in Section 8.2, Volume 4C of the Facilities Application (Filing ID A3S1L1). Integrity programs include detailed qualitative assessments, completed every three years, to review and identify integrity hazards and the management of those hazards through existing or new controls. The integrity programs also include maintenance and testing activities required for continued safe and environmentally sound operations. Equipment and piping undergo regular documented inspections to ensure early detection of any potential integrity issues that could result in a release.

In addition, improved operations and maintenance is facilitated by the Kinder Morgan Canada, Knowledge and Experience Enhancement Program (KEEP), which ensures the qualification and competence of KMC operating and maintenance staff.

d) Trans Mountain is implementing pipeline construction and operation practices as per provincial and federal regulatory requirements and industry standards. These practices

do not include the collection of water quality data to the extent listed in the above request.

Refer to the response to ALIB IR No. 1.3.34 (Filing ID A3X5V6) for information on water quality monitoring during construction. Information regarding proposed water quality monitoring is also provided in the Application, Section 3.0 of Volume 6B, Pipeline Environmental Protection Plan (Filing ID A3S2S3).

Groundwater monitoring programs are established at facilities where the potential for contamination is high, such as those where three or more spills with volumes greater than 1.5 m^3 have occurred. Other factors that are considered include proximity of the facilities to environmentally sensitive areas such as watercourses, waterbodies and wetlands and proximity to other properties where onsite activities have the potential to affect a Trans Mountain facility.

In the event groundwater contamination is discovered, additional investigation will be completed to delineate the contamination and identify its source. A notification to the NEB will be made in accordance with the NEB Remediation Process Guide, 2011. If the contamination is determined to be migrating beyond the Trans Mountain property line, a remedial strategy will be developed to address the contaminated groundwater. If contamination is not migrating off of Trans Mountain property, Trans Mountain will continue to monitor for natural attenuation of the contaminant. Refer to NEB IR No. 3.022 (Filing ID A4H1V2).

At the Darfield Pump Station, there are 11 wells distributed throughout the facility to monitor areas with known or potential groundwater contamination. Frequency: Semi-annual Analytical: BTEX, VPH, F1-F4, metals. Comparison Criteria: CCME: Freshwater Aquatic Life (as well as BC Contaminated Sites Regulations)

The proposed Black Pines Pump Station is a new site located on forested and pasture lands at RK 811.9. As a result, the Black Pines site has no on-going groundwater monitoring at present. There is no known contamination on these lands.

e) Refer to the response to d) above.

2.02.3 Identification, mitigation, and remediation of impacts to aquatic benthic invertebrates and freshwater sediments

Reference:

Application Volume 6b, Appendix B, p. B-3, pdf p. 165; Trans Mountain response to ALIB IR No. 1.2.3.a.1

Preamble:

Sediment quality and benthic invertebrate community structure and function are critically important contributors to river and lake ecosystem integrity. Especially in rivers, benthic invertebrates and algae are the main food source for almost all organisms higher in the food chain, including fish. Many invertebrates either live in or directly ingest aquatic sediments. While water quality is an important measure of aquatic ecosystem integrity, sediment quality is equally important. Often, water quality and sediment quality cannot be used as equivalent measures, especially where particulate matter quickly sinks to the river or lake bottom or where aquatic sediments are anoxic, which can cause some contaminants to change their form and toxicity.

TM has stated that it will not collect baseline benthic invertebrate or sediment quality data or monitor the same at planned watercourse crossings, as this is not standard pipeline construction and operation practice (Trans Mountain response to ALIB IR No. 1.2.3.a.1). However, TM also stated that if sediment contamination does occur at a watercourse during construction, it will implement remedial measures from its Contamination Discovery Contingency Plan (CDCP). From the CDCP (Trans Mountain, Volume 6b, Appendix B, p. B-3, pdf p. 165), TM states that soil, surface water and groundwater contamination can be recognized by: hydrocarbon odour; visual sheen; visual free product (oil or other product); visual staining.

The CDCP:

- does not refer to sediment contamination, and provides no list of indicators by which sediment contamination will be detected; and
- provides no mitigation and reclamation information for aquatic sediments.

Without developed mitigation and reclamation plans for aquatic sediments, it is not possible to accurately estimate the residual impacts of the Project on sediment quality. In addition, contamination of sediments may not necessarily result in any of the listed indications of contamination in soils and water.

Regarding clean up and remediation of a spill into a watercourse, TM states that it will attempt to restore the watercourse to baseline conditions (Trans Mountain response to ALIB IR No. 1.2.3.a.1). TM suggests that it could use data from upstream sites as surrogate baseline data, which would be collected after an impact occurs. However, upstream sites are not ideal indicators of baseline conditions. This is because, first, conditions in rivers and streams change over their length (the River Continuum Concept, Vannote et al. 1980) and therefore there are a limited number of locations along a river or stream that can serve as appropriate reference locations for baseline conditions. If the only available reference locations are already impacted

by contamination from another source or are not valid as a reference site for some other reason, the upstream reference site method will not be available to TM. Secondly, water bodies, such as lakes, do not have upstream segments to serve as reference sites for post-spill baseline determination.

Regarding other sources of baseline data, TM does not provide an enumeration of available data from regulatory or other publicly available data sources for each of the watercourse crossings and for any water bodies in the vicinity of the pipeline. This is a significant gap because many of the planned Project watercourse crossings are in remote areas, or involve relatively small water bodies, for which regulatory and publicly available data are often not available.

The absence of baseline data results in a high probability that TM will be unable to accurately characterize baseline sediment quality and benthic invertebrate communities at the planned watercourse crossings. This severely compromises TM's ability to measure the extent of any Project-related impacts, and to restore an impacted watercourse to baseline conditions if an impact occurs. TM does not explain how it will set mitigation and reclamation targets without knowledge of the sediment quality and benthic invertebrate baseline conditions at the crossings.

Request:

a) Please show that baseline sediment quality and benthic invertebrate data exists or that an appropriate upstream reference site exists for each watercourse crossing and for each vulnerable watercourse and water body in the vicinity of the pipeline route so that TM can accurately measure impacts and restore baseline conditions at impacted water crossings.

b) Please provide a list of indicators that TM will use to determine whether aquatic sediment contamination has occurred.

c) Please describe mitigation and reclamation practices for contaminated sediments, referring specifically to sediment quality and benthic invertebrate communities.

d) Please provide the specific criteria and targets that TM will use when restoring baseline sediment quality conditions and benthic invertebrate communities at impacted water crossing locations.

Response:

a) Baseline data for sediment quality and benthic invertebrates are not routinely collected since the construction and operations of the pipeline itself will not involve any additional contribution of effluents and chemicals that would increase current contaminant levels and mitigation measures would be applied to restore baseline conditions, for example, through proper handling, storage and replacement of instream sediment. Furthermore, benthic invertebrate data at the time of sampling would not necessarily be representative of baseline conditions at the time of construction and would not inform the development of additional mitigation or restoration measures beyond those already recommended for the Project resulting from other environmental studies and data collection.

Site-specific information was collected during the environmental field program at every watercourse crossing to inform specific mitigation and reclamation strategies at each watercourse. Field data consisted of both qualitative observations (*e.g.,* habitat quality, turbidity, bed and bank characteristics, riparian health) and quantitative data collection (*e.g.,* pH, dissolved oxygen, conductivity, temperature, fish sampling) to identify existing conditions and inform the development of mitigation and reclamation measures at each watercourse to return the bed and bank characteristics (including sediment quality and benthic invertebrate habitat) to pre-construction (*i.e.,* baseline) conditions.

By implementing watercourse-specific and standard pipeline construction and operation practices as per provincial and federal regulatory requirements and industry standards, no impacts to sediment quality or benthic invertebrate habitat are anticipated and, for this reason, collection of such baseline data is not considered necessary.

Additional explanation for why collection of sediment quality and benthic invertebrate data was not considered necessary is provided in Section 7.2.3.4 of Volume 5A (Filing ID A3S1Q9).

b) In the unlikely event existing sediment contamination is identified at a watercourse crossing during construction, Trans Mountain will implement remedial measures provided in the Contamination Discovery Contingency Plan (Section 1 of Appendix B in Volume 6B; Filing ID A3S2S3). Although aquatic sediment is not specifically mentioned or defined within the Contamination Discovery Contingency Plan, the process for the identification of suspected contamination of aquatic sediment would be the same as that which is used for the discovery of suspected contaminated soil and/or water. Contamination would be recognized by one or more of the following indicators prior to or during sediment handling activities:

- hydrocarbon odor;
- visual sheen;
- visual free product (oil or other product); and/or
- visual staining.

c) In the unlikely event contaminated sediments are encountered during construction activities, Trans Mountain will implement the applicable mitigation measures provided in the Contamination Discovery Contingency Plan (Section 1 of Appendix B in Volume 6B; Filing ID A3S2S3). Measures within the plan include immediately suspending work in the area, notifying the Lead Environmental Inspector and the Environmental Inspector(s) and developing specific measures to reduce or avoid any additional contamination. The type of mitigation and reclamation strategy would depend on the extent, type and nature of the contamination and would be developed on a site-specific basis in consultation with the appropriate provincial/federal authorities and the NEB, and would include, if necessary, measures specific to sediment quality and benthic invertebrate communities.

d) Restoration of baseline sediment quality conditions will be achieved during instream habitat restoration of each watercourse where the pipeline is installed using a

conventional trenched construction technique. The objective is to replicate pre-construction conditions following pipeline construction and reclamation. The criteria or target is to return the watercourse to conditions of undisturbed habitat as represented by the habitat immediately adjacent to the right-of-way. This would incidentally encompass benthic invertebrate communities and sediment quality conditions. As described in the response to ALIB IR No. 1.3.28a (Filing ID A3X5V6), while it is acknowledged that benthic invertebrates do provide an indicator of stream health, studies have shown (*e.g.,* Anderson *et al.* 1998; Collier *et al.* 2002) that benthic invertebrates recover quickly from short-term disturbances such as those posed by pipeline construction.

The level to which pre-construction conditions have been restored will be based on field observations during post-construction environmental monitoring (PCEM) of channel morphology, bank stability and instream habitat. Based on the findings at any stage of the PCEM Program, recommendations for remedial measures may be provided, if warranted, at any watercourse, to ensure that the overall objective or reclaiming the watercourse to pre-construction conditions can be achieved.

As stated in the response to ALIB IR No. 1.2.3b (Filing ID A3X5V6), in the low likelihood event of a spill reaching a watercourse, clean up and remediation efforts would seek to restore the watercourse to baseline conditions, which would be determined through upstream water and sediment quality sampling and, if required, characterization of upstream benthic invertebrate communities. In addition, regulatory consultation (*e.g*., BC Ministry of Environment, Fisheries and Oceans Canada), site-specific information collected during the environmental field program, and various publically available sources (*e.g*., case studies, government records, third-party information) would be utilized to characterize baseline conditions.

References:

Anderson, P.G., C.G.J. Fraikin and T.J. Chandler. 1998. Impacts and Recovery in a Coldwater Stream Following a Natural Gas Pipeline Crossing Installation. In: Proceedings of the International Pipeline Conference 1998. American Society of Mechanical Engineers. Calgary, AB. June 7-11, 1998. Pp. 1013-1022.

Collier, K., S. Parkyn, J. Quinn, and M. Scarsbrook. 2002. Stream Ecology. Bouncing Back: How fast can stream invertebrates recolonize? Water and Atmosphere 10(2) 2002. National Institute of Water and Atmospheric Research Ltd.

2.02.4 Comparison of qualitative baseline data with quantitative monitoring data in determining water crossing impacts

Reference:

Trans Mountain 2013, Volume 5C - Alberta, Section 3.6.3.1 p 3-18 and Section 7.1.3, Table 7.1, p 7-18, 7-19; Trans Mountain 2013, Volume 5C – British Columbia (BC), Section 3.2.7; Trans Mountain response to ALIB IR No. 1.2.3.a.1

Preamble:

Suspended particles in water contribute to water turbidity (i.e., water "cloudiness"). Turbidity or total suspended solids (TSS) are parameters that are monitored in rivers and lakes because high turbidity can lead to significant negative impacts on aquatic animals, including fish. In its 2012 field program, TM describes baseline river and stream turbidity as being visually assessed (i.e., field personnel simply look at the water to determine if it contains suspended sediment) (Trans Mountain, Volume 5C - Alberta, Section 3.6.3.1 p 3-18; Trans Mountain, Volume 5C - BC, Section 3.2.7). It should be noted that people are not necessarily capable of seeing changes in suspended sediment concentrations that would constitute an impact on the ecosystem and could create a regulatory exceedance (e.g., long term increase of 2 NTU from background levels, or 10% over background under high turbidity conditions; Alberta ESRD 2014 and BC Environment 2001).

TM plans to monitor TSS as a mitigation measure, at the least in the case of potential loss or alteration of instream or riparian habitat from pipeline construction (Trans Mountain, Volume 5C - Alberta, Section 7.1.3, Table 7.1, p 7-18, 7-19). For this monitoring, TM proposes using a numerical measurement, using a turbidity meter or laboratory total suspended sediment (TSS) analyses, to determine turbidity levels.

Request:

a) Please provide the procedure that TM will use to compare turbidity data from the visual baseline assessments with turbidity data collected using turbidity meters or TSS analysis during monitoring of water crossing construction and impacts.

b) Please explain how this comparison procedure is quantifiable numerically and how it has been successfully used elsewhere to determine whether turbidity/TSS exceeds regulatory guidelines that are based on a deviation from baseline conditions.

c) Please explain how baseline turbidity observations listed as "stained" in the 2012 Reconnaissance and Inventory Program document (Trans Mountain, Volume 5C Alberta and BC, Appendix C) will be converted to a baseline turbidity value that can be compared to numerical turbidity values in determining water crossing impacts.

Response:

a) As defined in Table 1.1 of Technical Report 5C-7 (Filing ID A3S2C1) and Table 3.3 of Technical Report 5C-6 (Filing ID A3S1W6), the collection of qualitative turbidity information during the pre-construction aquatic assessments adhered to the sampling

standards in both Alberta and British Columbia (BC). More specifically for BC, turbidity data was collected with reference to the standards outlined by the BC Ministry of Environment (BC MOE; 2008).

As described in the response to ALIB IR No. 2.03.03, Trans Mountain is proposing the collection and interpretation of quantitative turbidity (and total suspended solid or TSS, where warranted) data as supporting mitigation for construction at select watercourses. Please refer to the response to ALIB IR No. 2.03.03 as well as the response to ALIB IR No. 1.3.34 (Filing ID A3X5V6) for additional information.

Turbidity levels are dynamic and can fluctuate on a seasonal (*e.g.*, spring freshet) and even daily basis (*e.g.*, rainfall runoff), consequently, there is no value in comparing quantitative turbidity data collected during pre-construction aquatics assessments with quantitative turbidity and/or total suspended solid (TSS) data collected during water quality monitoring (WQM) where coinciding with construction. Therefore, Trans Mountain does not intend to compare qualitative turbidity data collected during the pre-construction aquatic assessments with quantitative turbidity and/or total suspended solid (TSS) data collected during water quality monitoring where coinciding with construction.

Reference:

British Columbia Ministry of Environment. 2008. British Columbia Fisheries Information Services Branch for the Resources Information Standards Committee Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Site Card Field Guide. Government of British Columbia. Victoria, BC. 41 pp.

b) Pleaser refer to the responses provided in ALIB IR No. 1.3.34 (Filing ID A3X5V6), ALIB IR No. 1.3.31b (Filing ID A3X5V6) and ALIB IR No. 2.03.03. Trans Mountain notes that the ALIB asked this question (or versions of it) on multiple occasions in the first round of Information Requests and responses were provided (see above).

Trans Mountain also notes that the National Energy Board denied the ALIB's motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H7). Trans Mountain will not be providing further information on this question.

c) Refer to response a) above.

2.02.5 Defensible analysis of the fate and behaviour of diluted bitumen releases and spill impacts in river

Reference:

Trans Mountain 2013, Volume 7, Qualitative Ecological Risk Assessment of Pipeline Spill Technical Report (QERA); Trans Mountain 2013, Volume 7, Section 7, p 7-105, 7-117 and 7-130; Trans Mountain response to ALIB IR No. 1.2.5 (a) and (b)

Preamble:

In the hypothetical diluted bitumen spill scenarios assessed by Trans Mountain in the Athabasca River, North Thompson River and lower Fraser River, there are several subjective judgements made regarding the likely formation of oil-mineral aggregates (OMA) (e.g. in the form located at Volume 7, Section 7.1.2.2.1, p 7-105, Section 7.1.3.2.1, p 7-117 or at Section 7.1.4.2.1, p 7-130). The formation of OMA in the case of a spill of diluted bitumen in water influences whether bitumen will sink under the water surface, with significant implications for the extent of impacts and for mitigation and remediation efforts. TM has not provided a quantitative, more objective, comparison of the environmental conditions at each hypothetical spill location that will determine the likelihood of OMA formation. Instead, TM states that its subjective interpretation of oil mineral aggregate formation potential is merited and is sufficient to characterize the risks associated with a diluted bitumen spill into rivers.

We are aware of only one documented spill of diluted bitumen into a river (the Marshall Spill in the Kalamazoo River, Michigan in 2010). None of the other real-world spill case studies considered by TM involved a spill of diluted bitumen (Trans Mountain, Volume 7, QERA of Pipeline Spill Technical Report, p. i). Trans Mountain has not stated whether it employed experts on the Marshall Spill to conduct its river spill scenarios. For this reason, it is quite possible that the experts who contributed to the river spill scenarios have no experience with diluted bitumen spills into rivers. Moreover, even experts with experience in the Marshall Spill would only have experience with a single real-world case. In different terms, based on very little real-world experience, TM believes that it can rely on the qualitative judgement of consultants that have likely never completed such an analysis to predict the potential for OMA formation in different river systems. Given uncertainties regarding OMA formation in river systems, this assertion is unacceptable.

Request:

a) Please clarify whether any of the experts who contributed to the riverine diluted bitumen spill scenario assessments have professional experience assessing and mitigating aquatic ecosystem impacts caused by the Marshall Spill.

b) If the answer to 2.5a) is no, please confirm that the experts who contributed to the riverine spill scenarios have no experience with diluted bitumen spills into rivers.

c) Please provide a quantitative comparison of the relevant environmental conditions at each hypothetical spill location, for the Marshall Spill and studies on OMA behaviour, including quantitative estimates of:

- mixing energy in the water column (turbulence)
- temperature
- oil characteristics
- oil droplet size and number
- concentration, type and size distribution of suspended sediment
- salinity

d) Please formulate and use a quantitative relationship between these parameters and OMA formation potential to calculate the probability of OMA formation in each hypothetical spill scenario.

e) Ensure that data, conditions and outcomes of the Environment Canada study on diluted bitumen behaviour in water is included in the comparison of OMA formation potential (Environment Canada 2013).

f) In completing this analysis, please provide complete and detailed information regarding assumptions and methods used to develop the quantitative model and any sources of uncertainty in parameter estimation.

Response:

a) The authors of the Technical Report 7-1 of Volume 7, Qualitative Ecological Risk Assessment of Pipeline Spills (Filing ID A3S4W9) were not personally involved in the response to the Enbridge Line 6B pipeline spill at Marshall, Michigan.

b) The assessment of pipeline spills (Techncial Report 7-1, Filing ID A3S4W9) was based upon literature reports from selected accidents that occurred in various locations throughout North America. The authors of the Qualitative Ecological Risk Assessment of Pipeline Spills technical report (Technical Report 7-1) were not personally involved in the response to any of those spills. Nevertheless, the selected case studies (see Section 6.2.2 of Techncial Report 7-1), which involve a variety of crude and refined oil types as well as river locations selected for relevance to the terrain and river basins traversed by the proposed Trans Mountain pipeline, provide a sound technical basis from which the likely fate and environmental effects of crude oil spills, including diluted bitumen, can be predicted.

c) Data on sediment concentrations and river velocities during the first three weeks of the Marshall spill are not available from the vicinity of the spill. Discharge volumes for the USGS monitoring station on the Kalamazoo River near Battle Creek are provided in ALIB IR No. 2.02.5c - Attachment 1, showing in excess of 85 m^3/s (3,000 cubic feet/second) at the time of the spill. The USGS records for 2013 (ALIB IR No. 2.02.5c - Attachment 2) show that turbidity measurements were not in place until April 2011. In comparison, the Fraser River flow varies between the low 2,000 m^3/s to the near 10,000 m^3/s during freshet. A memo is provided in ALIB IR No. 2.02.5c – Attachment 3 and compares conditions in the Kalamazoo River and in the Nicola River, especially in terms of turbidity.

It is worth noting that river velocities vary within a watercourse, dependent on river geomorphology, cross-section, and water discharge (or flow) rates. In places, river velocities can be near static to very fast flow in constricted locations. As pointed out in numerous reports of the Line 6B spill that the portion of oil that entered the creek and river traveled downstream within a range of hydrodynamic settings: main channels, channel margins, secondary channels, oxbows, pools, and over dams (Dollhopf et al. 2014).

Finally, it should be noted that the spilled oil travelled on land, picking up a significant amount of sediments, before reaching the watercourse. The significance of the sinking process observed during the Marshall spill wasn't only due to high suspended sediments in the river, but also likely due to sediments that got attached to the oil before reaching the watercourse.

Reference:

Dollhopf, R.H., Fitzpatrick, F.A., Kimble, J.W., Capone, D.M., Graan, T.P., Zelt, R.B., Johnson, R. 2014. Response to heavy, non-floating oil spilled in a Great Lakes river environment: a multiple-lines-of-evidence approach for submerged oil assessment and recovery. Proceedings, 2014 International Oil Spill Conference, Savannah, GA, p.434-448.

d) The formation and stabilization of OMAs is described in rigourous scientific studies. The OMA formation approach was developed by Payne et al. (1987) and is presented in "Integration of Suspended Particulate Matter and Oil Transportation Study". Effects of water turbulence are incorporated. In addition, the calibration of the model was based on lab experiments conducted by Khelifa et al. (2008) and presented in "Effects of Dispersants on Oil-SPM Aggregation and Fate in US Coastal Waters". As described in ALIB IR No. 2.02.5c, a non-negligible number of unknowns exist regarding the environmental parameters during the Marshall spill. An attempt to extrapolate OMA formation, in the absence of sediment concentrations in the Kalamazoo, and in the absence of quantification of sediment pickup during the overland portion of the spill, would not be rigorous or defensible and therefore not useful. The calibration of the SPILLCALC model confirmed that it could replicate OMA formation, provided that a sufficient suspended sediment concentration and a sufficient level of turbulent energy dissipation was available. These conditions of sufficient suspended sediment concentration and turbulence energy level are rarely encountered along the marine transportation route, or indeed in the lower Fraser River, and so the formation of OMAs was extremely rare in the modelling that was conducted. A maximum of 0.08% of the spilled oil during a Credible Worst Case Scenario was found forming OMAs in the stochastic spill modelling. This maximum occured at the Strait of Georgia Site, and described in Technical Report TR 8C 12 Supplemental TR S9, Modelling the Fate and Behaviour of Marine Oil Spills for TMEP of Volume 8C (Filing ID A3S5G9).

References:

Khelifa, A., M. Fingas and C. Brown. 2008. "Effects of Dispersants on Oil-SPM Aggregation and Fate in US Coastal Waters". Final Report to the Coastal Research Response Center, University of New Hampshire, July 2008. 38 pp.

Payne, J.R., B.E. Kirstein, J.R. Clayton, C. Clary, R. Redding, D. McNabb and G. Farmer. 1987. Integration of Suspended Particulate Matter and Oil Transportation Study. Report Submitted to Minerals Management Service by Science Application International Corporation. 215 pp.

e) The Environment Canada Report considered extremely high sediment concentration to provide an upper bound on the potential OMA formation. They used a sediment concentration of 10,000 mg/L. As shown in Table 2.02.5e-1, suspended sediment concentration in the Fraser River would be at least two orders of magnitude lower.

TABLE 2.02.5e-1

SURFACE SEDIMENT CONCENTRATION

	Winter			Spring			Summer			Fall		
	min	**median**	**max**	**min**	**median**	**max**	**min**	**median**	**max**	**min**	**median**	**max**
	(mg/L)											
Westridge	0.1	0.3	2.6	0.8	1.6	11.9	0.5	1.0	4.4	0.3	0.7	5.1
Fraser River	26.5	31.0	54.2	48.6	50.1	79.6	25.5	28.7	41.3	30.2	34.3	44.3
Strait of Georgia	0.1	1.4	20.8	0.6	7.2	51.5	0.7	5.7	25.6	0.5	2.9	24.1
Arachne Reef	0.1	0.1	1.5	0.3	1.1	11.5	1.0	1.6	7.7	0.5	0.7	2.8
Race Rocks	0.0	0.0	0.1	0.0	0.3	2.2	0.4	0.7	2.0	0.1	0.2	0.6
Buoy J	0.0	0.0	0.0	0.0	0.1	0.6	0.1	0.3	0.8	0.0	0.0	0.3

Note:
All values are summarized from an area around the spill location corresponding to the median oil coverage after 24 hours. Minimum and Median values are computed as the median (during each season, in time) of modelled surface sediment concentration minimums or medians from the spatial extent. Maximum values are the highest in both space and time.

A maximum of 79.6 mg/L was observed for surface sediment concentration, and was found in the Fraser River. This number is representative of fine sediment concentrations during the freshet in the Fraser River. Total sediment concentration in the river would be higher, but OMA is a process that operates most efficiently with fine sediment. It should be noted that while the Fraser River Plume looks very muddy, it doesn't take particularly high concentrations of fine sediment to give the appearance of high sediment concentration.

f) No quantitative model was developed in light of the non-negligeable number of unknowns that exist regarding the environmental parameters during the Marshall spill.

Rather, the formation and stabilization of OMAs in the oil spill model is based on rigourous published scientific studies. Refer to response to ALIB IR No. 2.02.5c, 2.02.5d and 2.02.5e for more details.

2.02.6 Unrealistic concept of river and lake ice conditions at potential spill sites

Reference:

Trans Mountain 2013, Volume 7, QERA of Pipeline Spill Technical Report; Trans Mountain Response to ALIB IR No. 1.2.7

Preamble:

In outlining measures to mitigate a hydrocarbon spill from the pipeline under winter conditions where an ice cover will exist on rivers and lakes, TM has stated that ice, as a solid, is impermeable and would keep oil on its surface. TM goes on to state that containment on the ice surface will be achieved through the use of berms, trenches, or other barriers. Finally, TM states that clean-up activities could entail manual and mechanical collection of oil from the ice surface (Trans Mountain response to ALIB IR No. 1.2.7).

This characterization of river ice conditions does not reflect reality. This is because it does not acknowledge that river ice is rarely a flat plane without areas of thin ice or open water, without cracks and consistently and completely attached to the shore without gaps. Any of these conditions existing at a river spill site would increase the likelihood of diluted bitumen being released to the water column. In fact, for the North Thompson River, TM states that ice cover "may not be reliable" and that some of the oil would become entrained in the river after entering through open water patches (Trans Mountain, Volume 7, QERA of Pipeline Spill Technical Report, p. 6-71).

It is important for TM to realistically assess river and lake ice conditions in its spill scenarios. This is significant because, although an ice cover may limit the amount of spilled oil that can enter a river, it will also greatly restrict attempts to recover oil once it reaches the water column. If ice cover is unreliable, recovery of the oil from the ice surface would be hampered due to safety concerns. In addition, despite finding that oil would enter the North Thompson River through open water patches, TM finds that the effects on fish and fish habitat, benthic invertebrates and aquatic vegetation would be limited in spatial extent (Trans Mountain, Volume 7, QERA of Pipeline Spill Technical Report, p. 6-71). However, Trans Mountain does not provide recovery plans for oil that enters rivers under winter conditions.

Request:

a) Please confirm that TM's spill scenario assessments for the Athabasca River involving ice cover assume that the ice cover is a flat plane without areas of thin ice, open water or cracks and that the ice is consistently and completely attached to the shore without gaps.

b) If 2.6a) is confirmed, please provide a comparison of this hypothetical concept of river ice conditions with real-world Athabasca and North Thompson River ice cover conditions at the relevant spill scenario sites.

c) Provide justification for the finding that effects on fish and fish habitat, benthic invertebrates and aquatic vegetation as well as sediment quality would be limited in

spatial extent where oil enters the North Thompson River water column through holes in the ice cover:

i. Include a quantitative estimate of the amount of oil that will reach the water column and the extent of oil transport within the River; and
ii. Provide a quantitative estimate of the oil that will be deposited to the sediments along the River bed (benthos).

d) Describe recovery plans for oil that enters a watercourse where an ice cover is present.

Response:

a) Not confirmed. The description provided is not Trans Mountain's conceptual model of ice conditions on the Athabasca River at the time of the hypothetical oil spill under winter conditions. Section 6.4.1.1 Technical Report 7-1, Qualitative Ecological Risk Assessment of Pipeline Spills (QERA, Filing ID A3S4W9) makes specific reference to the potential for oil to penetrate cracks in the ice, and this situation was considered in the assessment of potential ecological effects.

Environment Canada (2015) climate normal data for Whitecourt, Alberta, the nearest relevant location also located on the Athabasca River, for the period 1981 to 2010, show the average daily temperatures for November, December, January and February to be -5.6, -10.0, -11.2 and -7.9 degrees Celsius respectively with December and January average daily minimum values of -14.5 and -15.9 degrees Celsius. Under these conditions, it is reasonable to expect ice cover on the Athabasca River to be typical during the winter season.

Section 6.4.1 of the QERA considers four seasons, and three flow conditions for the Athabasca River near Hinton, Alberta. Winter conditions are represented by freezing temperatures, with ice cover on the river, and flow of 50 m^3/s or less. Spring and fall conditions are represented by moderate temperatures, and flow of approximately 200 m^3/s. Summer conditions are represented by warm temperatures, and freshet flow of 500 m^3/s or greater.

Reference:

Environment Canada. 2015. Canadian Climate Normals 1981-2010 Station Data, Temperature, for Whitecourt, Alberta. Available online at: http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=2632&lang=e&StationName=whitecourt&SearchType=Contains&stnNameSubmit=go&dCode=1&dispBack=1. Accessed, January 29, 2015.

b) Refer to response to ALIB IR No. 2.02.6a where this concept was not confirmed.

c) Section 6.4.2 of Technical Report 7-1, Qualitative Ecological Risk Assessment of Pipeline Spills (QERA, Filing ID A3S4W9) considers four seasons, and three flow conditions for the North Thompson River near Darfield, British Columbia. Winter conditions are represented by freezing temperatures, with potential but not reliable ice

cover on the river, and flow of 100 m^3/s or less. Spring and fall conditions are represented by moderate temperatures, and flow of approximately 500 m^3/s. Summer conditions are represented by warm temperatures, and freshet flow of 1,250 m^3/s or greater.

The conclusion reached in the QERA that potential environmental effects on fish, fish habitat, benthic invertebrates and aquatic vegetation and sediment quality might be limited in spatial extent were qualitative, reflecting the likely spatial extent of environmental effects in other seasons, as well as seasonal flow conditions in the river. It was beyond the scope of the QERA to provide quantitative estimates of the amount of oil that may reach the water column and the extent of oil transport within the river, as well as to provide a quantitative estimate of the amount of oil that would be deposited to the sediments along the river bed, so the quantitative estimates requested cannot be provided. Quantitative estimates would not change the assessment conclusions that an oil spill into the North Thompson River in any season could have substantial negative effects that could be long-lasting if prompt and effective measures are not taken to mitigate the immediate impacts by containment and recovery. However, as described in Section 3.0 of Volume 7 (Filing ID A3S4V5), the probability of a crude oil spill to freshwater is very low.

d) KMC acknowledges and agrees that partial and full ice cover conditions, of varying thickness and strength can present very challenging access and oil recovery conditions for emergency responders in the unlikely event of a pipeline spill into a river, stream or lake. Environmental conditions that may exist at any time of year need to be considered and incorporated into KMCs emergency response plans, selection of response equipment, available tactics and training of personnel.

To help address these and other emergency response challenges, KMC is commencing a project to develop Geographic Response Plans (GRPs) which will become part of an enhanced Emergency Management Program in support of the expanded pipeline system. Among other factors, the project will consider partial and full ice cover challenges in terms of access and effective response tactics under various ice conditions.

Refer to response to Province of BC IR No. 2.35a for more information about the scope of the GRP project. It is included below:

> *The scope of the analysis outlined in the request and the research required to provide an adequate response cannot be adequately addressed in the short timeframe available prior to the IR response submission date. Trans Mountain believes that sufficient information has been provided to address the National Energy Board's (NEB) List of Issues (Filing ID A3V6I2).*
>
> *Kinder Morgan Canada Inc. (KMC) acknowledges and agrees that all of the river systems mentioned in the question undergo marked seasonal variations in rates of flow, ice cover, accessibility and other factors that*

impact and challenge emergency response operations in the unlikely event of a pipeline spill. Environmental conditions that may reasonably exist for any time of year need to be considered and incorporated in KMCs emergency response plans, selection of response equipment and training of personnel.

To help enhance how KMC provides emergency response throughout the year, considering the various environmental conditions that may be encountered as described above, KMC is commencing a project to develop Geographic Response Plans (GRPs) which will become a part of the enhanced Emergency Management Program (EMP) to support the expanded pipeline system.

The project will include:

- *A review of both Lines 1 and 2 with production of a response capability analysis that will address the requirements in the Province's request above.*
- *Development of a complete set of GRPs covering both Lines 1 and 2. The analysis referenced above will serve as a key foundational element for the new GRPs that will be developed. The GRPs will provide responders with guidance and detailed information on access, deployment and product recovery as well as strategies and tactics relevant to environmental conditions throughout the year.*
- *Include guidance for KMC responders for other environmental factors such as full or partial ice cover of rivers, streams and lakes, forest fire and smoke, avalanche and flooding conditions. The North Thompson Valley has the highest fire return history of any transited by the Trans Mountain pipeline system (TMPL system).*
- *A full review of control points including spacing, access suitability under various environmental conditions and others.*
- *Full consultation and incorporation of First Nations, local and regional governments as well as Canadian Pacific Railway and Canadian National Railway response capabilities and mutual aid, in addition to KMCs existing mutual aid partners.*
- *SCAT guidance, the extent and details of this guidance will be finalized prior to the project commencing.*

Commitment:

- *KMC is commencing a project to develop Geographic Response Plans (GRPs) which will become a part of the enhanced Emergency*

Management Program (EMP) to support the expanded pipeline system.

KMC acknowledges the interest of Intervenors to seek more information about the existing EMP documents, and reference materials related to the TMPL system, which is why KMC filed a redacted copy of the existing Emergency Response Plans (ERP) publicly (Filing ID A63573). In Ruling No. 50 (Filing ID A4G5I9) the National Energy Board (NEB) determined that it was "satisfied that sufficient information has been filed from the existing EMP documents to meet the Board's requirements at this stage in the process."

It is KMC's intent to continue to share un-redacted versions of the EMP documents with agencies tasked with ensuring public safety. KMC's EMP is shared, tested and regularly exercised with federal, provincial and local agencies. The EMP meets regulatory requirements and KMC works with emergency planners and emergency responders to maintain relationships and to ensure their awareness of KMC's system, as well as mutual awareness of joint exercises and programs.

The Application, Volume 7, Section 4.8 outlines the process to enhance KMC's existing EMP's as they relate to the TMPL system to address the needs of the Project (Filing ID A3S4V5). The final programs will be developed in a manner consistent with the NEB draft conditions related to emergency response (Filing ID A3V8Z8).

KMC also acknowledges the Province of BCs interests and concerns about consultation opportunities for the updated EMP for the Project.

Since the updated EMP depends upon the final detailed design of the Project, a process which will not be carried out unless the Project receives approval and until KMC has an opportunity to review the conditions of such approval, the updated EMP cannot be provided during the NEB's regulatory review of the Project. However, to ensure affected parties have the opportunity to express concerns and provide input which will inform the updated EMP, KMC will conduct a consultation program as part of developing the updated EMP as described in the NEB draft conditions related to emergency management.

Following receipt of a Certificate of Public Convenience and Necessity for the Project (CPCN), KMC will file with the NEB a consultation plan related to KMC's EMP review that will include consultation scope, objectives; preliminary lists of regulatory authorities, communities, Aboriginal groups with whom KMC will engage, and a preliminary list of consultation locations and timing, as well as any other information that the NEB requires. The consultation plan will describe the methods that will be used to track commitments made during consultation and to incorporate them into KMC's EMP, including its ERP's. As part of this program KMC will periodically file reports with the NEB on progress of its EMP review including summaries of interested parties consulted and how their comments were considered.

KMC will file with the NEB the revised ERP for the pipeline as part of the approval conditions for the Project. The plan will demonstrate KMC's ability to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type related to the TMPL system. Filing of the ERP will include, for the NEB's consideration, a final report on the consultation process as well as confirmation that an independent third party has reviewed and assessed the ERP and that KMC has considered and incorporated the comments generated by the independent review and assessment into the plan.

Ultimately, updates to the EMP incorporating feedback from consultation activities must result in an EMP that continues to meet the requirements of the *National Energy Board Onshore Pipelines Regulations* (2013) (OPR). As it does for the existing system, the OPR provides lifecycle regulation for all aspects of the Project operation including requirements for emergency response programs. KMC must maintain and update the EMP throughout the lifecycle of the expanded TMPL system. As well, throughout the life of the expanded system, NEB staff will continue to conduct emergency response exercise evaluations and emergency procedures manual reviews to verify that companies are prepared to anticipate, prevent, manage, and mitigate emergency situations.

The Application, Volume 7, Section 4.8 outlines the process to enhance KMC's existing EMP's as they relate to the TMPL system to address the needs of the Project (Filing ID A3S4V5). The final programs will be developed in a manner consistent with the NEB's draft conditions 42, 52, 53 and 54 (Filing ID A3V8Z8).

2.03.0 AQUATIC RESOURCES/FISHERIES ROUND 2 IRS

2.03.01 Dredging effects on marine and estuarine environments

Reference:

Trans Mountain, Vol. 1, Section 3.2.6, Page 1-66, Volume 5A, Section 7; Trans Mountain Response to ALIB IR No. 1.3.01(a)

Preamble:

The assumption that proposed dredging will only result in short-term and low magnitude effects on marine sediment and water quality is not well supported or documented and the attention given to this issue is inadequate given the importance of intertidal, estuarine and subtidal habitats to both marine and anadromous species. The proposed 2014 marine geotechnical surveys should now be completed and should be provided for review by ALIB. In addition, the survey results should now allow for questions regarding specifics of the dredging and disposal plans and potential effects on biota in the marine environment to be adequately answered.

Section 7 in Volume 5A of the Application indicated that copper, arsenic, lead and cadmium levels were each over the Disposal at Sea sediment guidelines (Canadian Environmental Protection Act 1999, Disposal at Sea Regulations SOR/2001-275) and the CCME Interim Sediment Quality guidelines (CCME 2013) and in the range where environmental effects are occasionally observed. Copper in particular had very high sediment concentrations close to the probable effect level. In Table 7.6.8-2 of the Application, proposed sampling is only for polycyclic aromatic hydrocarbons (PAHs) if TSS concentrations are exceeded during dredging. This sampling program appears mismatched to the actual metals concentrations in the sediments which should be closely monitored and a focus of sampling during any dredging. Additionally, there is no information on how the removal of sediment and replacement with infill will be assessed for any effect on the near shore and sediment biota. If dredging does occur, the generalities of disposal at sea (if the sediments meet regulatory requirements) are discussed, but no plan is provided for assessing the biota in the proposed disposal site before the dumping. There is also no plan for tracking the recovery of the biota at the dumping site.

Request:

a) Please provide a sampling plan for all metals that exceed screening guidelines and CCME ISQGs in addition to the existing sampling plan for PAHs to be completed should TSS levels exceed guidelines during dredging.

b) The planned 2014 marine geotechnical surveys should now be completed. Please provide the actual extent of the dredging area and the range of concentrations of metals and PAHs found in the area as a result of the survey and details of planned sampling regimes during the construction work for review.

c) Please provide field data from the near shore area proposed as the most likely location for dredging (or the actual dredge footprint if it differs) for the biota in residence at that location and their densities.

d) Please provide a plan for compensating for the loss of this habitat (since it will be replaced by infill in the proposed approach).

e) Please provide a sampling and monitoring plan for assessing biota at the dumping site before and after dumping should dumping at sea be the pursued option for sediment disposal.

Response:

a) The data discussed in Section 7.6.8 of Volume 5A (Filing ID A3S1R0) refer to the 2013 sampling program in an area previously considered for dredging in the berth areas (no longer being considered due to berth re-design) and to historical data for eastern Burrard Inlet. These areas will not be disturbed during Project construction. The 2014 sampling was conducted in the nearshore infill area where dredging may occur; however, a decision on whether to dredge that area has not yet been made. The 2014 sampling program results are discussed in the response to ALIB IR No. 2.03.01b and indicate that polycyclic aromatic hydrocarbon (PAH) and copper levels were elevated in surface sediments at several locations within the potential infill area (see the *2014 Marine Sediment Technical Report*, Stantec Consulting Ltd. December 2014, Filing ID A4F4Z5). Cadmium and lead levels were elevated at only two isolated spots each. Sampling has shown that copper levels higher than the Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guidelines (ISQGs) are widespread in the area surrounding the potential dredge site, related to both human activities and natural sources.

   A water quality monitoring program during dredging would focus on turbidity and total suspended solids (TSS) because maintaining acceptable turbidity levels outside the active work area would also protect from elevated metal levels. Mitigation measures such as clamshell dredge would limit sediment release and silt/turbitidy curtains would be used to restrict movement of turbid water off the site. In this approach, monitoring of metals is considered unnecessary. The monitoring of PAH is included because historically, sediment in the berth area contained elevated PAH levels (this area was dredged in 2006).

b) Limited marine geotechnical surveys were conducted in 2014 and more work will be needed to inform finalised terminal design. The potential shoreline infill area is identified on Figure 4.1 of the *2014 Marine Sediment Technical Report* (Stantec Consulting Ltd. December 2014, Filing ID A4F4Z5).

   Sampling was conducted in October 2014 to characterise the physical and chemical characteristics of sediments within the potential dredge area. Results showed that cadmium, copper, lead and polycyclic aromatic hydrocarbons (PAHs) exceeded Disposal at Sea (DAS) sediment screening criteria and Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guidelines (ISQGs) in some samples.

- Cadmium exceedances were limited to two samples from surface grabs. The maximum value of 0.66 mg/kg was marginally above the DAS screening criterion of 0.6 mg/kg but below the CCME ISQG of 0.7 mg/kg, and is not considered a concern.

- Lead exceedances were recorded in two samples in the 0 to 0.5 m depth range of two cores. The lead maximum of 46.9 mg/kg was higher than the DAS screening criterion and CCME ISQG of of 30.2 mg/kg and lower than the CCME Probable Effects Level (PEL) of 112 mg/kg. These samples also had copper levels higher than the CCME PEL.

- Copper concentrations ranged from 6.5 to 120 mg/kg and exceeded the DAS screening criterion (and CCME ISQG) of 18.7 mg/kg in 27 of 51 samples from a range of depths and locations. Two of the samples had concentrations higher than the CCME PEL of 108 mg/kg. The copper levels reflect a combination of anthropogenic and natural sources. The natural sources are the soils of the surrounding watersheds, which have eroded over time. Background metal levels in terrestrial soils are described in BC Ministry of Environment (2010); copper levels of 45 mg/kg and 100 mg/kg are listed as background levels for the Lower Mainland and the Greater Vancouver area, respectively, and are higher than the CCME ISQG but not the CCME PEL (108 mg/kg). If the 45 mg/kg level is conservatively assumed to reflect natural conditions, then five surface grab and five surface core samples (0 to 0.5 m depth) had concentrations above the natural range and no samples from 0.5 to 3.0 m depth had concentrations higher than the natural range (6.5 to 42.9 mg/kg). Anthropogenic influences are discussed below.

- Total PAH concentrations ranged from below the detection limit of 0.02 mg/kg to 14.5 mg/kg, and were above the DAS screening criterion of 2.5 mg/kg in 11 of 55 samples. Exceedances were noted in surface grabs (10 of 17 samples) and one core (1 of 10 samples, from the 0 – 0.5 m depth range), with the highest concentrations identified for samples collected near the existing skiff wharf (which has creosoted pilings).

Two types of anthropogenic inputs were identified: the skiff wharf (creosoted pilings as a source of PAHs, discussed above) and stormwater discharges from upland areas (as a source of lead and copper).

Two sites at the northern perimeter of the sampling area (sites S01 and S11) had lead levels higher than the CCME ISQG and copper levels higher than the CCME PEL and other areas also had copper levels higher than the CCME ISQG and the natural background range (conservatively assumed to be 45 mg/kg). This distribution suggests localized hotspots, unrelated to terminal operations but perhaps associated with current or historical stormwater runoff from upland areas. Historical use of leaded fuels would be a source of lead in sediment. Historical and current stormwater and industrial discharges would be a source of copper, as noted elsewhere in Burrard Inlet. Technical Report 5C-12 of Volume 5C, Marine Sediment and Water Quality – Westridge Marine

Terminal Technical Report (Stantec Consulting Ltd. December 2013, Filing ID A3S2R6) identifies the numerous stormwater outfalls in the area (Burrard Inlet Environmental Action Plan 2010, EVS Environmental Consultants 2003) and variations in sediment and water quality (British Columbia Ministry of Water, Land and Air Protection 2004).

If dredging and ocean disposal are selected as the construction method for the shoreline infill area, further investigation, including sediment sampling and perhaps sediment toxicity testing, would be required to further delineate areas of elevated metal and PAH concentrations. Other disposal options, including land disposal, would also be evaluated.

Design of a water and sediment sampling plan for use during construction requires information on the scale and duration of dredging, equipment used and timing. When this information is available (likely in 2016), a sampling plan will be developed.

References:

British Columbia Ministry of Water, Land and Air Protection. 2004. Water quality objectives attainment monitoring in Burrard Inlet in 2002. Ministry of Water Land and Air Protection, Lower Mainland Region.

Burrard Inlet Environmental Action Plan. 2010. Burrard Inlet Point Source Discharge Inventory. Burrard Inlet Environmental Action Program, Burnaby, BC.

EVS Environmental Consultants. 2003. Receiving Environment Monitoring Program for Stormwater Discharges within the Greater Vancouver Regional District. Prepared for the Greater Vancouver Regional District, Burnaby, BC by EVS Environment Consultants, North Vancouver, BC.

c) Field data for marine biota at the potential dredge site are discussed in Section 7.6.9 of Volume 5A (Filing ID A3S1R0) and detailed survey results are presented in Technical Report 5C-13 of Volume 5C, Marine Resources – Westridge Marine Terminal Technical Report (Stantec Consulting Ltd. December 2013, Filing ID A3S2R7). Information on fish habitat, and fish and benthic species presence and abundance, was collected using existing literature and video footage from a submersible remotely operated vehicle (ROV).

d) Please refer to the *Preliminary Marine Fish Habitat Offsetting Plan*, submitted to the National Energy Board on December 1, 2014, as part of Technical Update No. 4 (Filing ID A4F5C5). This plan outlines the approach for compensating for (i.e., offsetting) any serious harm to fish that are part of, or support, commercial, recreational or Aboriginal (CRA) fisheries at the Westridge Marine Terminal.

e) Finalised engineering plans, which will likely be available in 2016, are needed to make a decision about whether dredging is required, and to calculate the volume of sediment for dredging and disposal. Trans Mountain will consult with Environment Canada to ensure that all requirements for sampling and monitoring at the disposal site are met, before dredging takes place.

2.03.02 Monitoring programs

Reference:

Trans Mountain, Vol. 1, Section 3.1.3.4, p. 84; Trans Mountain Response to ALIB IR No. 1.3.05(a)

Preamble:

The specifics provided by TM to date about the monitoring program point to a program that will not be adequate in its duration or its scientific rigour to determine if any aquatic environmental issues will be detected and whether longer term assumptions of returning to baseline conditions will be met. It is proposed that monitoring will occur in alternate years and cease after three years of monitoring (over a 5 year span). Lack of scientific rigour is prevalent in TM's monitoring plans, but one of the most worrisome plans is the proposed visual measurement of turbidity. It is not considered professional due diligence to use a measure that is not repeatable, is not comparable to federal or provincial guidelines, and cannot be compared to baseline measurements to assess potential effects.

TM also states that 5 years was generally adequate for other approved developments of this type. However, for the fisheries that may be affected by the proposed project, particularly those dealing with cyclic populations such as the various species of Pacific salmon or those that are a unique and valuable resource for CRA fisheries, these require monitoring that is not 'typical' to assess any potential changes. TM simply restated portions of the Fisheries Act regarding serious harm definitions in their responses to ALIB IRs. What is still not addressed by TM is the fact that the baseline data collected to date by TM will likely be insufficient to assess whether serious harm (death of fish or permanent alterations of fish habitat) has occurred because the data collected is presence and absence only, and generally restricted to one season and one sampling bout.

Request:

a) Please provide information on how fish populations and fish habitat will be assessed throughout routine operations and maintenance program.

b) Please provide the environmental sampling training plans for TM staff who will be carrying out sampling during the routine maintenance and operations program for review by ALIB.

c) Please also provide monitoring schedules and locations for all sampling planned to occur during operations and maintenance and provide details as to how professional due diligence will be maintained while employing non QAEP staff to carry out monitoring.

d) Please provide information on the analytic approaches (with citations) that will be used to employ presence-absence data as collected to assess whether serious harm (as defined by DFO) has occurred to any of the fish populations or their habitat along the proposed route.

e) Please provide an example analysis of before and after construction using the existing data for one potential crossing point to provide clarity on the approach and its strengths and weakness for ALIB to assess.

Response:

a) As described in Section 7.1.5 of the Fisheries (Alberta) Technical Report (Filing ID A3S1W7) and Section 7.1.5 of the Fisheries (British Columbia) Technical Report (Filing ID A3S2C2), Trans Mountain acknowledges that Post-Construction Monitoring (PCM) will be required at some of the Project's watercourse crossings. However, it is anticipated that at locations where serious harm to fish and fish habitat (DFO 2013) will be avoided or successfully mitigated by the Project, PCM will be limited to the evaluation of overall stability of the crossing location, effectiveness of sediment and erosion control measures and re-vegetation of bank and riparian areas. In these instances, there is no anticipated requirement to replicate or supplement aquatic assessments (*i.e.*, including the collection of detailed fish habitat data) as these have been conducted in support of the Project's application to the National Energy Board (NEB). Trans Mountain will, however, accept PCM requirements as conditioned by the NEB.

Following the completion of the Project's PCM program, the assessment of fish populations and fish habitat will not be included in Trans Mountains' routine operations and maintenance program. However, should subsequent remediation needs in or near a watercourse be identified, it is expected that an assessment of the remediation works will be completed with reference to the aquatic environment in the vicinity. This assessment may or may not include a re-evaluation of fish habitat potential and use, but will be dependent upon the scope or remediation, the timing of potential works and proximity to fish habitat.

Reference:

Fisheries and Oceans Canada. 2013a. Fisheries Protection Policy Statement. Catalogue No. Fs23-595/2013E-PDF. Ottawa, ON. 22 pp.

b) If the need for remediation works in the vicinity of a watercourse is identified Trans Mountain's routine operations and maintenance program, Trans Mountain will engage the services of a qualified professional(s) to lead in the assessment of the remediation needs with respect to maintenance of productive capacity of the aquatic environment. Depending on the location of the remediation need (*i.e.*, British Columbia or Alberta), any required aquatic assessment will be led by either a Qualified Environmental Professional (QEP) who is in good standing with The College of Applied Biology – British Columbia (*i.e.*, is a Registered Professional Biologist or of R.P. Bio. status), and/or a Qualified Aquatic Environment Specialist (QAES) who is in good standing with the Alberta Society of Professional Biologists (*i.e.*, is a Professional Biologist or of P. Biol. status). Regardless of which jurisdiction the work may be required, a QEP or QAES is bound to a strict code of ethics, and is required to apply sound methodologies and only able to provide assessments in their area of professional expertise. For simplicity and

because of their interchangeable references between provinces, both QAES and QEP will be subsequently referred in this response as a QEP.

Environmental sampling (if required) will be conducted by a QEP-led crew. However, the level of training for staff completing this work may be variable, and dependent upon the type and scope of remediation as well as thresholds established by the contracted consultant/individual. Trans Mountain has no intentions of developing specific training plans for PCM or the assessment of aquatic environments (if required) for remediation related monitoring/assessment activities. Trans Mountain will, however, ensure that staff conducting environmental monitoring or subsequent aquatic assessments for remediation works resulting from the routine maintenance and operation program will have training equal to that used for the pre-construction aquatic assessments and that lead biologists meet the qualifications of a QEP. Qualifications of a QEP are provided in the response to Upper Nicola Band IR No. 1.25c (Filing ID A3Y3V1).

c) Scheduling of Trans Mountain's Post-Construction Monitoring (PCM) will be developed subsequent to, and in accordance with, conditions provided by the National Energy Board.

Any aquatic assessments completed as part of potential remediation works, identified during Trans Mountain's subsequently routine operations and maintenance program, will be scheduled on an as-needed basis. As a result, this potential scheduling and location is not predictable. Any maintenance requiring instream works would include on-site monitoring by a qualified aquatic environmental professional (QAEP) during these works. As well as water quality monitoring, any works in fish-bearing watercourse requiring an isolated work area would also require a salvage of fishes from within the isolated area.

For information related to the qualifications and due-diligence of staff who will conduct aquatic environmental sampling or subsequent aquatic assessments related to remediation works, please refer to the response to ALIB IR No. 2.03.02b.

d) Trans Mountain is currently determining the potential for the proposed Project to result in serious harm (Fisheries and Oceans Canada [DFO] 2013a) to fish and fish habitat, through the DFO endorsed self-assessment process (DFO 2014). Trans Mountain provided its methodology for the Project's self assessment of the potential for serious harm (Self Assessment) to the National Energy Board (NEB) on December 1, 2014 (Filing ID A4F5C7).

Trans Mountain will complete its Self Assessment and seek leave to file it with the NEB in Q1 2015. However, it is anticipated that confirmation of any potential serious harm will occur subsequently, following review by the NEB/DFO. As a result, it is premature to propose analytic (or other) approaches to quantify potential loss to the productivity of fisheries in watercourses to be crossed by the proposed pipeline. However, should the potential for serious harm to fish or fish habitat resulting from the Project's proposed primary construction methods be confirmed, Trans Mountain will ensure all necessary data will be collected at the confirmed locations where there exists the potential for serious harm, and will do so in a manner that will satisfy submission requirements as

outlined in Section 3 of An Applicant's Guide to Submitting an Application for Authorization under Paragraph 35(2)(b) of the *Fisheries Act* (DFO 2013b). If additional data collection (*i.e.*, beyond that already completed on behalf of the Project) is required, sampling will be designed to collect comprehensive data related to, among others, fish habitat, species abundance and potential effects on fish and fish habitat and will consider guidance provided by DFO (2012) and Kenchnington *et al.* (2013).

References:

Fisheries and Oceans Canada. 2012. Science Advice to Support Development of a Fisheries Protection Policy for Canada. Science Advisory Report. Government of Canada. Ottawa, ON. 22pp.

Fisheries and Oceans Canada. 2013a. Fisheries Protection Policy Statement. Catalogue No. Fs23-595/2013E-PDF. Ottawa, ON. 22 pp.

Fisheries and Oceans Canada. 2013b. An Applicant's Guide to Submitting an Application for Authorization under Paragraph 35(2)(b) of the *Fisheries Act*. Government of Canada. Ottawa, ON. 19 pp.

Kenchington, E., Duplisea, D.E., Curtis, J.M.R., Rice, J.C., Bundy, A., Koen-Alonso, M., and Doka, S.E., 2013. Identification of Species and Habitats that Support Commercial, Recreational or Aboriginal Fisheries In Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/110. iv + 68 p.

Fisheries and Oceans Canada. 2014. Projects Near Water. Website: http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html Date Accessed: January 20, 2015. (Note that the Fisheries and Oceans Canada website is continually refreshed and the material is not optimized for printing or saving offline.).

e) Refer to response d) above.

2.03.03 Collection of turbidity measures

Reference:

Trans Mountain, AB Fish Tech Report, Section 3.6.3.1, page 3-18; Trans Mountain Response to ALIB IR No. 1.3.08

Preamble:

In their responses to ALIB IRs, Trans Mountain outlines the need to be able to determine the average increase of TSS concentration in mg/L to determine if regulatory guidelines are ever exceeded. However, they have not used methods that measure the variable in concentration units so it is impossible to determine the TSS in relation to guidelines. Subjective observational measurements were used by TM observing neither due professional diligence nor scientifically defensible methods. Using the methods as outlined, TM will not be able to determine if they have exceeded guidelines. Sedimentation is a potentially significant effect of construction and operations of watercourse crossings with impacts on several species and life stages of fish.

Request:

Please provide TSS measured in mg/L for each stream crossing either pre-construction at the crossing location or above the crossing during construction and below the crossing at the same time for comparison.

Response:

As indicated in the response to ALIB IR No. 1.3.31b (Filing ID A3X5V6), Trans Mountain is proposing to complete water quality monitoring (WQM) during trenched construction at all High sensitivity watercourses (as defined in Section 3.7 of Technical Report 5C-6 in Volume 5C (Filing ID A3S1W6) and Section 3.4 of Technical Report 5C-7 in Volume 5C (Filing ID A3S2C1) as well as select Low sensitivity watercourse given their proximity to High sensitivity habitat. Trans Mountain is also proposing to complete WQM at all trenchless crossings.

As indicated in the response to ALIB IR No. 1.3.34 (Filing ID A3X5V6), Trans Mountain intends to conduct WQM programs based primarily on turbidity. Turbidity will be monitored quantitatively, both upstream from the proposed pipeline crossing and downstream throughout construction. If warranted (*i.e.*, in the event of suspected exceedance) and based on thresholds identified by the Canadian Council of Ministers for the Environment (CCME 2007), water samples will be collected and analyzed for total suspended solid concentrations (TSS). These results will then be used to establish a relationship between turbidity and TSS data at that location, so that results of the WQM program can be discussed in terms of TSS. Water quality monitoring results will be recorded, analyzed and reported following construction of the Project. If required by the National Energy Board, WQM reporting will be made available for public review. For more information related to the proposed WQM in support of the Project, please refer to Sections 3.0 and 12.0 in Appendix C of Volume 6B (Filing ID A3S2S3).

Reference:

Canadian Council of Ministers of the Environment. 2007. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Table. Updated in December 2007 from the Canadian Environmental Quality Guidelines, 1999. Canadian Council of Ministers of the Environment. Winnipeg, MB.

2.03.04 Increased angler harvest from improved access

Reference:

Trans Mountain, General, Table 7.1 in BC and AB Fisheries Technical Reports, Section 7 Volume 6B; Trans Mountain Response to ALIB IR No. 1.3.09(a)

Preamble:

Increased access and potential effects on fish harvest will occur during construction and will continue during operations unless access is restricted or reduced to levels at or below baseline conditions. Increased access and increased direct mortality through harvest were identified as concerns during the operations phase of the program in the ESA. Bull Trout as a species are very susceptible to overharvest (Johnston et al. 2007), Steelhead are a population of significant recreational importance on the Thompson, and Coho Salmon populations abundance declined 90% between 1990-2000 in the Thompson River and declines are linked with road density in the watershed, overfishing, changes in marine and freshwater habitat (Bradford and Irvine 2000). The only mention by TM of addressing increased access for anglers was "*Prohibit recreational fishing by Project personnel on or in the vicinity of the construction right-of-way. The use of the construction right-of-way to access fishing sites is prohibited.*" (Application, Table 7.1 in BC and AB Fisheries Technical Reports, Section 7 Volume 6B). To date TM has not provided a plan that outlines how access to the watercourses proposed for pipeline crossings will be reduced or eliminated after construction is concluded to minimize the increases in angling pressure that additional roads and access points are known to generally cause (Trombulak and Frissell 2000).

Request:

a) Please provide a plan for eliminating (or reducing to baseline conditions) the increased access to the watercourses in a timely fashion post construction.

b) Please provide a monitoring plan that will assess the angling pressure at the watercourse crossings before and after construction and after mitigation of access is completed.

Response:

a) Trans Mountain has proposed a Traffic and Access Control Management Plan encompassing the Project's pre-construction, construction and post-construction periods. Please refer to Section 10 of Appendix C of Volume 6B (Filing ID A3S2S3) for this information. If the Traffic and Access Control Management Plan does not completely prevent access to the pipeline right-of-way during operations (*i.e.,* post-construction), the fish and fish habitat assessment has considered disturbance to instream habitat resulting from a potential increase in access during operations and increased fish mortality or injury from a potential increase in access during operations. It is noted that 89% of the proposed pipeline corridor parallels the existing TMPL right-of-way or other linear facilities and, consequently, the concern is limited to the potential for increased access at new right-of-way and watercourse crossings.

b) Trans Mountain is implementing standard pipeline construction and operation practices as per provincial and federal regulatory requirements and industry standards. These practices do not include the collection of angling pressure data, as referenced in this request.

2.03.05 Supplemental studies

Reference:

Trans Mountain Response to ALIB IR No. 1.3.10(a)

Preamble:

TM clarified which watercourse crossings were the focus of additional baseline studies in 2014 and the type of data that were to be collected. However, the presence/absence data collected will likely not be adequate to detect changes in fish populations or habitat resulting from the Project.

Request:

a) Please provide the additional baseline studies completed in 2014 for review.

b) Please provide data beyond presence and absence for watercourse crossings rated with high fish sensitivity or importance (e.g., size, age structure, length, weight).

c) Please provide the analytic approach that will be used to assess changes in fish populations and habitat for review.

d) Please provide an example analysis with actual pre-construction data and simulated post construction data to demonstrate how presence/absence data will be used to determine if there has been a deleterious effect.

Response:

a) Trans Mountain has prepared supplemental technical reports related to fish and fish habitat in both Alberta and British Columbia. These reports and revised appendices were submitted as part of the responses to NEB IR No. 3.038d (Alberta report, Filing IDs A4H1Y6, A4H1Y7, A4H1Y8, A4H1Y9, A4H1Z0, and A4H1Z1) and NEB IR No. 3.039a (British Columbia report, Filing IDs A4H1Z2, A4H1Z3, A4H1Z4, A4H1Z5, A4H1Z6, A4H1Z7, A4H2A1, A4H2A2, A4H2A3, A4H2A4, A4H2A5, A4H2A6, A4H2A7, A4H2A8, A4H2A9, A4H2C0, A4H2C1, A4H2C2, A4H2C3, A4H2C4, A4H2C5, A4H2C6, A4H2C7, A4H2C8, A4H2C9, and A4H2D0).

b) As indicated in the response to ALIB IR No. 1.3.9 (Filing ID A3X5V6), the collection of population-level data and age structures was beyond the scope of the aquatic assessments completed by Trans Mountain to support the Application for the Project. Should the potential for serious harm be confirmed at select locations, further data collection may be conducted by Trans Mountain. For more information related to the determination of serious harm, refer to the response provided to ALIB IR No. 2.03.2d.

Trans Mountain has submitted all fish and fish habitat data (*e.g.*, fish length and weight, habitat information) collected at all crossings to date, as conditioned by provincial and federal fisheries managers (*i.e.*, Alberta Environment and Sustainable Resource Development [AESRD], British Columbia Ministry of Environment [BC MOE], Fisheries

and Oceans Canada). This information is available to the public and is accessible online. Information in Alberta can be accessed from AESRD's Fisheries and Wildlife Information Management System (2015), while information in British Columbia can be accessed from the BC MOE Fisheries Information Summary System (BC MOE 2015).

References:

British Columbia Ministry of Environment. 2015. Fisheries Inventory: Fisheries Information Summary System, Consolidated Waterbody Surveys, Habitat Wizard and EcoCat. Website: http://env.gov.bc.ca/fish/fiss/index.html. Accessed: January 2015.

Fisheries and Wildlife Management Information System. 2015. Fish and Wildlife Division, Alberta Sustainable Resource Development. Area-Specific Search Request and Website: http://xnet.env.gov.ab.ca/imf/imf.jsp?site=fw_mis_pub. Accessed: January 2015.

c) Refer to the response to ALIB IR No. 2.03.02d.

d) Refer to the response to ALIB IR No. 2.03.02d.

2.03.06 Testing of tissue samples for toxins

Reference:

Trans Mountain Response to ALIB IR No. 1.3.11(b)

Preamble:

Prior to construction, fish of each indicator species at a sub-sample of sites where traditional fish harvest occurs should be tested for body burden levels of toxins associated with spills of bitumen. Without these baseline levels, there is no level to use as a comparison should any accidental releases or spills occur. This would be precautionary and beneficial for TM.

Request:

a) Please provide peer-reviewed toxicology levels at which human-related health concerns occur for each indicator species.

b) Please provide toxicology levels at which fish begin to display reactions for each indicator species.

c) In order to have adequate baseline toxicity information to compare to, if any accidents should happen, please provide pre-construction baseline data from testing of 3 fish of each species used for food at each proposed crossing where harvesting of fish occurs for toxins associated with construction, operation and accidental spills and releases of pipelines prior to construction.

Response:

a) The Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report (Stantec Consulting Ltd. December 2013) (Filing IDs A3S4W9 and A3S4X0) presents tissue residue levels for the protection of ecological receptors. These levels are not based on human-related health concerns. It is important to note that there is no evidence that petroleum hydrocarbons, including polycyclic aromatic hydrocarbons, biomagnify up the food chain (Environment Canada and Health Canada 2011). Environment Canada and Health Canada (2011) noted that only the C_{20}–C_{25} two-ring cycloalkanes in petroleum products are persistent (half-life in soil and water ≥ 182 days and half-life in sediment ≥ 365 days) based on persistence and bioaccumulation criteria.

With few exceptions, fish tissue residue guidelines for the protection of human health that are specific to a given chemical, receptor life-style or fish species are not readily available in peer-reviewed literature, nor are they available from Canadian health authorities. Canadian tissue residue guidelines are available for the protection of wildlife consumers of aquatic biota for bio-accumulative and persistent chemicals (CCME 1999); however in terms of human health, only fish tissue residue guidelines for exposure to methyl mercury in seafood and fish are available from Health Canada (2007). In addition to Health Canada, the Government of Canada (1998) has developed contaminant profiles that present food residue levels for the protection of human health for bioaccumulative and persistent chemicals in commercial foods (as opposed to traditional

foods). Unfortunately, these contaminant profiles do not address specific chemicals or chemical groups typically associated with an accidental release or spill of petroleum hydrocarbons.

Chan *et al.* (2011) conducted a First Nations Food, Nutrition and Environment Study that characterized food contaminant exposure levels in First Nations peoples from British Columbia, but did not present tissue residue guidelines for the protection of human health. These types of guidelines are confounded by the following variables:

- Differences in individual lifestyles among community members;
- Frequency of food use;
- Type of foods consumed on a regular and seasonal basis;
- Differences in food consumption patterns between males and females, young and old, and traditional foods *vs*. store bought foods;
- Differences in access to traditional foods; and
- Cultural importance and differences among community members.

In the event of an accidental release or spill, fish tissue residue guidelines would be based on a site-specific risk assessment that would reflect the nature and significance of the accidental release or spill as well as a number of other factors:

- Consultation with federal and provincial authorities, including local, regional, provincial and/or federal health authorities and municipalities.
- Consultation with affected communities and stakeholders to determine the valued ecological components (VECs) that should be included in the site-specific risk assessment.
- Determination of local food preferences, lifestyles, consumption rates and frequency of use for specific food commodities that are consumed among community members that have been affected.
- Measurement of concentrations of chemicals of potential concern (COPC) in food items (*e.g.,* fish and aquatic plants) that were potentially affected.
- Measurement of COPC in food items from reference areas for comparison.
- Development of a site-specific risk management plan, if necessary.
- Development of a monitoring program that focuses on target COPC in specific media (*e.g.,* water and sediment) and sensitive or sentinel food items or VECs.

The risk assessment would include sampling of media from reference areas that are representative of current conditions when the accidental release or spill occurred and would be directly comparable to media in affected areas. The collection of baseline samples in advance of a spill event is problematic in that such historical data may not be representative of the environmental conditions that exist at the time of an event. The results of the monitoring program would be used, in part, to guide decision-making about the need for control measures such as fisheries closures, beach closures and/or food advisories. These controls would remain in place until the results of the monitoring program indicate that public health and safety is no longer at risk.

References:

Canadian Council of Ministers of the Environment. 1999. Protocol for the Derivation of Canadian Tissue Residue Guidelines for the Protection of Wildlife that Consume Aquatic Biota. Winnipeg, MB.

Chan, L., O. Receveur, D. Sharp, H. Schwartz, A. Ing and C.Tikhonov. 2011. First Nations Food, Nutrition and Environment Study (FNFNES): Results from British Columbia (2008/2009).

Environment Canada and Health Canada. 2011. Screening Assessment, Petroleum Sector Stream Approach. Gas Oil [Site-Restricted]. Chemical Abstracts Service Registry Number 68333-25-5.

Government of Canada. 1998. Health Canada Contaminant Profiles.

Health Canada. 2007. Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption. Ottawa, ON.

b) There are several possible types of reactions by fish in response to exposure to toxins in water (*e.g.*, behaviour, physiological, etc.). Reaction type and severity can vary depending upon, among others, the toxin, its concentration and solubility in water, mode of exposure, the fish species affected and the species' life stage. Since the above request does not describe the type of reaction of interest, it has been assumed that information is being requested on toxin levels resulting in either acute or chronic toxicity, ultimately resulting in mortality. For the purposes of this response, acute (or short-term) toxicity is defined as the effect observed over a short exposure period, typically between 1 and 4 days. Chronic toxicity refers to an effect observed over a relatively longer or delayed period (*e.g.*, >7 days).

The Canadian Council of Ministers of the Environment (CCME) have established Canadian water quality guidelines for the protection of freshwater and marine life that are consistent across Canada, creating a national standard. The intent of these guidelines is to provide limits for the constituent of interest that will protect all life stages of freshwater and marine life. The guidelines, however, are not species specific and represent the acceptable limit within the water column for all aquatic life. Oil chemical properties (constituents) from the products to be transported by the Project that may have toxic effects on aquatic life are described in Section 5.1.1.2 in Volume 7 of the Risk Assessment and Management of Pipeline and Facility Spills (Filing ID A3S4V5). The CCME guidelines for the protection of freshwater and marine life for all of the constituents available are provided in Table 2.03.06B-1. If discrepancies were found between the provincial and CCME guidelines, the CCME guidelines were followed. Where CCME guidelines were not available but provincial guidelines existed, the provincial guideline was provided.

The expected range in acute toxicity of the listed constituents (where available), specific to the Project's indicator species in British Columbia is also provided in Table 2.03.06B-1. This information was gathered from the United States Environmental

Protection Agency's ECOTOX online database (2015) and represent LC50 data based on exposure by respiration.

TABLE 2.03.06B-1

WATER QUALITY GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE

Constituent Name	Freshwater[1]		Marine[1]		Acute toxicity range (BC indicator spp. specific)[2] (µg/L)
	Short Term Concentration (µg/L)	Long Term Concentration (µg/L)	Short Term Concentration (µg/L)	Long Term Concentration (µg/L)	
Benzene	No data	370	No data	110	Bull trout: No data Cutthroat trout: No data Rainbow trout: 5,300-56,000 Chinook salmon: 11,730 Coho salmon: 9,800-542,000
Toluene	No data	2	No data	215	Bull trout: No data Cutthroat trout: No data Rainbow trout: 5,800-24,000 Chinook salmon: No data Coho salmon: 5,500-333,000
Ethylbenzene	No data	90	No data	25	Bull trout: No data Cutthroat trout: No data Rainbow trout: 4,200-14,000 Chinook salmon: No data Coho salmon: No data
Acenaphthene PAHs	No data	5.8	No data	6[3]	Bull trout: No data Cutthroat trout: No data Rainbow trout: 670-1,570 Chinook salmon: No data Coho salmon: No data
Acridine PAHs	No data	4.4	No data	Insufficient data	Bull trout: No data Cutthroat trout: No data Rainbow trout: 300-440 Chinook salmon: No data Coho salmon: No data
Anthracene PAHs	No data	0.012	No data	Insufficient data	Bull trout: No data Cutthroat trout: No data Rainbow trout: No data Chinook salmon: No data Coho salmon: No data
Benz(a)anthracene PAHs	No data	0.018	No data	Insufficient data	Bull trout: No data Cutthroat trout: No data Rainbow trout: No data Chinook salmon: No data Coho salmon: No data
Benzo(a)pyrene PAHs	No data	0.015	No data	0.01[1]	Bull trout: No data Cutthroat trout: No data Rainbow trout: No data Chinook salmon: No data Coho salmon: No data
Fluoranthene PAHs	No data	0.04	No data	Insufficient data	Bull trout: No data Cutthroat trout:No data Rainbow trout: 7.7-187 Chinook salmon: No data Coho salmon: No data
Fluorene PAHs	No data	3	No data	12[1]	Bull trout: No data Cutthroat trout: No data Rainbow trout: 820-2,000 Chinook salmon: No data Coho salmon: No data

TABLE 2.03.06B-1

WATER QUALITY GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE (continued)

Constituent Name	Freshwater[1]		Marine[1]		Acute toxicity range (BC indicator spp. specific)[2] (µg/L)
	Short Term Concentration (µg/L)	Long Term Concentration (µg/L)	Short Term Concentration (µg/L)	Long Term Concentration (µg/L)	
Naphthalene PAHs	No data	1.1	No data	1.4	Bull trout: No data Cutthroat trout: No data Rainbow trout: 110-100,000 Chinook salmon: No data Coho salmon: 730-11,800
Phenanthrene PAHs	No data	0.4	No data	Insufficient data	Bull trout: No data Cutthroat trout:No data Rainbow trout: 30-3,200 Chinook salmon: No data Coho salmon: No data

Notes: 1 Data from the Canadian Council of Ministers of the Environment (1999).
2 Selected references from ECOTOX database (United States Environmental Protection Agency 2015) providing Lethal Concentration 50 (LC50) data.
3 Data from the British Columbia Ministry of Environment Approved Water Quality Guidelines.
PAHs - polycyclic aromatic hydrocarbons

References:

Alberta Environment and Sustainable Resource Development (AESRD). 2014. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Policy Division. Edmonton, AB. 48 pp.

British Columbia Ministry of Environment. 2014. Approved Water Quality Guidelines. Website: http://www2.gov.bc.ca/gov/topic.page?id=044DD64C7E24415D83D07430964113C9. Date Accessed: January 2015.

Canadian Council of Ministers of the Environment. 1999. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Table. Website: http://st-ts.ccme.ca/en/index.html. Date Accessed: January 2015.

United States Environmental Protection Agency. 2015. ECOTOX database. Website: http://cfpub.epa.gov/ecotox/advanced_query.htm. Date Accessed: January 2015.

c) Trans Mountain notes that ALIB asked this question in the first round of Information Requests and a response was provided (refer to ALIB IR No. 1.3.11a [Filing ID A3X5V6]). Trans Mountain also notes that the National Energy Board denied the ALIB motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H7). Accordingly, Trans Mountain provides no further response.

2.03.07 Field data for crossings in BC

Reference:

Trans Mountain, Vol. 5C (BC Fish. Tech. Rpt.), Section 6.1, page 5.34; Trans Mountain Response to ALIB IR No. to 1.3.15

Preamble:

There were 60 potential watercourse crossings that were not assessed by the fisheries field program in 2012-2013. Where available, existing literature and data were used to develop interim assessment results and proposed mitigation measures. TM implies in the IR response that all the crossings that were not yet surveyed would be subject to field studies assessing the presence or absence of fish with the usual methodologies in 2014.

Request:

a) Please provide copies of the additional field studies and their findings.

b) Please provide assessments of sensitivity based on field data as well as the literature for every crossing.

Response:

a) Supplemental information regarding watercourses investigated during 2014 in British Columbia is contained in appendices A, B and C of the Supplemental Fisheries (BC) Technical Report for the Trans Mountain Pipeline ULC Trans Mountain Expansion Project (Triton Environmental Consultants 2014), submitted in response to NEB IR No. 3.039a (Filing IDs A4H1Z2, A4H1Z3, A4H1Z4, A4H1Z5, A4H1Z6, A4H1Z7, A4H2A1, A4H2A2, A4H2A3, A4H2A4, A4H2A5, A4H2A6, A4H2A7, A4H2A8, A4H2A9, A4H2C0, A4H2C1, A4H2C2, A4H2C3, A4H2C4, A4H2C5, A4H2C6, A4H2C7, A4H2C8, A4H2C9, A4H2D0).

b) Supplemental information, including sensitivity ratings, for watercourses investigated during 2014 in British Columbia is contained in appendices A, B and C of the Supplemental Fisheries (British Columbia) Technical Report for the Trans Mountain Pipeline ULC Trans Mountain Expansion Project (Triton Environmental Consultants 2014), submitted in response to NEB IR No. 3.039a (Filing IDs A4H1Z2, A4H1Z3, A4H1Z4, A4H1Z5, A4H1Z6, A4H1Z7, A4H2A1, A4H2A2, A4H2A3, A4H2A4, A4H2A5, A4H2A6, A4H2A7, A4H2A8, A4H2A9, A4H2C0, A4H2C1, A4H2C2, A4H2C3, A4H2C4, A4H2C5, A4H2C6, A4H2C7, A4H2C8, A4H2C9, A4H2D0).

2.03.08 Acid rock drainage effects

Reference:

Trans Mountain Response to ALIB IR No. 1.3.16(a)

Preamble:

There were no discussions in the fish and fish habitat sections of how acid rock drainage may affect fish and fish populations in the project area and how this would be mitigated. TM has provided a discussion of potential impacts, but did not include the pH or sulphate tolerance levels of the species that could be affected by acid rock drainage and associated effects along the pipeline corridor.

Request:

a) Please provide a table of the listed species and sportfish species along the proposed route as well as their pH and sulphate tolerances from literature.

b) Please provide a summary table of the current pH values as taken from water chemistry samples at each of the proposed crossings.

Response:

a) Information is available for species-specific tolerances of pH and sulphate, though there is a lack of data for many of the species requested. As indicated in the response to ALIB IR No. 1.3.16a (Filing ID A3X5V6), the pH and sulphate tolerance ranges of fish are dependent on many parameters, and general guidelines have been developed by the federal and provincial governments for the protection of aquatic life.

In general, pH tolerance ranges are affected by CO_2 levels, length of exposure, acclimation rate, life stage, and temperature (Carter 2008, McKean and Nagpal 1991, Robertson-Bryan 2004). Currently the pH thresholds for freshwater environments, as established by the Canadian Council of Ministers of the Environment (CCME) in the Canadian Water Quality Guidelines for the Protection of Aquatic Life, are between pH levels of 6.5 to 9.0 (CCME 2007). Both the British Columbia (BC) and Alberta governments have adopted this pH range for the protection of aquatic life in their surface water quality guidelines (Alberta Environment and Sustainable Resource Development [AESRD] 2014, BC Ministry of Environment 2006). It is accepted by these organizations that within this range, pH levels would not be expected to result in deleterious conditions to fish or other aquatic organisms.

As indicated in the response to ALIB IR No. 1.3.16a (Filing ID A3X5V6), sulphate tolerance levels are correlated directly to water hardness. Table 1.7 in the Quality Guidelines for Alberta Surface Waters provides the sulphate guidelines for the protection of aquatic life at varying water hardness levels. The maximum sulphate concentration guideline ranges from 128 mg/L in very soft water to 429 mg/L in very hard water (AESRD 2014).

Further information regarding this topic is provided in Technical Report 5C-1 of Volume 5C (Filing ID A3S1T3).

References:

Alberta Environment & Sustainable Resource Development. 2014. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Policy Division. Edmonton, AB. 48 pp.

British Columbia Ministry of the Environment. 2013. Ambient Water Quality for sulphate: Technical Appendix. Water Protection and Sustainability Branch, environmental Sustainability of Strategic Policy Division. BC Ministry of the Environment, Victoria, BC.

Carter, K. 2008. Appendix 4 Effects of Temperature, Dissolved Oxygen/Total Dissolved Gas, Ammonia, and pH on Salmonids. Santa Rosa, CA. 47 pp.

McKean, J. and Nagpal, K. 1991. Ambient Water Quality Criteria for pH: Technical Appendix. Victoria, BC. 119 + 2 appendices.

Robertson-Bryan, Inc. 2004. Technical Memorandum: pH requirements of Freshwater Aquatic Life. Elk Grove, CA. 13 pp.

b) All pH values taken at fish-bearing watercourses (where possible during field investigations) are provided in Trans Mountain's supplemental (Alberta and British Columbia) fisheries technical reports. These reports and revised appendices were submitted as part of the responses to NEB IR No. 3.038d (Alberta report; Filing IDs A4H1Y6, A4H1Y7, A4H1Y8, A4H1Y9, A4H1Z0, and A4H1Z1) and NEB IR No. 3.039a (British Columbia report; Filing IDs A4H1Z2, A4H1Z3, A4H1Z4, A4H1Z5, A4H1Z6, A4H1Z7, A4H2A1, A4H2A2, A4H2A3, A4H2A4, A4H2A5, A4H2A6, A4H2A7, A4H2A8, A4H2A9, A4H2C0, A4H2C1, A4H2C2, A4H2C3, A4H2C4, A4H2C5, A4H2C6, A4H2C7, A4H2C8, A4H2C9, and A4H2D0). For pH values at fish-bearing watercourse crossings in BC, please refer to Appendices B1 and B2 of the Supplemental Fisheries (British Columbia) Technical Report (Triton Environmental Consultants 2014). For pH information collected at fish-bearing watercourse crossings in Alberta, please refer to Appendix B of the Supplemental Fisheries (Alberta) Technical Report (TERA, a CH2M Hill Company 2014).

2.03.09 Declining water quality

Reference:

Trans Mountain, Vol. 5A, Section 5.3.1.1, 5.3.1.2, page 38; Trans Mountain Response to ALIB IR No. 1.3.17

Preamble:

Traditional Ecological Knowledge (TEK) participants reported that water quality has been declining over the past 30 years believed to be due to cumulative effects of pollution and industrial development and that water temperatures are increasing due to climate change. In addition, the headwaters of the North Thompson River to Clearwater and from Clearwater to Barriere were ranked within the top ten watershed units at high risk of anthropogenic effects on water quality and water users due to urbanization, agriculture, mining, and road and stream crossing densities compared to other watershed units within the Thompson Region (BC Ministry of Environment, Thompson Region, January 2011). A water quality monitoring plan that includes monitoring to track water temperatures and major water quality parameters would address this major First Nations concern and would provide a measure of how the proposed project is or is not contributing to cumulative effects on the water quality.

Request:

Please provide a plan for a water quality monitoring program to be implemented to assess any changes in water quality over the lifetime of the project. Please refer to IRs 2.02 and 2.04 above for further details.

Response:

Trans Mountain notes that ALIB asked this question in the first round of Information Requests and a response was provided (refer to ALIB IR No. 1.3.17 [Filing ID A3X5V6]). Trans Mountain also notes that the National Energy Board denied the ALIB motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H7). Accordingly, Trans Mountain provides no further response.

2.03.10 Standard riparian width assumption

Reference:

Trans Mountain, Vol. 5A, Section 8.6.3.1, page 8-70; Trans Mountain Response to ALIB IR No. 1.3.19

Preamble:

The requested table of watercourse widths throughout the proposed pipeline development was not provided by TM so it cannot as yet be determined if TM is meeting best practice levels with their riparian buffer widths. Riparian zone function is of high importance to fish habitat quality and quantity.

Request:

a) Please provide a table showing the mean bankfull width of every watercourse with a proposed crossing.

b) For any watercourse with a mean width greater than 20m, please provide a plan for how an extended riparian buffer will be retained and /or restored.

Response:

a) Mean bankfull width data (where discernible during field investigations) are provided in Trans Mountain's supplemental (Alberta and British Columbia) fisheries technical reports. These reports and revised appendices were submitted as part of the responses to NEB IR No. 3.038d (Alberta report; Filing IDs A4H1Y6, A4H1Y7, A4H1Y8, A4H1Y9, A4H1Z0, A4H1Z1) and NEB IR No. 3.039a (British Columbia; Filing IDs A4H1Z2, A4H1Z3, A4H1Z4, A4H1Z5, A4H1Z6, A4H1Z7, A4H2A1, A4H2A2, A4H2A3, A4H2A4, A4H2A5, A4H2A6, A4H2A7, A4H2A8, A4H2A9, A4H2C0, A4H2C1, A4H2C2, A4H2C3, A4H2C4, A4H2C5, A4H2C6, A4H2C7, A4H2C8, A4H2C9, A4H2D0). For bankfull width data at watercourse crossings in BC, please refer to Appendices A1 and A2 of the Supplemental Fisheries (British Columbia) Technical Report (Triton Environmental Consultants 2014). For bankfull width data at watercourse crossings in Alberta, please refer to Appendix A of the Supplemental Fisheries (Alberta) Technical Report (TERA, a CH2M Hill Company 2014).

b) As indicated in Table 7.1 of Technical Report 5C-7 in Volume 5C (Filing ID A3S2C2) and in Section 8.1 of Volume 6B (Filing ID A3S2S3), Trans Mountain intends to adhere to the Forest Practices Code, Riparian Management Area Guidebook in British Columbia (BC) (BC Ministry of Forests 1995) during clearing activities associated with the construction of the Project. For S1A and S1B class watercourses (*i.e.*, those with a bankfull width exceeding 20 m), a riparian reserve zone of 50 m will be established during pre-construction clearing activities.

Where trenched pipeline construction methods are to occur at S1 watercourses, clearing of riparian vegetation to the watercourse edge will be required. However, as indicated in Section 8.1 of Volume 6B (Filing ID A3S2S3), clearing within the riparian buffer will be

limited to the trench area and any required workspace within the proposed pipeline corridor. Upon completion of construction, all riparian margins at fish-bearing watercourses will be revegetated, with the long-term objective of emulating plant communities adjacent to the right-of-way at that location.

Reference:

British Columbia Ministry of Forests. 1995. Forest Practices Code, Riparian Management Area Guidebook. Government of British Columbia. 68 pp.

2.03.11 Fish habitat compensation plan

Reference:

Trans Mountain, Vol. 5A, Section 8.6.3.2-3, page 8-78; Trans Mountain Response to ALIB IR No. 1.3.21(a)

Preamble:

TM stated only that a fish habitat compensation/offset plan may be developed. Since there are short, medium and long term effects resulting from pipeline development, with the high probability that cumulative effects on fish mortality and injury will occur at a watershed scale, an offset plan should be a certainty. Along the proposed pipeline route there are several First Nations fisheries that must be protected from serious harm as defined in the *Fisheries Act*. Therefore, First Nations need to be directly involved in the development of any offset plans as well as provided with capacity for ongoing engagement on this issue.

One of the greatest concerns brought forward to TM numerous times by ALIB is the inadequate baseline data for fisheries in that the current fish presence and absence data will not likely allow the determination of whether serious harm will occur. Additionally, the list of crossings that will be subject to review by DFO has not yet been provided. If serious harm may result from the activities proposed by a proponent, then a review by DFO can be requested to confirm the likelihood of serious harm.

Request:

a) Please commit to providing capacity, budget, and time for ALIB to engage comprehensively, early and often, on the fish habitat compensation plan.

b) Please list the budget and timeline TM is willing to commit to assist ALIB in engaging in the fish habitat compensation plan.

c) Please commit to providing the draft fish habitat compensation plan for review, along with appropriate capacity and time (minimum of 30 days) to do so adequately.

d) Please provide confirmation from DFO of the likelihood of serious harm.

e) Please confirm confirmation from DFO of the scientific ability to detect whether serious harm has occurred for any proposed watercourse crossings that contain CRA fisheries that may be affected by the pipeline construction and operation.

Response:

a) As outlined in its letter to ALIB on November 3, 2014, Trans Mountain requested high-level ideas for consideration for inclusion the Conceptual Fish Habitat Offset Plan, if a plan is required. Accordingly, at this time Trans Mountain is not able to commit to providing capacity or budget for ALIB but is committed to further engagement to discuss ideas regarding an offset plan should it be required.

b) Refer to response to ALIB IR No. 2.03.11a. It has not been determined if a Fish Habitat Offset Plan is required.

c) As indicated in the response to ALIB IR No. 2.03.02d, Trans Mountain is currently determining the potential for the TMEP to result in serious harm to fish and fish habitat. When complete, Trans Mountain's Self Assessment (as defined in the response to ALIB IR No. 2.03.02d) will then be reviewed for confirmation of any potential for serious harm by the National Energy Board (NEB) and/or Fisheries and Oceans Canada (DFO). It is anticipated that, at that time, Trans Mountain will be able to confirm whether offsetting planning will be required of the Project.

However, in a proactive approach, Trans Mountain has already initiated the development of conceptual fish habitat offsetting plans (CFHOP), focusing on potential opportunities both in British Columbia (BC) and Alberta. As part of the development of these CFHOP, fisheries managers, regulators, stakeholders and First Nations were invited to provide input on potentially suitable offset opportunities that would be considered for application by the Project if offsetting is confirmed as necessary. The ALIB, along with many others, were asked to provided input in the developing CFHOP (BC) via a letter mailout sent in September 2014 (refer to ALIB IR No. 2.03.11c - Attachment 1). However, to date the Project has received no response from the ALIB to this written invitation. Trans Mountain remains interested in any input the ALIB could provide in the development of the CFHOP (for BC) and would welcome a response to the invitation letter provided.

Trans Mountain would like to extend an offer to meet with the ALIB to discuss the CFHOP, and to answer any question or concerns. This meeting can occur via conference call or in-person based on the ALIB's preference. Should this meeting be of interest to the ALIB, please contact Trans Mountain as indicated on the attached letter (ALIB IR No. 2.03.11c - Attachment 1).

d) Refer to response to ALIB IR No. 2.03.02d.

e) Refer to response to ALIB IR No. 2.03.02d.

2.03.12 Species at Risk in field assessments

Reference:

Trans Mountain, Vol. 5a, Section 9.0, page 9-3; Trans Mountain Response to ALIB IR No. 1.3.23(a)

Preamble:

TM states that no specific surveys for Species at Risk are anticipated, yet standard presence/absence surveys may not be adequate to sample SAR and their attendant habitat adequately. TM's response to this concern was that the data collection completed with the minimal sampling protocol would have been adequate and inclusive of Species at Risk. This response is not appropriately precautionary given that SARA listed species merit special consideration which was not heeded by TM in their sampling protocols. As was proven in the legal system, SAR habitat needs are also critical to the survival and thriving of SAR and are protected under the *Species at Risk Act* (SARA). Critical habitat of SAR at the watercourse crossings and downstream of construction and operations was not addressed specifically in the assessments. In British Columbia, five fish species listed under Schedule 1 of SARA are known to occur in watercourses crossed by the proposed revised pipeline corridor in British Columbia (i.e., white sturgeon, green sturgeon, westslope cutthroat trout, nooksack dace and salish sucker).

Request:

a) Please provide sampling programs for the five federally listed species at risk, including comprehensive habitat assessments for SAR along the route.

b) Please provide a summary table with the habitat requirements of the five listed species along the route and locations where that habitat is provided.

c) Please provide mitigation plans as to how the SAR-associated critical habitat will be restored to pre-construction condition.

Response:

a) Trans Mountain is implementing standard pipeline construction and operation practices as per provincial and federal regulatory requirements and industry standards. These practices do not include comprehensive species specific sampling programs as identified in the above request. Further, it has been Trans Mountain's experience that sampling for species at risk in some watercourses and for the purposes of the Project is prohibited by by DFO.

However, during summer 2014 and where permitted by DFO, Trans Mountain completed supplemental fish and habitat sampling to better understand potential habitat for nooksack dace and salish sucker in relation to the Project's revised proposed pipeline corridor. Trans Mountain also consulted with a provincial expert with respect to the presence and location of proposed critical habitat in relation to the proposed Project. This information has been recently provided to the National Energy Board (NEB) in

response to NEB IR No. 3.039a (Filing IDs A4H1Z2, A4H1Z3, A4H1Z4, A4H1Z5, A4H1Z6, A4H1Z7, A4H2A1, A4H2A2, A4H2A3, A4H2A4, A4H2A5, A4H2A6, A4H2A7, A4H2A8, A4H2A9, A4H2C0, A4H2C1, A4H2C2, A4H2C3, A4H2C4, A4H2C5, A4H2C6, A4H2C7, A4H2C8, A4H2C9, and A4H2D0).

b) Habitat requirement and distribution information for the five species at risk (SAR) fishes is provided in Section 4 of Technical Report 5C-7 (Filing ID A3S2C1). Further information related to the distribution of habitat for each of the five SAR species is provided in the responses to: NEB IR No. 1.52a (white sturgeon), NEB IR No. 1.52b (green sturgeon), NEB IR No. 1.52c (westslope cutthroat trout), NEB IR No. 1.52d (nooksack dace), and NEB IR No. 1.52e (salish sucker) (Filing ID A3W9H8). For additional information related to proposed critical habitat for nooksack dace and salish sucker in the vicinity of the Project, please refer to the response provided to NEB IR No. 3.039a (Filing ID A4H1V2).

c) Specific watercourse crossing mitigation and restoration measures have been adopted for the Project to help protect all fish and fish habitat (refer to Table 7.2.7-2 in Section 7.2.7 of Volume 5A [Filing ID A3S1Q9] as well as Section 8.7.3 and the Fish Species of Concern Contingency Plan in Appendix B of the Pipeline Environmental Protection Plan (Volume 6B; Filing ID A3S2S3). Mitigation measures specific to the five species at risk (SAR) fishes are provided in the responses to: NEB IR No. 1.52a (white sturgeon), NEB IR No. 1.52b (green sturgeon), NEB IR No. 1.52c (westslope cutthroat trout), NEB IR No. 1.52d (nooksack dace), and NEB IR No. 1.52e (salish sucker) (Filing ID A3W9H8).

2.03.13 Trenchless crossings

Reference:

Trans Mountain, Vol. 5C (AB Fish. Tech. Rpt.) , Section 6.1, page 5-23 and BC Tech. Fish. Rpt., Section 8.0, Page 8-1; Trans Mountain Response to ALIB IR No. 1.3.26(a)

Preamble:

There are 23 high sensitivity crossing sites identified in Alberta, yet only 5 crossings are proposed to be completed with trenchless methods. In BC, there are 137 high sensitivity sites, yet only 20 are proposed to be completed with trenchless methods. It remains unclear as to why only 14.5% of the high sensitivity fish sites are proposed to be completed with trenchless crossings in BC and only 21% in Alberta.

Request:

a) Please provide a plan for altering the crossing methods used at high sensitivity fish sites to trenchless crossings.

b) Please provide a full and scientifically referenced discussion of the potential impacts of not doing trenchless crossings in the high sensitivity sites if 3.13a) is not fulfilled.

Response:

a) The Watercourse Crossing Method Selection Process for the TMEP is based on a fish and fish habitat Risk Management Framework (RMF) which is outlined in Section 2.11 of Volume 4A (Filing ID A3S0Y8) in the Application. The RMF is based upon compliance with the requirements outlined in the Fisheries and Oceans Canada (DFO) document Practitioners Guide to the Risk Management Framework for the DFO Habitat Management Staff, Version 1.0 (DFO 2013), and in accordance with the Pipeline Associated Watercourse Crossings Guidelines, 3rd Edition (2005) published by the Canadian Association of Petroleum Producers (CAPP).

The two stage screening and review process is used to determine the most suitable crossing methodology for each watercourse based upon fish and fish habitat sensitivity, the flow rate anticipated during the time of construction, channel width, engineering, constructability, geotechnical, environmental, First Nations, Stakeholder, and Archeological issues, where applicable.

Detailed information regarding the Watercourse Crossing Method Selection Process may be found in Section 2.11 and Appendix B of Volume 4A (Filing ID A3S0Z2, PDF page 10 & 11 of 11) in the Application.

References:

Fisheries and Oceans Canada. 2013. Practitioners Guide to the Risk Management Framework for the DFO Habitat Management Staff, Version 1.0. Website: http://www.dfo-mpo.gc.ca/habitat/role/141/1415/14155/risk-risque/index-eng.asp

Canadian Association of Petroleum Producers, Canadian Energy Pipeline Association and Canadian Gas Association. 2005. Pipeline Associated Watercourse Crossings Guidelines, 3rd Edition. Prepared by TERA Environmental Consultants and Salmo Consulting Inc. Calgary, AB. http://www.cepa.com/wp-content/uploads/2014/01/Pipelines-Associated-Watercourse-Crossings.pdf

b) Trans Mountain notes that ALIB asked this question in the first round of Information Requests and a response was provided (refer to ALIB IR No. 1.3.26a [Filing ID A3X5V6]). Trans Mountain also notes that the National Energy Board denied an ALIB motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H7). Although no further information is provided in direct response to this question, additional information was provided in response to NEB IR No. 3.038a (Filing ID A4H1V2) on a related question, regarding the overall process followed by Trans Mountain in the allocation of a trenched versus trenchless crossing methods.

2.03.14 Post-construction monitoring plans

Reference:

Trans Mountain, Vol. 5C, Section 7.1.5, page 7-30; Trans Mountain Response to ALIB IR No. 1.3.27(a)

Preamble:

There are no details provided on the temporal and spatial scale of the post-construction monitoring or on how the effectiveness of the mitigation measures will be assessed. TM stated that comparisons would be made between post-construction condition at affected sites to reference areas to determine if the measured parameters are consistent with the pre-construction conditions and the surrounding landscape. However, TM did not include how the consistency would be assessed; i.e., how close to pre-construction measurements is close enough? TM has not stated what model for comparison will be used or even if they will use a model at all? What effect size will be the minimum detectable? In addition, the maximum length of any post-construction monitoring is set at 5 years which would likely only encompass one or two cycles of any Pacific salmon species with a 4 year cycle (depending on whether they monitor each year or in years 1,3,5 as is a stated option).

Request:

a) Please provide details on objective methods of comparison for pre- and post-construction that will be utilised by TM to assess effects of construction, including:

   i. the effect size that will be considered as the minimum difference between time periods;
   ii. the model structure to be used; and
   iii. the monitoring schedule in relation to life cycles of the salmon species potentially affected by the pipeline corridor.

b) Please provide a plan for monitoring that encompasses at least two peak years of each species of potentially affected Pacific salmon.

c) Please provide details on how the function of in-stream habitat enhancement will be assessed.

d) Please provide an analytic plan for assessing changes in natural flow patterns.

Response:

a) As discussed in the response to ALIB IR No. 2.03.02a, Trans Mountain acknowledges that Post-Construction Monitoring (PCM) will be conducted at some of the watercourses that are crossed by the Project. It is anticipated, however, that at locations where the potential for serious harm to fish and fish habitat (DFO 2013) will be avoided or successfully mitigated by the Project, PCM may be limited to the evaluation of overall stability of the crossing location, effectiveness of sediment and erosion control measures and re-vegetation of bank and riparian areas (see Section 9.8 of Volume 6A [Filing

ID A3S2S1]). In these instances, there is no anticipated requirement to replicate or supplement the aquatic assessments (*i.e.,* including the collection of detailed fish habitat or community data) that have previously been conducted at these locations in support of the Project's Application to the National Energy Board (NEB). While PCM at fish-bearing watercourses will evaluate fish habitat potential following construction, a precedent requiring PCM to: evaluate instream or near-stream use, model exercises to predict reclamation success or to establish quantifiable thresholds, or to synchronize monitoring activities to specific species life cycles or timing, is not known. PCM will be qualitatively based (as defined by standard industry practise) and used to verify the success of, and potential remediation needs for, reclamation measures. Trans Mountain remains confident that the PCM program proposed is sufficient, but will adhere to any additional or alternative PCM requirements that may be requested by the NEB.

Reference:

Fisheries and Oceans Canada. 2013. Fisheries Protection Policy Statement. Catalogue No. Fs23-595/2013E-PDF. Ottawa, ON. 22 pp.

b) Refer to response a) above.

c) Refer to response ta) above.

d) As indicated in the response to ALIB IR No. 2.03.14a, Trans Mountain does not intend to employ a comprehensive analytic approach to the Project's Post-Construction Monitoring (PCM) at watercourses where suitable and effective mitigation and reclamation measures are proposed. As with the other parameters considered during PCM, the monitoring of natural flow patterns will be qualitatively based and rely on a comparison of previously collected photographs and data from the crossing locations for post-construction evaluation. Effective replacement of morphological features, functionality and integrity of instream and near stream reclamation measures will all be considered when evaluating the natural flow pattern at the pipeline crossings post-construction.

2.03.15 Omission of key aquatic ecosystem components in assessment

Reference:

Trans Mountain, Vol. 5C, Section – All; Trans Mountain Response to ALIB IR No.1.3.28(a)

Preamble:

The Trans Mountain ESA did not collect data on, or provide information about, vital aquatic resources such as benthic invertebrates and the algal community. Because no baseline data appears to have been collected, there will be no way of monitoring changes in benthic invertebrate abundance and composition as a result of impacts from the proposed project. TM has indicated in their responses to ALIB Round 1 IRs that the fish and fish habitat assessments, as well as the assessment of the water quality parameters, are sufficient. However, this is not an accurate statement because with the type of fish and fish habitat data collected by TM, it would be difficult to detect even the loss of the presence of a species of fish, let alone changes to benthic invertebrate composition.

Assessing benthic invertebrates and periphyton would allow estimation of secondary productivity as well as act as early warning for changes in the community supporting the fish. The periphyton and benthic invertebrate communities are critical for providing a foundation on which self-sustaining populations of fish are based, and are well known as indicators of shifts in water quality and instream conditions (Rosenberg and Resh 1993) and respond on more rapid timescales than the fish community. This allows for mitigation of any potential effects to occur in a more timely fashion.

Request:

a) Please provide a thorough review and summary tables of which crossings have potential for serious harm.

b) Please provide periphyton and benthic invertebrate assessments at potential crossings of high fish sensitivity to allow a more rapid response to any effects that are detected.

c) Please discuss why TM believes it is acceptable to not assess potential impacts to all aquatic ecosystem components in light of this being deemed a critical information gap in the Application by ALIB.

d) How will this information gap be addressed prior to onset of construction?

Response:

a) Refer to response to ALIB IR No. 2.03.02d.

b) As indicated in the response to ALIB IR No. 1.3.28 (Filing ID A3X5V6), Trans Mountain is implementing standard pipeline construction and operation practices as per provincial and federal regulatory requirements and industry standards. These practices do not include plans to monitor benthic invertebrates and periphyton at watercourse crossings.

The provision of benthic invertebrate and periphyton data is not a filing requirement of the National Energy Board (NEB) (see Fish and Fish Habitat in Table A-2 of the NEB Filing Manual; NEB 2014), nor are they required parameters of consideration by provincial standards or guidelines related to pipeline construction in Alberta or British Columbia (see Alberta Code of Practice for Pipeline and Telecommunication Lines Crossing a Water Body [Government of Alberta 2013] and Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures BC Fisheries Information Services Branch 2001].

References:

BC Fisheries – Information Services Branch. 2001. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Standards and Procedures. Prepared for the Resources Inventory Committee. 133 pp. + app.

Government of Alberta. 2013. Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body. Edmonton, AB. 36 pp.

National Energy Board. 2014. Filing Manual. Inclusive of Release 2014-02 (October 2014). Calgary, AB.

c) As indicated in the response to ALIB IR No. 1.3.28a (Filing ID A3X5V6), Trans Mountain acknowledges that there are alternative aquatic ecosystem elements that can be assessed in support of projects in or near watercourses. However, the information related to fish and fish habitat which has been provided to the National Energy Board (NEB) in support of the Application for the Project meets or exceeds the NEB's filing requirements and adheres to data collection standards for pipeline related projects in both Alberta and British Columbia (refer to response to ALIB IR No. 2.03.15b). As a result, the exclusion of data related to alternative aquatic ecosystem elements in the Project's Application is not considered an information gap by Trans Mountain.

Trans Mountain notes that the ALIB asked this question in the first round of Information Requests and a response was provided (refer to ALIB IR No. 1.3.28a [Filing ID A3X5V6]). Trans Mountain also notes that the NEB denied the ALIB's motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H7). Accordingly, Trans Mountain provides not further response.

d) Refer to response c) above.

2.03.16 Ability to detect change in fish populations

Reference:

Trans Mountain, Vol. 5c (BC Tech. Fish. Rpt.), Section 3.2.6, page 3-15; Trans Mountain Response to ALIB IR No. 1.3.29(a)

Preamble:

The field sampling conducted by TM assessed presence or absence of fish. It was noted previously by ALIB that even achieving that goal may require multiple seasons of sampling to gain certainty on presence/absence when only one season was typically done for the watercourse crossings in BC. With the type of baseline data collected by TM, the post-construction monitoring would only be useful for stating whether a population is present or absent and provides no indication of whether the project alone, or cumulatively with other disturbances, are impacting populations. This concern remains unaddressed. TM appears to only be interested in ensuring compliance with minimum requirements. To address this issue appropriately would require TM to have the will to exceed bare minimum requirements. ALIB's concerns about potential changes in the fish populations of concern, particularly the Pacific salmon species of high cultural and ecological importance, cannot be addressed if TM is only willing to do the bare minimum.

Request:

a) Please confirm TM will provide the capacity for ALIB to review the watercourse crossings selected through the self-assessment process by TM to determine if there is adequate coverage of fish sites of importance.

b) Please provide the analytic methods that will be used to determine if there is an effect of the project on fish and provide summary tables of what data will be used and how it will be used for review by ALIB.

Response:

a) Trans Mountain reminds ALIB that multiple engagement letters were shared with ALIB throughout 2012 and 2013, inviting ALIB to engage on the Project and a response was not received until October 16, 2013. Engagement logs for ALIB are included in Appendix A of Volume 3B (Filing ID A3S0U6), Appendix A of Consultation Update No. 1 (Filing ID A3V3L9), Appendix A of Consultation Update No. 2 (Filing ID A3Z8Q2) and NEB IR No. 3.008a - Attachment 1 (Filing ID A65693).

Trans Mountain acknowledges that ALIB has participated in the National Energy Board process as a registered intervenor. ALIB provided evidence at the Aboriginal Oral Hearing in Kamloops, BC on November 11, 2014 and has submitted in excess of 300 information requests.

Under these conditions and at this stage of the process, Trans Mountain is not able to commit to providing capacity funding for ALIB to review the watercourse crossings selected however all of the criteria for selecting the watercourse crossings are located in

Section 3.2.1 and Section 3.2.5 of the British Columbia Fisheries Technical Discipline Report (Filing ID A3S2C1).

b) Trans Mountain is not proposing to quantitatively sample fish populations before and after construction, to support any post-construction monitoring program. Through the application of general and site-specific mitigation measures during construction of the Project, no significant adverse effects to fishes or their habitat are expected (refer to Section 7.2.7 in Volume 5A; Filing ID A3S1Q9). Further justification for this, is provided in the responses to ALIB IR No. 2.03.02d and ALIB IR No. 2.03.14a.

2.03.17 Baseline data on productive capacity watercourses

Reference:

Trans Mountain, Vol. 5C (BC Fish. Tech. Rpt.), Section 7.1.2, page 7-1; Trans Mountain Response to ALIB IR No. 1.3.33(a) and b)

Preamble:

Potential food sources are one aspect of fish habitat that is protected under the *Fisheries Act*. The response of TM was that implementation of the mitigation measures described in Section 7.0 of Volume 5C is intended to protect all aspects of fish and fish habitat. However, there are no data and no plans to monitor aspects of productive capacity within the watercourses along the pipeline route resulting in lack of clarity regarding how TM will determine if changes to fish habitat quality have occurred. This is a major gap in the information provided by TM to date.

Request:

a) Please provide details on how assessment of surface water quality and fish habitat post-construction will allow TM to infer the productive capacity and whether it has been impaired by the construction activities.

b) Please provide a worked model/analytic example of how changes in productive capacity will be assessed using only the data that has been collected to date.

Response:

a) As discussed in the response to ALIB IR No. 1.3.33a (Filing ID A3X5V6), avoidance strategies and mitigation measures intended to reduce the spatial scale, duration and intensity of effects will be implemented by the Project. As indicated in Section 7.2.7 of Volume 5A of the ESA – Biophysical (Filing ID A3S1Q9), the implementation of suitable environmental mitigation measures and best management practices, where feasible, will eliminate or minimize potential project-related effects to fish and fish habitat to a negligible level. Where this implementation occurs, serious harm to fish and fish habitat can be avoided, and no change to the productive capacity of fish habitat as a result of construction activities is expected.

   Trans Mountain is currently determining the potential for the Project to result in serious harm (as defined by Fisheries and Oceans Canada [DFO] 2013) to fish and fish habitat, through the DFO endorsed self-assessment process (Self Assessment). For more information related to Trans Mountain's Self Assessment, refer to response to ALIB IR No. 2.03.02d.

Reference:

Fisheries and Oceans Canada. 2013. Fisheries Protection Policy Statement. Catalogue No. Fs23-595/2013E-PDF. Ottawa, ON. 22 pp.

b) Refer to response to ALIB IR No. 2.03.02d.

2.03.18 Analytical framework for monitoring programs

Reference:

Trans Mountain, Vol. 6A, Section 3.3, page 3-2; Trans Mountain Response to ALIB IR No. 1.3.34(a)

Preamble:

Given that TM has only discussed the need for monitoring within the context of company policies, ALIB had previously requested specifics regarding the monitoring plans and analytic approaches. To date TM has failed to provide any information as to how monitoring would be executed to determine if there are any project-related impacts. Also, TM has not provided any analytic framework as requested. TM replied that: "*Data is reviewed frequently and results and interpretation is communicated to Environmental Inspection staff. Appropriate data management protocols are followed and summary reporting of results typically follows construction completion*." (Trans Mountain Response to ALIB IR No.1, Pg. 70) This statement does not address the core ALIB concern of how the data will be analyzed and if the statistical approach used by TM is scientifically valid given the likely hierarchical (nested) structure of the data. TM also does not inform ALIB regarding how results will be brought forward for ALIB's consideration. Summary reporting of water quality monitoring (WQM) as proposed is not adequate to assess whether there has been a significant change in water parameters.

Request:

Please provide a statistical model and details on how the collected data will feed into a model to analyze and test whether there is a difference in the WQM parameters before and after construction (suggest a hierarchical Bayesian model or a BACIPS model).

Response:

Refer to responses provided to ALIB IR No. 2.02.04a, ALIB IR No. 2.03.02d, ALIB IR No. 2.03.03 and ALIB IR No. 2.03.14a for information regarding the water quality monitoring program that will be implemented on the Trans Mountain Expansion Project.

2.03.19 Instream flow needs have not been addressed

Reference:

Trans Mountain Response to ALIB IR No. 1.3.36(a)

Preamble:

It remains a serious concern to ALIB that water withdrawals may impact various life stages of salmonids. TM has not yet addressed the issue of instream flow needs for salmonids. Instream flow levels particularly in winter and during egg incubation periods can affect survival rates of salmonids, listed species and other species of fish present along the proposed route.

Request:

a) Please provide a review of instream flow needs for the relevant species and life stages at high value watercourse crossings for fish.

b) Please provide water withdrawal amounts (as % of Mean Annual Discharge (MAD)) and timing of water withdrawals for review.

c) Please provide a discussion of what approach to instream flow needs will be taken using current peer-reviewed literature for context.

Response:

a) All conditions of Water Licences (British Columbia [BC]) (BC Queen's Printer 2014) Temporary Diversion Licences (Alberta) (Government of Alberta [GOA] 2000a) and the Alberta *Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines* (withdrawals less than 30,000 m^3) (GOA 2000b) required for pipeline related work activities will be adhered to, including but not limited to source location limitations, seasonal closures, volume and rate restrictions. To further protect fish and fish habitat, potential withdrawal locations will be prioritized based on the following options: surface run-off dugouts; sloughs; non fish-bearing lakes and creeks; and as a last option fish-bearing watercourses.

   By adhering to the regulatory requirements and industry best practices listed above, a review of instream flow needs is not required.

References:

Government of Alberta. 2000a. *Water Act*. Revised Statutes of Alberta 2000 Chapter W-3, Current as of March 29, 2014. Government of Alberta. Edmonton, Alberta. 140 pp.

Government of Alberta. 2000b. Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines. Includes Amendments to January 2004. Government of Alberta. Edmonton, AB. 15 pp.

British Columbia Queen's Printer. 2014. *Water Act*. Victoria, British Columbia. http://www.bclaws.ca/civix/document/id/complete/statreg/96483_01. Date Accessed: January 22, 2015.

b) Specific water withdrawal amounts and the timing of water withdrawals that will be required for the Project have not yet been determined. As indicated in Section 7.2.7 of Volume 5A of the ESA – Biophysical (Filing ID A3S1Q9), withdrawal amounts, rates and timing of water withdrawals will be provided prior to diversions in Water Licence applications (British Columbia), Temporary Diversion Licence applications (Alberta) and Alberta Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing notifications. Applications will include all necessary information to meet permit and notification requirements. Additional information and mitigation measures specific to water withdrawal are provided in the Water Withdrawal and Discharge Procedures Management Plan (see Section 13 of Appendix C in Volume 6B; Filing ID A3S2S3).

c) Refer to response a) above.

2.03.20 Cumulative impacts of multiple Right-of-Ways (ROWs)

Reference:

Trans Mountain Response to ALIB IR No. 1.3.37(a)

Preamble:

Multiple pipeline ROWs and transportation and utility corridors can have cumulative impacts on ecosystems. In their response to the ALIB Round 1 IR about this concern, TM did not provide information on the level of re-disturbance on the existing ROWs, and deferred their response until such time as engineering plans are completed. This creates a challenging situation for ALIB because without an adequate understanding of the scale and amount of total disturbance and re-disturbance, it is not possible to assess whether the cumulative effects assessment approach and the conclusions are adequate to prevent serious harm to fish and fish habitat as defined under the *Fisheries Act* and/or are accurate. This is a critical gap in the TM Application and needs to be addressed.

Request:

a) Please provide the requested information on amount of re-disturbance on the ROWs once engineering plans are completed to ALIB for review.

b) Please provide a review of potential cumulative impacts, with specific reference to how ROW disturbance may affect salmonids and listed species and their habitats.

Response:

a) Detailed engineering is currently underway with construction footprint definition and drawings under development over the next 12 months. The drawings, represented as Plans, Profiles, Book of Reference (PPBoR) will be made publicly available and filed with the National Energy Board (NEB) on granting of the Certificate of Public Convenience and Necessity (CPCN) to Trans Mountain for the Project.

b) The cumulative effects assessment completed for fish and fish habitat indicators explicitly considered watershed-scale disturbance processes that can affect salmonids, listed fish species, and their habitats. More specifically, quantitative estimates of existing and reasonably foreseeable disturbance was provided for three metrics: riparian habitat disturbance; instream habitat disturbance; and stream crossing density were provided in Section 8.6.2 of Volume 5A (Filing ID A3S1R2). The discussion of each disturbance metric provided in this section references scientific literature that explains the value of these metrics, the way that each type of disturbance contributes to cumulative effects on fish and fish habitat, including salmonids and listed species, and assumptions used in the quantitative analysis. Tables 8.6-6, 8.6-7, 8.6-8, 8.6-9, 8.6-10 and 8.6-11 of Volume 5A (Filing ID A3S1R2) summarize analyses to show the contribution of existing disturbance, the Project, and other reasonably foreseeable activities to cumulative disturbance for each metric in each watershed.

2.04.0 VEGETATION AND RECLAMATION ROUND 2 IRS

2.04.1 Reliance on natural regeneration as mitigation

Reference:

Trans Mountain Response to ALIB IR No. 1.4.3(a)

Preamble:

Trans Mountain states in their response to this IR that it will allow pipelines that run through wetlands to naturally regenerate and provided references in support of the statement that natural regeneration is an effective strategy for reclamation in wetlands. TM states that: "*wetland soils and organic deposits have large seed banks of viable native species. These species are hardened off and acclimatized to the area, making their establishment success greater than species planted or seeded that are new to the area…..Post-construction environmental monitoring of wetland function at wetlands along recent large pipeline projects have shown that mitigation measures implemented during construction, such as allowing for natural regeneration, will be successful*" (Trans Mountain Response to ALIB, pg. 81). In their response, TM also cited references that were unavailable or results from studies in disturbed landscapes or forest types different from the forest types that the proposed pipeline will travel through. Given that natural regeneration will be used extensively as mitigation for the proposed project, it is critical that TM be able to provide clear evidence from a similar forest type and condition as the one within which their pipeline will travel through.

TM did provide a non-peer reviewed report to ALIB from the first year of reclamation for the Trans Mountain Expansion - Anchor Loop Project. The 2009 report entitled, "The Restoration of the TMX - Anchor Loop Project in Jasper National Park" discusses reclamation of another pipeline project; unfortunately, no data is provided along with this report. The report simply discusses some preliminary results, after one year of reclamation, and concludes that natural regeneration is an effective means of re-vegetation. However, TM's conclusion is based on only one year of data and it is not clear if this trend continued for the subsequent four years that monitoring was to have occurred.

Request:

a) Please provide evidence, from peer-reviewed scientific literature, to support the assertion that the "*establishment success*" (for seed bank species) "*is greater than species planted or seeded that are new to the area*."

b) Please provide references for the monitoring reports of recent large pipeline projects that have shown the success of natural regeneration.

c) In terms of the stated reclamation success associated with the TMX Anchor Loop project, did the first year results regarding natural regeneration continue through the next four years (please provide supporting data and results to support all statements)?

d) Please provide an assessment of whether natural regeneration on the TMX Anchor Loop project proved to be an effective means of re-vegetation where topsoil was salvaged and replaced promptly, and where soil erosion was not a substantial concern.

Response:

a) As discussed in Section 7.2.8.3 of the Environmental and Socio-economic Assessment (ESA) – Biophysical (Volume 5A, Filing ID A3S1Q9), with proper construction methods and mitigation measures (*i.e.,* profile contours returned and the appropriate protection and use of the seedbank), adverse effects can be successfully reduced.

Shem *et al.* (1993) assessed four locations where pipeline construction had occurred in wetlands. Natural regeneration was implemented at three of the sites and seeding and fertilizer was used at one site on the disturbed portion of the right-of-way. The authors studied these locations one year after construction. They concluded that on sites where natural regeneration of disturbed wetlands was allowed, many plants species documented one year after construction re-established on the construction right-of-way from the replaced native soil and from the adjacent wetland area. When compared to a site where a seed mixture and fertilizer treatment was used, the sites where natural regeneration was used had more plant species coverage and less bare soil than the site where seeding occurred.

Van Dyke *et al.* (1994) assessed the establishment of vegetation at wetland crossings ranging from 8 months to 31 years following the pipeline construction. General observations made during this study were that diverse vegetation communities can re-establish on the construction right-of-way due to the germination of species in the seedbank as well as the migration of species from the surrounding undisturbed area. Proper salvage and handling of the wetland substrate, along with returning wetland contours to pre-construction profiles, were found to be important components in natural regeneration. Seeding of the disturbed wetland areas was not found to be efficient in accelerating vegetation establishment.

As presented in the 2013 Supplemental Wetland Function Study (SWFS) (TERA Environmental Consultants 2013), Parks Canada requested supplemental wetland function monitoring to be conducted at four wetlands where potential impacts to wetland function were observed in the year following construction of the TMX Anchor Loop Project. During summer 2013, the fifth and final year of Wetland Function Post-construction Monitoring (PCM) for the SWFS was carried out and the findings of that monitoring are presented in that report. Natural regeneration, along with sapling plantings and seeding, if warranted, was utilized in areas where vegetation was slow to re-establish, similar to shrub staking that is recommended in Appendix K of the Pipeline Environmental Protection Plan (EPP) for the Project (Volume 6B, Filing ID A3S2S3). In areas of tree removal, natural regeneration allowed successional species to establish through the growing seasons following construction.

Natural regeneration and restoration revegetation efforts (revegetation requirements determined after construction on a case-by-case basis only for wetlands where it was

determined to be beneficial) continue to stabilize and improve vegetation regeneration. Over five years of SWFS monitoring, increased moisture levels have been observed along the elevated portions and at wetland margins. A substantial improvement in wetlands where vegetation was slow to re-establish was noted during the fourth year (*i.e.*, 2012) survey. The growth of vegetation microsites and vegetation coverage was noted to have continued to improve during the fifth year survey. Weedy species were gradually succeeded by appropriate wetland species. Kinder Morgan implemented a Weed Management Program as warranted, similar to the Weed and Vegetation Management Plan provided in Appendix C of the Pipeline Environmental Protection Plan for the Project (Volume 6B, Filing ID A3S2S3).

Over the five years of monitoring, the SWFS wetlands have shown that accepted pipeline construction methods and supplemental restoration mitigation measures, along with the passage of time, have allowed for the re-establishment of the soil moisture regime and the successful establishment of naturally regenerating and encroaching species. Where warranted, species planted during restoration efforts have also assisted with the successful recovery of wetland function although natural regeneration has proven to be the best method for a majority of wetlands.

Overall, the fifth year SWFS field visit provided confidence that mitigation measures implemented during construction (*i.e.,* natural regeneration) and subsequent restoration and revegetation efforts as warranted, have proved to be successful, that wetlands are proving to be resilient to the temporary disturbance of pipeline construction and that the goal of “no net loss” of wetland function has been achieved.

References:

Shem, L.M., R.E. Zimmerman, S.D. Sellmer, G.D. Van Dyke and J.R. Rastofer. 1993. Regeneration of Vegetation on Wetland Crossings for Gas Pipeline Rights of Way One Year After Construction. Proceedings of the Fifth International Symposium on Environmental Concerns in Rights-of-Way Management. September. Montreal, Québec, Canada. (Eds) G.J. Doucet, C. Séguin and M. Giguère. Pp. 183-190.

TERA Environmental Consultants. 2013. 2013 Supplemental Wetland Function Study Post-construction Monitoring Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Final Year. Prepared for Kinder Morgan Canada Inc.

Van Dyke, G.D., L.M. Shem, P.L. Wilkey, R.E. Zimmerman and S.K. Alsum. 1994. Pipeline Corridors Through Wetlands: Summary of Seventeen Plant Community Studies at Ten Wetland Crossings. December. Gas Research Institute. GTI 1770. Chicago, IL. 96 pp.

b) Mitigation measures implemented for past pipeline construction projects in similar ecoregions have successfully reduced effects on wetlands. Post-construction environmental monitoring of wetland function at disturbed wetlands along recent pipeline projects on agricultural lands, similar to lands crossed by the proposed Project in portions of Alberta and British Columbia, have shown that mitigation measures implemented during construction (*e.g.,* profile reconstruction, allowing natural regeneration) have proven to be successful; wetlands have been confirmed to be resilient when such mitigation methods are utilized. In addition, the absence of

environmental issues pertaining to wetland function restoration has been observed and documented in As-built Environmental Reports for the first, second and third-year Post-Construction Monitoring (PCM) reports for numerous past pipeline projects (TERA Environmental Consultants 2009c, 2011a-b, 2012, 2013a-c, 2014).

Pipeline projects in the Green and White areas of Alberta cross similar terrain to portions of the proposed pipeline corridor in Alberta, such as Enbridge Pipelines Inc.'s Line 4 Expansion Project (TERA Environmental Consultants 2009c, 2012, 2013b) and Alberta Clipper (TERA Environmental Consultants 2011a) as well as NOVA Gas Transmission Ltd.'s Groundbirch Mainline Project (TERA Environmental Consultants 2013c) and Tanghe Creek Lateral Loop No. 2 (Sloat Creek Section) (TERA Environmental Consultants 2014). The post-construction monitoring conducted for these projects have shown that wetland function was restored successfully where natural regeneration was used. PCM reports referenced in this response are available through the NEB regulatory documents Index website as well as Enbridge Pipelines Inc. website.

In addition, the TMX - Anchor Loop Project (TERA Environmental Consultants 2009a,b, 2011b 2013a,d,e,f) is located within similar terrain as segments of the proposed pipeline corridor in British Columbia, these reports were submitted to Parks Canada and the results are summarized in the response to ALIB IR No. 2.04.1c.

References:

TERA Environmental Consultants. 2009a. Post-Construction Environmental As Built Report – Pipeline for Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Prepared for Kinder Morgan Canada Inc. January 2009. Calgary, AB.

TERA Environmental Consultants. 2009b. 2009 Post-Construction Monitoring Report for Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Prepared for Kinder Morgan Canada Inc. December 2009. Calgary, AB.

TERA Environmental Consultants. 2009c. Post-Construction Environmental Monitoring Report – Year 1 for the Enbridge Pipelines Inc. Line 4 Extension Project. Prepared for Enbridge Pipelines Inc. November 2009.

TERA Environmental Consultants. 2011a. 2010 Post-Construction Monitoring Report for Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Prepared for Kinder Morgan Canada Inc. January 2011. Calgary, AB.

TERA Environmental Consultants. 2011a. Post-Construction Environmental Monitoring Report (Year 1) for the Enbridge Pipelines Inc. Alberta Clipper Project – Spread 5, Part A: Environmental As Built Report. Prepared for Enbridge Pipelines Inc. January 2011. Calgary, AB.

TERA Environmental Consultants. 2011b. 2011 Wetland Follow-up Monitoring Program Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Fourth Year. Prepared for Kinder Morgan Canada Inc.

TERA Environmental Consultants. 2012. Post-Construction Environmental Monitoring Report – Year 3 for the Enbridge Pipelines Inc. Line 4 Extension Project. Prepared for Enbridge Pipelines Inc. January 2012.

TERA Environmental Consultants. 2013a. 2012 Post-Construction Monitoring Report for Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Prepared for Kinder Morgan Canada Inc. January 2013. Calgary, AB.

TERA Environmental Consultants. 2013b. Post-Construction Environmental Monitoring Report – Year 4 for the Enbridge Pipelines Inc. Line 4 Extension Project. Prepared for Enbridge Pipelines Inc. January 2013.

TERA Environmental Consultants. 2013c. First Year Post-Construction Environmental Monitoring Program Report for the NOVA Gas Transmission Ltd. Groundbirch Mainline Project. Prepared for NOVA Gas Transmission Ltd. January 2013. Calgary, AB.

TERA Environmental Consultants. 2013d. 2012 Wetland Follow up Monitoring Program Report for the Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Prepared for Kinder Morgan Canada Inc.

TERA Environmental Consultants. 2013e. 2013 Supplemental Wetland Function Study Post-construction Monitoring Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Final Year. Prepared for Kinder Morgan Canada Inc.

TERA Environmental Consultants. 2013f. 2013 Wetland Follow-up Monitoring Program Report for the Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Fifth Year. Prepared for Kinder Morgan Canada Inc.

TERA Environmental Consultants. 2014. First Year Wetland Function Post-Construction Monitoring Report for the NOVA Gas Transmission Ltd. Tanghe Creek Lateral Loop No. 2 (Sloat Creek Section). Prepared for NOVA Gas Transmission Ltd. Calgary, AB.

c) During summer 2013, the fifth and final year of Wetland Function Post-construction Monitoring (PCM) for the Supplemental Wetland Function Study (SWFS) and for the Wetland Follow-up Monitoring Program (WFMP) for the TMX – Anchor Loop Project was carried out (TERA Environmental Consultants 2013a,b).

In the years immediately following construction, issues identified included: wetland profile reconstruction; an increased moisture regime due to tree removal; the potential for sediment and/or nutrient loading into surface waters; and the occurrence of anthropogenic materials. Where required, issues such as wetland profile reconstruction were effectively mitigated through reclamation measures (*i.e.*, recontouring). In areas of tree removal, natural regeneration allowed successional species to establish through the growing seasons following construction. Where warranted, anthropogenic materials were removed (*e.g.*, silt fencing) if it was determined they impeded to wetland function. Weedy species were gradually succeeded by appropriate wetland species, Kinder Morgan Canada implemented a Weed Management Program as warranted, similar to the Weed and Vegetation Management Plan in Appendix C of the Pipeline Environmental Protection Plan (EPP) for the TMEP (Volume 6B, Filing ID A3S2S3). Natural regeneration, along with sapling plantings and seeding, if warranted, was utilized in areas where vegetation was slow to re-establish, similar to shrub staking that is recommended in Appendix K of the Pipeline EPP for the Project (Volume 6B, Filing ID A3S2S3).

In 2010 for the SWFS, three of the nine wetlands studied showed “Proper Functional Conditions” and one was “Functional-at-Risk”, no wetlands were determined to be “Non-Functional” and no specific restoration efforts were recommended at that time. Wetlands initially determined to be of “Proper Functional Conditions” maintained that ranking throughout the five years of monitoring. By 2011, all wetlands were ranked “Proper Functional Conditions” as vegetation growth continued to improve and the soil moisture regime returned to the wetlands. The 2012 and 2013 field visits observed continued stabilization of wetland function as “Proper Functional Conditions” and no incidents of regressed functional conditions were noted.

All wetlands observed during the WFMP were determined to show direct indicators of “Proper Functional Conditions”. No wetlands exhibited characteristics that were detrimental to overall wetland function or were documented as being “Functional-At-Risk” or “Non-Functional”. This result was supported by the observations of reclaimed seedbanks within wetlands based on the growth of the appropriate successional species on the construction right-of-way and the absence of excessive ponded water or impeded hydrology.

Natural regeneration and site-specific supplemental restoration revegetation efforts continued to stabilize and improve vegetation regeneration. Over five years of SWFS and WFMP Wetland Function PCM field work, increased moisture levels were observed along the elevated portions and at wetland margins. A substantial improvement in wetlands where vegetation was slow to re-establish was noted during the fourth year surveys. The growth of vegetation microsites and vegetation coverage was observed to have continued to improve during the fifth year surveys.

Over the five years of monitoring, the SWFS and WFMP wetlands have shown that accepted pipeline construction methods and supplemental restoration mitigation measures, along with the passage of time, have allowed for the re-establishment of the soil moisture regime and the successful establishment of naturally regenerating and encroaching species. Species planted during restoration efforts where appropriate also assisted with the successful recovery of wetland function although natural regeneration has proven to be the best method for a majority of wetlands.

Overall, the fifth year SWFS and WFMP Wetland Function PCM provided confidence that mitigation measures implemented during construction (*i.e.,* natural regeneration) and subsequent restoration and revegetation efforts as warranted, have proved to be successful, that wetlands are proving to be resilient to the temporary disturbance of pipeline construction and that the goal of “no net loss” of wetland function has been achieved.

References:

TERA Environmental Consultants. 2013a. 2013 Supplemental Wetland Function Study Post-construction Monitoring Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Final Year. Prepared for Kinder Morgan Canada Inc.

TERA Environmental Consultants. 2013b. 2013 Wetland Follow-up Study Monitoring Program Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Final Year. Prepared for Kinder Morgan Canada Inc.

d) The response to ALBI IR No. 2.04.1c provides additional information on natural regeneration within wetlands and Wetland Function Post-construction Monitoring (PCM) results along the TMX Anchor Loop Project. During summer 2013, the fifth and final year of Wetland Function Post-construction Monitoring (PCM) for the Supplemental Wetland Function Study (SWFS) and for the Wetland Follow-up Monitoring Program (WFMP) for the TMX – Ancher Loop Project was carried out (TERA Environmental Consultants 2013a,b). As wetlands monitored during the SWFS and WFMP had topsoil salvaged and replaced promptly after pipeline construction, these studies show that where this practice is implemented, natural regeneration works to allow the recovery of wetland vegetation and once successional species regenerate on the construction right-of-way, soil erosion is reduced or prevented.

References:

TERA Environmental Consultants. 2013a. 2013 Supplemental Wetland Function Study Post-construction Monitoring Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Final Year. Prepared for Kinder Morgan Canada Inc.

TERA Environmental Consultants. 2013b. 2013 Wetland Follow-up Study Monitoring Program Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Final Year. Prepared for Kinder Morgan Canada Inc.

2.04.2 Evaluation for success of reclamation unclear

Reference:

Trans Mountain Response to ALIB IR No. 1.4.5(c); Trans Mountain Follow-Up Response to ALIB IR No. 1, (17-Oct-2014) IR No. 1.4.5(c)

Preamble:

The NEB granted the ALIB request for further information about how TM will know when reclamation of disturbed sites has been successful. In the IR follow-up response prepared by TM (17-Oct-2014), they provide the parameters that will be measured and "*visually compared*" to adjacent or nearby undisturbed land. TM states that for areas that contained native vegetation prior to construction, reclamation will focus on *"the establishment of an early successional trajectory of a native vegetation community. Native vegetation observed during the post-construction monitoring program will be deemed successful by qualitative and quantitative analysis when vegetation growth both on and off the right-of-way are comparable. Monitoring of vegetation species composition, percent cover and vigour, compared to off right-of-way reference sites, will be performed to determine if reclamation is successful*." (pg. 4)

However, it is not clear what an early successional trajectory is? What qualitative and quantitative analysis will be used? Or what constitutes the term "*comparable*"? Also, although TM has provided the parameters to be measured, it is still not clear what constitutes reclamation success for each of these parameters? For example, TM states that species composition will be measured but how many species do the post-construction sites and adjacent or nearby undisturbed sites need to have in common before TM deems the post-construction site successfully reclaimed? Is there a threshold or target that TM has set (e.g. presence of 25%, 50%, or 75% of original species) that would define success for this parameter? Without a clearly defined target and by using vague terms like "*comparable*", the definition of success seems open to interpretation. This is not acceptable to ALIB.

Request:

a) Please provide a concrete definition of an "*early successional trajectory*"?

b) Please provide direct evidence in the form of scientific literature, data, or otherwise for the existence of an "*early successional trajectory*".

c) Please list details and specific methodology for qualitative and quantitative analyses that will be used in post-construction monitoring.

d) In terms of post-construction monitoring please provide a concrete definition and thresholds for what is meant by "*comparable*".

e) Please list each parameter that will be measured (species composition, percent cover and vigour) and state the quantitative threshold that defines reclamation success for each parameter?

f) Will Trans Mountain consider using similarity indices to compare post-construction sites with adjacent or nearby undisturbed land? If the answer is no, please provide rationale.

Response:

a) The Reclamation Management Plan for the proposed Trans Mountain Expansion Project states "that the primary goal of reclamation is to reduce adverse effects of pipeline construction and return the affected lands to a stable, non-erosive condition that will promote the re-establishment of land productivity" (refer to Section 7.0 of Appendix C of Volume 6B; Filing ID A3S2S3). Successfully achieving this goal typically includes implementing a number of construction reclamation measures. One of these measures is:

- establishment of vegetative cover to stabilize surface soils and to re-establish an *early successional trajectory* (where a primarily native plant community existed prior to construction) [that] will facilitate the development of plant communities that are compatible with those maintained during the operational phase of the Project (requirements of maintenance and access) and temporary workspace areas that are allowed to re-establish the surrounding vegetation and land uses

In this context, an early successional trajectory means the establishing of a pioneer seral plant community and maintaining the underlying hydrology and nutrient regimes by stabilising soils.

"Pioneer seral" refers to the successional status where vegetation occupies a site following elimination of the original plant cover by natural or anthropogenic disturbances. Pioneer seral communities are expected to progress through succession over the long term to vegetation communities similar to those in adjacent off right-of-way areas. Pioneer seral communities are usually dominated by forbs, gramminoids and shrubs (BC Ministry of Forests and Range and BC MOE 2010).

On the permanent right-of-way, plant communities would be maintained at a successional stage compatible with the requirements of maintenance and access during the operations phase of the project (shrubs and herbaceous species). Temporary workspace areas would be allowed to regenerate to the successional status of the adjacent vegetation.

Maintaining the underlying hydrology and nutrient regimes is achieved by topsoil/root zone material salvage, subsoil conditioning and grade and drainage feature re-establishment, topsoil/root zone material replacement and installation and maintenance of temporary and permanent erosion and sediment control measures (refer to Section 7.0 of Appendix C of Application Volume 6B; Filing ID A3S2S3). These measures ensure that soil is stabilised and that land productivity is maintained.

Reference:

British Columbia Ministry of Forests and Range and British Columbia Ministry of Environment. 2010. Field Manual for Describing Terrestrial Ecosystems. 2nd Edition. Land Management Handbook No. 25. BC Ministry of Forests and Range, Research Branch and BC Ministry of Environment, Resources Inventory Branch. Victoria, BC.

b) The Society for Ecological Restoration describes a comparable term called an *ecological trajectory*, which describes the developmental pathway of an ecosystem through time, and in restoration planning, the trajectory begins with the unrestored ecosystem and progresses towards the desired state of recovery (Society for Ecological Restoration International Science & Policy Working Group 2004).

The existence of an early successional trajectory on a pipeline right-of-way has been shown in the Post-Construction Monitoring Reports for the Trans Mountain Pipeline L.P. TMX – Anchor Loop Project (TERA 2009a, 2011a, 2011b and 2013a). Monitoring of this project showed that over the years following construction, cover of live plant material and litter increased and that native herbs, shrubs and trees encroached onto the right-of-way.

Five year post-construction monitoring was conducted for the Southern Crossing Pipeline (SCP) in southern BC. The South Okanagan seed mix consisted primarily of native bunchgrass cultivars, and after 5 years vegetation cover was approximately 50% in the South Okanagan showing an early successional trajectory (Atwood 2007).

Early monitoring of a pipeline right-of-way indicated that broadcast seeding, whole plant salvage and hydroseeding of native grass species were successful re-establishment techniques for many native species on the construction right-of-way in a grassland habitat dominated by bunchgrasses (Atwood 2000).

Section 7.2.9.6 of Volume 5A of the Application (Filing ID A3S1Q9) lists two pipeline projects as examples of revegetation of desirable species progressing toward meeting the objective of the management plan by the second year of PCM (TransCanada Keystone Pipeline GP Ltd. 2012), and native plant communities re-establishing on all monitoring sites where natural revegetation had been used after 14 years (Kestrel Research Inc. and Gramineae Services Ltd. 2011).

Shem *et al.* (1993) assessed locations where pipeline construction had occurred in wetlands, and concluded that on sites where natural regeneration of disturbed wetlands was allowed, many plants species documented one year after construction re-established on the construction right-of-way from the replaced native soil and from the adjacent wetland area.

Post-construction monitoring of wetland function at disturbed wetlands along recent pipeline projects on agricultural lands, similar to lands crossed by the proposed Project in portions of Alberta and British Columbia, have shown that mitigation measures implemented during construction (*e.g.,* profile reconstruction, allowing natural regeneration) have proven to be successful; wetlands and associated vegetation have

been confirmed to be resilient when such mitigation methods are utilized. In addition, the absence of environmental issues pertaining to wetland function restoration has been observed and documented in As-built Environmental Reports for the first, second and third-year Post-Construction Monitoring reports for numerous past pipeline projects (TERA Environmental Consultants 2009b, 2011c-e, 2012, 2013a-c, 2014).

References:

Atwood, L. 2000. Monitoring Restoration of the Vaseux-Bighorn National Wildlife Area Following Pipeline Construction. Pp.815-820 in Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk, Kamloops, B.C., 15-19 Feb 1999. L.M. Darling (ed.). British Columbia Ministry of Environment, Lands and Parks, Victoria, B.C.

Atwood, L. 2007. Terasen Southern Crossing Project Vegetation Monitoring 2001 to 2006. Westland Resource Group 24 pp.

Kestrel Research Inc. and Gramineae Services Ltd. 2011. Long Term Recovery of Native Prairie from Industrial Disturbance: Express Pipeline Revegetation Monitoring Project 2010. September 2011. 349 pp. Website: http://www.foothillsrestorationforum.ca/express-pipeline-revegetation. Accessed: September 2013.

Shem, L.M., R.E. Zimmerman, S.D. Sellmer, G.D. Van Dyke and J.R. Rastofer. 1993. Regeneration of Vegetation on Wetland Crossings for Gas Pipeline Rights of Way One Year After Construction. Proceedings of the Fifth International Symposium on Environmental Concerns in Rights-of-Way Management. September. Montreal, Québec, Canada. (Eds) G.J. Doucet, C. Séguin and M. Giguère. Pp. 183-190.

Society for Ecological Restoration International Science & Policy Working Group, 2004. *The SER International Primer on Ecological Restoration*. www.ser.org & Tucson: Society for Ecological Restoration International.

TERA Environmental Consultants. 2009a. 2009 Post-Construction Monitoring Report for the Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Calgary, AB.

TERA Environmental Consultants. 2009b. Post-Construction Environmental Monitoring Report – Year 1 for the Enbridge Pipelines Inc. Line 4 Extension Project. Prepared for Enbridge Pipelines Inc. November 2009.

TERA Environmental Consultants. 2011a. 2010 Post-Construction Monitoring Report for the Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Calgary, AB.

TERA Environmental Consultants. 2011b. 2011 Post-Construction Monitoring Report for the Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Calgary, AB.

TERA Environmental Consultants. 2011c. 2010 Post-Construction Monitoring Report for Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Prepared for Kinder Morgan Canada Inc. January 2011. Calgary, AB.

TERA Environmental Consultants. 2011d. Post-Construction Environmental Monitoring Report (Year 1) for the Enbridge Pipelines Inc. Alberta Clipper Project – Spread 5, Part A: Environmental As Built Report. Prepared for Enbridge Pipelines Inc. January 2011. Calgary, AB.

TERA Environmental Consultants. 2011e. 2011 Wetland Follow-up Monitoring Program Report for the Kinder Morgan Canada Inc. TMX – Anchor Loop Project. Fourth Year. Prepared for Kinder Morgan Canada Inc.

TERA Environmental Consultants. 2012. Post-Construction Environmental Monitoring Report – Year 3 for the Enbridge Pipelines Inc. Line 4 Extension Project. Prepared for Enbridge Pipelines Inc. January 2012.

TERA Environmental Consultants. 2013a. 2012 Post-Construction Monitoring Report for Trans Mountain Pipeline L.P. TMX – Anchor Loop Project. Prepared for Kinder Morgan Canada Inc. January 2013. Calgary, AB.

TERA Environmental Consultants. 2013b. Post-Construction Environmental Monitoring Report – Year 4 for the Enbridge Pipelines Inc. Line 4 Extension Project. Prepared for Enbridge Pipelines Inc. January 2013.

TERA Environmental Consultants. 2013c. First Year Post-Construction Environmental Monitoring Program Report for the NOVA Gas Transmission Ltd. Groundbirch Mainline Project. Prepared for NOVA Gas Transmission Ltd. January 2013. Calgary, AB.

TERA Environmental Consultants. 2014. First Year Wetland Function Post-Construction Monitoring Report for the NOVA Gas Transmission Ltd. Tanghe Creek Lateral Loop No. 2 (Sloat Creek Section). Prepared for NOVA Gas Transmission Ltd. Calgary, AB.

TransCanada Keystone Pipeline GP Ltd. 2012. Keystone Pipeline Project Year 2 Post Construction Environmental Monitoring. January 31, 2012. Website: https://www.neb-one.gc.ca/ll-eng/Livelink.exe?func=ll&objId=786796&objAction=browse. Accessed: September 2013.

c) Industry standard management objectives will be used to measure reclamation of the proposed Project during the environmental monitoring period. The main objectives of Post-Construction Monitoring (PCM) include soil stabilization and establishment of vegetation on the construction right-of-way. Additional objectives may be proposed in sensitive areas (*e.g.*, Provincial Parks or Lac du Bois Grasslands Protected Area) based on consultation with stakeholders (*e.g.,* BC Parks). Thresholds will not be used, as detailed in the response to ALIB IR No. 1.4.5e (Filing ID A3X5V6, PDF page 86 of 123). Further PCM information (including the criteria for success) is provided in Volume 6A, Section 9.0 Post-Construction Environmental Monitoring (Filing ID A3S2S1).

The PCM Program will include inspecting the construction right-of-way for environmental issues related to Project construction. Vegetation growth success will be used as a key indicator of land productivity and ecosystem function throughout the PCM Program. The presence of a low vegetation cover often indicates an underlying soil issue.

Similarly, the presence of good vegetation establishment is a key indicator of successful soil reclamation.

Vegetation on the reclaimed construction right-of-way will be visually compared to similar vegetation communities on land adjacent to the construction right-of-way or to pre-construction field survey data. The construction right-of-way will be maintained as an early seral plant community and, in some instances, the direct comparison will be the existing Trans Mountain right-of-way that is adjacent to the new construction area. The cover of bare soil, seeded and native species and priority weeds and other non-native species will be considered during the vegetation assessment. Where vegetation shows signs of reduced vigour and establishment success, surface soils will be assessed to ensure compaction, admixing, topsoil/root zone material depth, erosion, stoniness and soil structure are comparable to adjacent areas of the construction right-of-way. For more information, see Section 9.0 in Volume 6A (Filing ID A3S2S1).

Vegetation parameters may be compared to pre-construction data when warranted. Vegetation parameters that may be assessed are listed in Section 9.6 of Volume 6A (Filing ID A3S2S1).

Pre-construction weed information will be available for comparisons used in the PCM Program. Pre-construction weed surveys are currently planned to be conducted in 2015. Numerical density distribution codes were assigned for all weed species observed during the survey, following the density distribution guide provided in the Alberta Sustainable Resource Development (now Alberta Environment and Sustainable Resource Development [AESRD]) Rangeland Health Assessment Guide (Adams *et al.* 2009) and by the BC Ministry of Forests (Luttmerding *et al.* 1990).

Vegetation on the construction right-of-way may be quantified by a visual assessment for total percent ground cover of desirable species by estimating the live cover in square metre plots in permanent plots identified during final cleanup. Live cover percentages will be tracked and compared on a yearly basis to assist in determining if a positive trajectory for vegetation has been established.

The verification of a soil compaction issues will include: physical resistance tests, visual observations of physical soil characteristics, plant rooting patterns and vegetation growth on the pipeline right-of-way. Soil mixing will be assessed by identifying obvious colour changes and/or obvious changes in soil structure on the pipeline right-of-way compared to off the pipeline right-of-way.

Terrain assessments will include a visual assessment of topography, hydrology and microsite conditions to ensure that the surface drainage, profile, stability and other features of the reclaimed construction right-of-way are consistent with the pre-construction conditions and the surrounding landscape.

For each rare ecological community and rare plant population the presence, abundance, density, distribution, areal extent, overall health, reproductive abundance and ability to maintain a viable local population have been documented during baseline

(*i.e.*, pre-construction) assessments (see Appendix F of Volume 5C: Vegetation Technical Report; Filing ID A3S2Q2).

Affected rare plant and lichen populations and rare ecological communities will be monitored in the years following construction in order to assess the success of employed mitigation measures, refer to Table 3.026a-1 of NEB IR No. 3.026a (Filing ID A4H1V2) for recommended mitigation measures. Any unresolved rare plant population issues will be revisited by a Rare Plant Specialist and post-construction characteristics of the populations will be recorded and compared to the pre-construction characteristics.

If a rare plant population is not present or was determined by the on-site Rare Plant Specialist to have reduced overall health or vigour, further monitoring during the following year may be recommended. Corrective mitigation measures may be recommended in subsequent years on a site-specific basis and only where factors restricting the affected population's viability/success are readily identified.

Trans Mountain will continue to consult with regulatory authorities regarding the protocols for PCM of reclamation success for terrain and soils, vegetation, wetlands, watercourses, wildlife habitat, noise and air, and will incorporate their recommendations as warranted. In the event that construction-related issues persist past five years of monitoring, PCM will continue until remediation measures are considered to be effective and issues are resolved.

References:

Adams, B.W., G. Ehlert, C. Stone, M. Alexander, D. Lawrence, M. Willoughby, D. Moisey, C. Hincz and A. Burkinshaw. 2009. Rangeland Health Assessment for Grassland, Forest and Tame Pasture. Revised April 2009. Pub. No. T/044. Government of Alberta Sustainable Resource Development, Lands Division, Rangeland Management Branch. Edmonton, AB. 128pp. Website: http://esrd.alberta.ca/lands-forests/grazing-range-management/documents/RangelandHealthAssessmentforGrasslandForestTamePasture-Revised-Apr2009.pdf. Accessed: October 2014.

Luttmerding, H.A., D.A. Demarchi, E.C. Lea, D.V. Meidinger and T. Vold, Eds.1990. Describing Ecosystems in the Field. 2nd Edition. MOE Manual 11. BC Ministry of Environment, Lands and Parks and BC Ministry of Forestry, Victoria, BC. 213 pp.

d) The term 'comparable' is used in terms of post-construction monitoring in the *Alberta Reclamation Assessment Criteria for Pipelines – 2001 Draft* (Alberta Environment 2001) and the *2010 Reclamation Criteria for Wellsites and Associated Facilities for Forested Lands* (Alberta Environment 2010) and it is used similarly to the word 'equivalent' in these two documents. 'Equivalent Land Capability' is described as: "the ability of land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the individual land uses will not necessarily be identical" (Alberta Environment 2010). "To accommodate natural variation, any definition of equivalency must recognize a zone of tolerance within which all values can be considered 'equivalent'" (Alberta Environment 2001).

Thresholds will not be used in post-construction monitoring (as mentioned in the response to ALIB IR No. 1.4.5e, Filing ID A3X5V6, PDF page 86 of 123). Industry standard management objectives will be used to measure reclamation success of the proposed Project during post-construction monitoring. The use of thresholds in post-construction monitoring are not industry standard practice.

References:

Alberta Environment. 2001. Reclamation Assessment Criteria for Pipelines – 2001 Draft. Alberta Environment, Edmonton, Alberta. 70 pp.

Alberta Environment. 2010. 2010 Reclamation Criteria for Wellsites and Associated Facilities for Forested Lands (Updated June 2011). Edmonton, AB. 99 pp.

e) The vegetation parameters to be assessed during post-construction monitoring (PCM), as provided in Section 9.6 of Volume 6A (Filing ID A3S2S1), include the following:

- loss or alteration of rare plants, lichens and rare ecological communities;
- revegetation and disturbances to vegetation within agricultural, forested and urban areas;
- native grass/forb re-establishment and the establishment of an early successional trajectory of native grasslands;
- acceleration of the spread of forest health pathogens;
- annual crop density, height, phenological stage, vigour, distribution and colour on cultivated lands;
- bare soil exposure, visible erosion, surface vegetation and litter, grazing pressure and plant vigour on hay, tame pasture, native pasture, native grasslands and treed pasture lands;
- cover establishment on forested lands;
- cover establishment in urban areas;
- spread of the clubroot pathogen within agricultural lands; and
- weed issues.

As stated in the response to ALIB IR No. 1.4.5e (Filing ID A3X5V6, PDF page 86 of 123), thresholds will not be used during post-construction monitoring.

Reclamation success is determined by comparing the vegetation on and off right-of-way to determine that ‘equivalent land capability’ has been attained. Equivalent land capability is defined as: “The ability of land to support various uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but the ability to support individual land uses will not necessarily be equal after reclamation” (Alberta Environment 2001).

Reference:

Alberta Environment. 2001. Reclamation Assessment Criteria for Pipelines – 2001 Draft. Alberta Environment, Edmonton, Alberta. 70 pp.

f) Trans Mountain is not considering using similarity indices as part of their standard Post-Construction Monitoring (PCM) Program given the areal extent of the project and the fact that a majority of the proposed pipeline corridor parallels the existing Trans Mountain pipeline and other linear infrastructure because they are not industry standard. Similarity indices are not a requirement of the National Energy Board Filing Manual.

Similarity indices are statistical measurements of the similarity between on and off right-of-way plots and entail quantitative assessments of species composition. Similarity between on and off right-of-way areas is measured qualitatively during PCM, through visual comparison of on right-of-way areas with similar vegetation communities on undisturbed lands adjacent (refer to Section 9.0 of Volume 6A, Filing ID A3S2S1).

2.05.0 WILDLIFE AND WILDLIFE HABITAT ROUND 2 IRS

2.05.1 Design of the follow-up program for wildlife is missing

Reference:

Trans Mountain, Volume 5C, Wildlife Technical Report, Section 6.4 page 6-12; Trans Mountain response to ALIB IR No. 1.5.2

Preamble:

The stated purpose of the proposed Trans Mountain Post-Construction Environmental Monitoring (PCEM) program is to determine the effectiveness of mitigation, identify the need for adaptive responses, and detect changes in wildlife and wildlife habitat resulting from the project. The *Canadian Environmental Assessment Act (CEAA), 2012, Section 2(1)* defines a 'follow-up program' as one designed to determine the effectiveness of mitigation measures. The PCEM program is also not compliance monitoring. According to CEAA Operational Policy Statement on follow-up programs (CEAA 2012: https://www.ceaa-acee.gc.ca/default.asp?lang=En&n=499F0D58), a compliance program is in place to verify "…whether required mitigation measures were implemented" and that "compliance monitoring on its own does not satisfy the requirements for a follow-up program." Therefore it appears that the PCEM program is indeed a follow-up program.

To determine the capacity of a follow-up program to measure the effectiveness of mitigation requires knowledge of sampling effort, sampling locations, field methods to be used, which species will be targeted, and how these data will be analyzed and interpreted given existing conditions, including spatial and temporal environmental variation and the cumulative effects of disturbance from other projects. For example, the statistical power required to detect change – if change has occurred – is dependent on the sampling effort. The appropriate sampling effort is determined by the amount of spatial and temporal environmental variation in the system. To date TM has not provided any of the necessary information required to assess the PCEM program adequately. The absence of critical details about the PCEM program precludes an understanding of how the effects of this project will be both quantified and communicated to ALIB.

Given (1) the use of unproven techniques to mitigate project impacts (i.e., natural restoration, see MacFarlane 2003; Lee & Boutin 2006; Bayne et al. 2011); (2) reliance on limited scientific knowledge (i.e., unpublished literature); and (3) explicit policy guidance to consider public involvement in the "…design and implementation of a follow-up program" (CEAA 2012) it is required that the details of the PCEM program be disclosed prior to construction.

Request:

a) Please provide the following details on the design of the PCEM program for wildlife:

   i. hypotheses to be tested,
   ii. sampling effort,
   iii. sampling locations,

iv. what methods will be used,
v. which species will be targeted, and
vi. how these data will be analyzed with respect to existing conditions, including spatial and temporal environmental variation, and the effects of disturbance from other projects.

b) Please provide a timeline for when the details of the PCEM program will be made available to the public.

c) Please describe all upcoming opportunities for ALIB involvement in the design of the PCEM program.

d) Please list the quantitative thresholds of change that will be identified through the PCEM that will be used to trigger adaptive management interventions.

e) Please list the adaptive management interventions planned to be used in the event that thresholds of change are exceeded.

Response:

a) Under *Canadian Environmental Assessment Act,* 2012, follow-up programs are intended to verify the accuracy of the environmental assessment of a designated project, in addition to determining the effectiveness of mitigation measures. Trans Mountain recognizes that follow-up programs may be warranted for the Project for some elements, including select species at risk where the assessment conclusions have low confidence or where the proposed mitigation is unproven (refer to the response to NEB IR No. 2.032 [Filing ID A3Z4T9]). The need for and specifics of follow-up programs will be defined as Project details become more refined and the spatially-explicit information on critical habitat for species at risk becomes available.

The proposed PCEM Program is typical of most other projects of a similar nature approved under the NEB, and requirements are presented in NEB Draft Condition 64 as outlined in the NEB's *Letter – Draft Conditions and Regulatory Oversight (April 16, 2014)* (NEB 2014a; Filing ID A3V8Z8). The purpose of the PCEM Program for the Project is to:

- evaluate the success of reclamation and effectiveness of mitigation measures used in areas disturbed during construction;
- identify environmental issues that may have arisen post-construction on the Environmental Issues List; and
- recommend and coordinate the implementation of any remedial measures that are warranted to address any outstanding or new environmental issues.

This is consistent with the guidance in the NEB *Filing Manual*, which recommends that post-construction monitoring reports discuss measures implemented during and following construction, and provide information on the status of issues and the effectiveness of mitigation, as appropriate (NEB 2014b). The stated objectives of the wildlife and wildlife habitat monitoring component of the PCEM Program are to collect sufficient information to determine the effectiveness of mitigation, identify need for

adaptive measures and detect changes in wildlife and wildlife habitat resulting from the Project (Section 9.0 of Volume 6A [Filing ID A3S2S1]). These objectives are designed to meet the purpose of the PCEM Program, described above.

As such, the information collected for the wildlife and wildlife habitat monitoring component of the PCEM Program will enable identification of issues resulting from construction, or ineffective mitigation that warrants remedial measures, such as additional or alternate mitigation. The design of the PCEM Program for wildlife and wildlife habitat does not, therefore, warrant the sampling effort suggested in the preamble to this IR, which may be suitable for follow-up programs.

Trans Mountain notes that Adams Lake Indian Band asked this same question in the first round and a response was provided. Trans Mountain also notes that the National Energy Board denied Adams Lake Indian Band's motion to compel a further response from Trans Mountain on this response based on the motion seeking information that was not required during the assessment stage, or that is more appropriately addressed post-decision. Therefore, Trans Mountain will not be providing further information on parts i) through vi) of this question.

References:

National Energy Board. 2014a. Draft Conditions and Regulatory Oversight. Hearing Order OH-001-2014. Trans Mountain Pipeline ULC (Trans Mountain) Application for the Trans Mountain Expansion Project (Project). April 16, 2014.

National Energy Board. 2014b. Filing Manual. Inclusive of Release 2014-03 (November 2014). Calgary, AB.

b) As suggested in NEB Draft Condition No. 29, in the NEB's *Letter – Draft Conditions and Regulatory Oversight (April 16, 2014)* (NEB 2014, Filing ID A3V8Z8), Trans Mountain will file an updated Project-specific Pipeline Environmental Protection Plan for the construction of the pipeline, at least 90 days prior to commencing construction. In accordance with the Draft Condition 29, the updated Environmental Protection Plan will be a comprehensive compilation of all environmental protection procedures, mitigation measures and monitoring commitments, and will describe the criteria for implementing all procedures and measures, including monitoring applicable to all Project phases and activities. As outlined in Draft Condition No. 64 in NEB's *Letter – Draft Conditions and Regulatory Oversight (April 16, 2014)* (NEB 2014, Filing ID A3V8Z8), Trans Mountain will submit the results of the PCEM program in a publicly-available report on or before January 31 of each year for the duration of the PCEM program.

Timelines specific to the wildlife components of Trans Mountain's proposed mitigation plans that include a monitoring component are as follows:

- As suggested in NEB Draft Condition No. 10, in the NEB's *Letter – Draft Conditions and Regulatory Oversight (April 16, 2014)* (NEB 2014, Filing ID A3V8Z8), Trans Mountain will develop and file a Preliminary Caribou Habitat Restoration Plan at least six months prior to construction of any Project component that potentially affects

each caribou range. Trans Mountain will also develop and file a Final Caribou Habitat Restoration Plan on or before November 1 following the first complete growing season after operations have begun.

- The spotted owl mitigation plan will be filed with the NEB six months prior to commencing construction of any Project component within the Sowaqua spotted owl WHA.
- Trans Mountain will complete and submit to the NEB a proposed mitigation strategy for grizzly bear four months prior to construction activities, which will include information regarding monitoring.
- The mitigation plans for Pacific water shrew, Townsend's mole, coastal giant salamander, Lewis's woodpecker and Williamson's sapsucker will be filed with the NEB at least four months prior to commencing construction.

Reference:

National Energy Board. 2014. Draft conditions and Regulatory Oversight. Hearing Order OH-001-2014. Trans Mountain Pipeline ULC (Trans Mountain) Application for the Trans Mountain Expansion Project (Project). April 16, 2014.

c) Trans Mountain will continue to engage Aboriginal communities through all phases of the Project, which includes providing updates on the status of the Project and discussing proposed mitigation and enhancement measures. Additional issues of concern, traditional use sites or features identified through ongoing engagement with Adams Lake Indian Band will be considered for incorporation into Project planning. The results of these ongoing engagement efforts will be provided to the NEB. For additional information pertaining to Aboriginal engagement design and processes, refer to Section 1.3, Volume 3B (Filing ID A3S0U5).

d) Trans Mountain notes that Adams Lake Indian Band asked this same question in the first round and a response was provided. Trans Mountain also notes that the National Energy Board denied Adams Lake Indian Band's motion to compel a further response from Trans Mountain on this response based on the motion seeking information that was not required during the assessment stage, or that is more appropriately addressed post-decision. Trans Mountain will not be providing further information on this question.

e) Trans Mountain notes that Adams Lake Indian Band asked this same question in the first round and a response was provided. Trans Mountain also notes that the National Energy Board denied Adams Lake Indian Band's motion to compel a further response from Trans Mountain on this response based on the motion seeking information that was not required during the assessment stage, or that is more appropriately addressed post-decision. Trans Mountain will not be providing further information on this question.

2.05.2 Validation procedure for habitat model is missing, lacks a timeline, and is not scientifically defensible

Reference:

Trans Mountain, Volume 5C, Wildlife Modelling and Species Accounts Technical Report, Section 2.9.1 page 2-10; Trans Mountain response to ALIB IR No. 1.5.3; Trans Mountain Follow-Up Response to ALIB IR No. 1, (17-Oct-2014) IR No. 1.5.3

Preamble:

Trans Mountain's timeline for validating the performance of wildlife habitat models has not yet been disclosed and without validated models, there is no means to determine which habitat models perform well and which perform poorly. In the absence of this information, uncertainly in the predicted residual effects of the proposed project on wildlife and habitat is high. This of great concern to ALIB.

The preliminary model evaluation procedure employed by TM (as outlined in Trans Mountain, Volume 5C, Wildlife Modelling and Species Accounts Technical Report, Section 2.9.1) reduces the amount of poor quality habitat if a species occurs in areas classified as Nil or Very Low in the habitat suitability model. This procedure may over-represent the capacity of the land to support populations of VECs because species occurrence is not an appropriate indicator of habitat quality. This source of uncertainty undermines confidence in the overall assessment of project impacts on wildlife.

There are at least two reasons why species occurrence is not an appropriate indicator of habitat quality and should not be used by TM for validation of habitat suitability models. Firstly, the presence of an organism does not indicate if an area is of high or low quality habitat (MacKenzie 2006; Boitani et al. 2013). For example, mammal indicator species can occur in urban centers, on a frozen lake, or on a mountain top, but few biologists would agree that these habitats are suitable for these species because their life history requirements cannot be met in these areas. Indeed, the discrepancy between wildlife occurrence and habitat models is recognized by TM (Volume 5A, Section 7.2.10.5 p 7-236) when it states that "*Model results do not represent actual wildlife use of habitats, but provide a characterization of habitats in the Wildlife LSA most likely to be used by a given indicator based on habitat variables that have been demonstrated or deemed likely to affect suitability and effectiveness*." It is therefore disconcerting that TM would then use occurrence records to alter a model knowing that its habitat models "*do not represent actual use of habitat by wildlife*". It is unclear from this statement whether TM has confidence in its own assessment of habitat using the habitat suitability and effectiveness models. A more-reasoned interpretation of habitat quality relative to TM's current use of species occurrence data (i.e., habitat use) is warranted.

Secondly, occurrence per se does not account for the probability of detection. In other words, some species may be present, but not detected by the surveys conducted by TM. A more appropriate use of occurrence data is to account for detection using occupancy modelling, a commonly-used technique that can be assessed using freely-available software (MacKenzie 2006). Such an approach is the current standard in addressing species occurrence.

TM states that models were not the only source of information used to evaluate project impacts and that "*Ecological and regulatory context, as well as information related to changes in wildlife movement and mortality risk were, incorporated into the evaluation of effects.*" (Trans Mountain Follow-Up Response to ALIB IR No.1, 17-Oct-2014, pp. 6). However, information about movement and mortality were not quantified. Therefore, it is unclear how this information shaped the development of habitat models. Moreover, the qualified nature of these assessments precludes an objective evaluation of project impacts and the efficacy of mitigation measures. Additional '*verification*' procedures were conducted in the Summer of 2014 (as suggested in Trans Mountain Follow-Up Follow-Up Response to ALIB IR No. 1), and TM has provided some suggestion as to the procedures used to quantify model accuracy. The results of this procedure have not been disclosed.

Request:

a) Following completion of the fieldwork scheduled for summer 2014, please state when the evaluation of the wildlife habitat models will be complete.

b) Please list the species, locations, and habitat types where the model evaluation changed from the original assessment of project impacts.

c) Please provide peer-reviewed literature justifying how species occurrence data is an appropriate measure of accuracy for habitat suitability models.

d) Please answer the following question: how do TM's field methods account for the probability of detection in records of species occurrence?

Response:

a) Supplemental habitat modelling, including the verification of habitat models using field wildlife habitat ratings collected in 2013 and 2014, was completed in December 2014 and is provided in GoC EC IR No. 2.041a-Attachment 1 (Filing ID A4H6D2).

b) The results of the supplemental wildlife modelling suggest that potential Project effects on effective habitat for the Wildlife and Wildlife Habitat indicators are similar to what was presented in the Application for most indicators/focal species. The models incorporated the final terrestrial ecological mapping (TEM) and updated routing relative to the Application, so minor changes were present in all models. The model results for the Wildlife and Wildlife Habitat indicators are provided in Section 4.0 of the Supplemental Wildlife Modelling Report in GoC EC IR No. 2.041a-Attachment 1 (Filing ID A4H6D2) and do not warrant a change to the assessment conclusions presented for wildlife and species at risk in the Application (Section 7.2.10 of Volume 5A [Filing ID A3S1Q9] and Section 8.9 of Volume 5A [Filing ID A3S1R2]).

c) According to the *BC Wildlife Habitat Ratings Standards* (BC Ministry of Environment, Lands and Parks [MELP] 1999) and the *Quality Assurance Guidelines: Wildlife Habitat Rating* (BC Ministry of Sustainable Resource Management [MSRM] 2003), verification of the model requires corroboration with results of field habitat ratings rather than using species occurrence data. Detailed methodology of habitat model verification using field

habitat ratings according to the above standards are provided in GoC EC IR No. 2.041a (Filing ID A4H6A5 and A4H6D2).

Species occurrence data is sometimes used to validate species distribution models (Boyce *et al.* 2002, Hijmans 2012, Ottaviani *et al.* 2004); however, a substantial amount of species occurrence data must be available (Duputié *et al.* 2014, Ottaviani *et al.* 2004). The field surveys completed for the Project were not designed to collect species occurrence data appropriate for validation of habitat models, and therefore, occurrence data were not used for model verification. Rather, habitat ratings collected in the field were used to verify models, according to the standards listed above. Species occurrence data (*e.g.,* known nest locations) were only used, where available, as a secondary qualitative evaluation of the model performance, but was not used to change or refine the habitat models due to limitations (*e.g.,* lack of identification of sink habitats [Falcucci *et al.* 2009, Heinrichs *et al.* 2010], unknown absence data [Zarnetske *et al.* 2005]).

References:

Boyce, M.S., P.R. Vernier, S.E. Nielsen and F.K.A. Schmiegelow. 2002. Evaluating resource selection functions. Ecological Modeling. 157:281-300.

British Columbia Ministry of Environment, Lands and Parks. 1999. British Columbia Wildlife Habitat Ratings Standards (Version 2). Prepared by Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force. Victoria, BC. 97 pp.

British Columbia Ministry of Sustainable Resource Management. 2003. Quality Assurance Guidelines: Wildlife Habitat Ratings (Draft). Resource Information Standards Committee. Victoria, BC. 37 pp.

Duputié, A., N.E. Zimmermann and I. Chuine. 2014. Where are the wild things? Why we need better data on species distribution. Global Ecology and Biogeography 23:457–467.

Falcucci, A., P. Ciucci, L. Maiorano, L. Gentile and L. Boitani. 2009. Assessing habitat quality for conservation using an integrated occurrence-mortality model. Journal of Applied Ecology 46(3):600–609.

Heinrichs, J.A., D.J. Bender, D.L. Gummer and N.H. Schumaker. 2010. Assessing critical habitat: Evaluating the relative contribution of habitats to population persistence. Biological Conservation 143:2229–2237.

Hijmans, R.J. 2012. Cross-validation of species distribution models: removing spatial sorting bias and calibration with a null model. Ecology 93:679–688.

Ottaviani, D., G.J. Lasinio and L. Boitani. 2004. Two statistical methods to validate habitat suitability models using presence-only data. Ecological Modelling 179:417–443.

Zarnetske, P.L., T.C. Edwards Jr. and G.G. Moisen. 2005. Modeling Forest Bird Species' Likelihood of Occurrence in Utah with Forest Inventory and Analysis and Landfire Map

Products and Ecologically Based Pseudo-Absence Points. Proceedings of the Seventh Annual Forest Inventory and Analysis Symposium: 291-305.

d) Field survey methodologies, provided in Section 3.7 of Technical Report 5C-10 in Volume 5C, Wildlife Technical Report (TERA Environmental Consultants December 2013; Filing ID A3S2Q3), are based on the Alberta Environment and Sustainable Resource Development (AESRD) Sensitive Species Inventory Guidelines (2013) and Resources Information Standards Committee (RISC) standard protocols for wildlife surveys. Surveys were designed to collect information during timing windows (*i.e.,* time of year, time of day) that maximize the probability of detection of target species and groups. Field surveys provide an indication of species presence. Absence cannot be confirmed by the field surveys. Further, it is impractical to survey the proposed pipeline corridor in its entirety. The assessment and mitigation planning take a precautionary approach by assuming that wildlife species with potential to occur in the Project area (*i.e.,* habitat and range overlap), may be affected by the construction and operations of the Project, regardless of whether detections are reported within the proposed corridor.

Field wildlife habitat ratings, described in Section 2.6 of Technical Report 5C-11 in Volume 5C, Wildlife Modelling and Species Accounts Technical Report (TERA Environmental Consultants December 2013; Filing ID A3S2R5), are an evaluation of the habitat suitability for modelled species, according to a set of habitat criteria (*e.g.,* structural stage, canopy closure, vegetation community). These ratings, used for verification of the habitat models, are independent from the observation of wildlife species, and therefore, the ratings do not vary with the probability of detection.

Reference:

Alberta Environment and Sustainable Resource Development. 2013. Sensitive Species Inventory Guidelines. Edmonton, AB. 127 pp.

2.05.3 Wildlife habitat restoration via natural recovery

Reference:

Trans Mountain, Volume 5A Wildlife Technical Report, Table 5.2.13 to Table 5.2.16, page 5-26 to 5-52; page 7-456 to 7-460; page 8-39; Trans Mountain response to ALIB IR No. 1.5.6; Trans Mountain Follow-Up Response to ALIB IR No. 1, (17-Oct-2014) IR No. 1.5.6

Preamble:

TM predicts that the impacts of the project will be reversible in the long term, after the pipeline has been decommissioned. The basis for this prediction stems from claims that the natural recovery of vegetation will eventually restore the former footprint of the pipeline. However, a reference condition for recovery has not been quantified or presented by TM.

With reference to some biophysical indicators, including rock fish, pacific salmon, and soil, TM argues that recovery will be targeted to 'pre-disturbance' conditions. However, for terrestrial plant and animal indicators, the stipulation that recovery will be in reference to pre-disturbance conditions was never made in the Wildlife Technical Report. Conversely, TM suggests that establishment of early-seral stage plant communities is equivalent to a trajectory of natural recovery, and is therefore sufficient evidence of recovery. For example, TM states that: "*…it can be expected that once an early seral native vegetation community is established, ecosystems will follow a natural successional trajectory, and in time will return to conditions similar to pre-disturbance conditions in the absence of disturbance*" (Trans Mountain Follow-Up Response to ALIB IR No. 1, 17-Oct-2014, pp. 11). However, plant communities occurring within linear disturbances often do not return to pre-disturbance conditions after early seral conditions are established (MacFarlane 2003; Lee & Boutin 2006; Bayne et al. 2011). Moreover, 'early-seral' stage is vague term that can mean anything from recolonization of lichen to bare rock, to a herbaceous plant community dominated by invasive and exotic species. A more transparent and scientifically-defensible definition of recovery would be one that has established the same abundance and distribution of plant and animal species prior to and following disturbance. Therefore, establishment of an early seral stage is not ipso facto a trajectory towards pre-disturbance conditions.

Bayne et al. (2011) suggest that the functional response of VECs or indicator species to the disturbance often is used as a proxy to determine if and when recovery has occurred along linear disturbances; for example, quantifying when the population size, mortality rates, and movements of indicator species return to pre-disturbance levels. However, given the information presented in the Application this option is not available because mortality rates and movements (impacts assessed by TM for wildlife indicator species in the Application) of indicator species were only assessed '*qualitatively*.' It is therefore impossible to determine the extent to which recovery has occurred.

Request:

a) Please provide a time-frame from decommissioning to recovery for the Project.

b) Will recovery be to 'pre-disturbance' conditions for terrestrial indictors, including plants and wildlife?

c) If yes to 5.3b), please quantify pre-disturbance conditions for terrestrial indictors, including plants and wildlife. If not to 5.3b), please concretely define what ecological state the impacts of this project will recover to.

d) If recovery is being determined by the response of indicator species to the decommissioned pipeline ROW, please provide data that quantifies mortality rates and movement patterns of indicator species in pre-disturbance conditions.

e) If recovery is being determined by the establishment of an early-seral stage, please provide evidence that the establishment of early seral stage plant communities along linear disturbances *ipso facto* forms plant communities identical to pre-disturbance conditions.

Response:

a) For most wildlife indicators, the timeframe for reversibility of combined residual effects of the Project resulting from changes in habitat, movement and mortality risk are constrained by the timeframe associated with recovery of disturbed habitat to conditions comparable to those prior to construction. This is described in the Summary of Effects Characterization Rationale for mammal, bird, amphibian and reptile indicators in Section 7.2.10 of Volume 5A (Filing ID A3S1Q9).

The time-frame from decommissioning to recovery for the Project will vary depending on habitat types and local biogeoclimatic conditions, as well as the degree of regeneration that has occurred over the operations phase of the Project and the disturbance activities required to facilitate decommissioning. Areas within the Project Footprint that are characterized by herbaceous vegetation and shrubs may regenerate to natural vegetation communities comparable to adjacent undisturbed areas in the short to medium-term following disturbance associated with decommissioning (*i.e.* less than 10 years after decommissioning). Shrub-steppe grassland habitats characterized by big sagebrush are expected to regenerate over a longer timeframe following disturbance (*i.e.,* 10 or more years following decommissioning).

Wetland habitats have been demonstrated to be resilient to disturbance where disturbance does not result in permanent loss or alteration of wetland function (see Section 7.2.8.6 of Volume 5A [Filing ID A3S1Q9] and the response to ALIB IR No. 2.04.1 for additional information). Herbaceous and shrubby wetland vegetation, and wetland hydrology are anticipated to be restored in the medium-term (*i.e.,* less than or equal to 10 years) following pipeline disturbance. Mature and old tree-dominated wetland communities, however, require decades for trees to mature to a seral stage comparable to pre-construction conditions. Wetland biogeochemical function is anticipated to be reclaimed once sedimentation has been controlled and vegetation is re-established in the medium to long-term (*i.e.,* 1 to 10 years or greater).

Restoration of forested habitats affected by the Project will take decades to achieve mature and late seral stages.

b) Recovery to pre-disturbance conditions may not be achieved over the entire Project Footprint, depending on various factors described below. The objective of the proposed mitigation measures to reduce the Project's residual effect on habitat loss or alteration (Section 7.2.10.6, Volume 5A [Filing ID A3S1Q9]), and the Reclamation Strategy for wildlife in the Reclamation Management Plan (Section 7.3.8, Appendix C, Volume 6B [Filing ID A3S2S3]) is to facilitate restoration of disturbed areas within the Project Footprint to natural vegetation communities comparable to those in adjacent areas, which will, over time, have capacity to provide habitat structure and composition that will support wildlife communities equivalent to those present prior to construction. Notwithstanding factors outside the control of Trans Mountain (*e.g.,* future disturbance or development adjacent to or crossing the Project Footprint, climate change, changes in resource management objectives, changes in regulatory requirements), the reclaimed Project Footprint is expected to be restored to conditions similar to pre-construction conditions over time, following decommissioning. The temporal context, in particular criteria ratings for reversibility of residual Project effects on vegetation and wildlife indicators (Section 7.0, Volume 5A [Filing ID A3S1Q9]), are based on this assumption.

Trans Mountain notes that decommissioning activities, including reclamation of the Project Footprint following decommissioning, will be completed in accordance with the applicable regulations and best practices that are in place at that time.

c) Recovery to pre-disturbance conditions may not be achieved over the entire Project Footprint, depending on various factors described in the response to ALIB IR No 2.05.3b. Pre-disturbance conditions are described for terrestrial indicators, in accordance with the requirements and guidance of the NEB *Filing Manual* (NEB 2014), in Technical Reports 5C-9 and 5C-10 of Volume 5C Vegetation and Wildlife Technical Reports (Filing IDs A3S2I7 and A3S2Q4, respectively). Reclamation of the Project Footprint will aim to facilitate restoration of disturbed areas to natural vegetation communities comparable to those in adjacent areas (refer to response to ALIB IR No. 2.05.3b).

Reference:

National Energy Board. 2014. Filing Manual. Inclusive of Release 2014-03 (November 2014). Calgary, AB.

d) Quantification of mortality rates and movement patterns of wildlife is not necessary to ensure the Project Footprint is properly reclaimed to facilitate restoration of habitat that can provide comparable habitat function, over time, as occurs prior to Project construction, or that is comparable to adjacent land use at the time of decommissioning. Refer to response to ALIB IR Nos. 2.05.3a and 2.05.3b of this information request for further rationale.

e) Trans Mountain does not claim that the proposed pipeline will return to conditions *identical* to those present prior to disturbance. Instead Trans Mountain expects that once an early seral native vegetation community is established, in time the Project Footprint will return to conditions comparable to adjacent areas, which presumably will be similar to pre-disturbance conditions, notwithstanding factors outside the control of Trans Mountain (refer to response to ALIB IR No. 2.05.3a).

2.05.4 Summary of effects for mammal indicators and project lifespan

Reference:

Trans Mountain, Volume 5A, Biophysical Section 7.2.10 page 7-270, 7-271, Trans Mountain response to ALIB IR No. 1.5.6(b)

Preamble:

The duration of impacts for mammal indicators is described as "*short-term*" (Vol 5A, Biophysical Section 7.2.10 page 7-270, 7-271). However, TM states (see Vol 5A, Biophysical Section 7.2.10) that ongoing studies and adaptive management will be applied to this project during the operation and remediation phases – a timeline upwards of 60 years. The prediction of short-term impacts in the face of the long-term operations of the project is incongruous. For example, the generation time of mammal indicators is 7-16 years for long-lived species like caribou and grizzly bears, and < 7 years for smaller, furbearing species like marten (Pacifici et al. 2013). Given a project lifespan projected to be >60 years, this means that local wildlife populations will be affected by this project for 3-10 generations. Scaled to the length of a human generation, this is equivalent to a persistent impact since the year 1817 (marten), 1858 (caribou), or 1940 (grizzly bear). Multi-generational impacts associated with habitat loss, heightened mortality, and decreased movement as a result of this project are therefore not short term at scales relevant to the population biology of wildlife indicators.

Request:

a) Please clearly state the anticipated duration of effects on wildlife of construction, operation, maintenance, and vegetation maintenance.

b) Please list the impacts of all project phases on mammal indicators described in Vol 5A, Biophysical Section 7.2.10.

c) Please describe how the long-term effect of project operations, prior to decommissioning, will impact the population sizes and distributions of mammal indicators listed in Vol 5A, Biophysical Section 7.2.10.

Response:

a) Following the methods in Section 7.1.4 of Volume 5A (Filing ID A3S1Q9), duration is defined as the period of the event causing the effect and short-term duration is defined as an event that occurs during the construction phase or is completed within any 1 year during the operations phase. The events causing effects on wildlife are those associated with construction and operations, which cause habitat alteration (e.g., vegetation clearing, grading, water crossings), noise, light, and human and motorized activity (e.g., traffic, equipment). Construction and operational activities (e.g., monitoring, vegetation management and site-specific maintenance) are not continuous, and are considered separate events. Operational activites are comprised of events that are assumed to be completed within any 1 year during operations. Therefore, the duration of the events causing Project effects on wildlife is rated as short-term.

As defined in Section 7.1.4 of Volume 5A (Filing ID A3S1Q9), reversibility refers to the period of time over which the residual effect extends, which encompasses the timeframe starting when the effect begins and ending when the effect is no longer detectable. For many wildlife species, in particular those with relatively long lifespans and generation times, and for species reliant on mature or old forest habitat, the residual effects of the Project will extend beyond the operations phase, and for decades following the reclamation of the Project Footprint upon decommissioning or abandonment, until earlier seral stage ecosystems that resulted from vegetation clearing are given enough time to develop the necessary stand complexity and features of older seral stage forests. Using the assessment criteria definitions in Section 7.1.4 of Volume 5A (Filing ID A3S1Q9), effects that extend beyond 10 years but are not permanent, are long-term reversibility.

For additional detail on the timeframe associated with the potential effects of the Project on wildlife indicators, refer to Section 7.2.10 in Volume 5A (Filing ID A3S1Q9).

b) Project construction and operations activities as well as decommissioning or abandonment activities, have the potential to directly and indirectly affect the mammal indicators through changes in wildlife habitat, movement and mortality risk. These effects mechanisms or “pathways” define the potential effects identified for the mammal indicators for the Project:

- change in habitat;
- change in movement; and
- and increased mortality risk.

These three effects pathways are related and interact to have combined effects on the mammal indicators (refer to response to NEB IR No. 2.033, Filing ID A3Z4T9). Each effect pathway is described in detail, with reference to potential Project interactions and relevant literature, in Section 7.2.10.5 of Volume 5A (Filing ID A3S1Q9).

The potential effects of the Project on mammal indicators will be reduced with the implementation of the proposed mitigation in Section 7.2.10.6 of Volume 5A (Filing ID A3S1Q9). Although the proposed mitigation is expected to reduce the magnitude of the potential effects of the Project on the mammal indicators, the mitigation is not expected to completely alleviate the potential effects of the Project. Potential residual effects are the effects of the Project that remain after the implementation of mitigation.

Section 7.2.10.9, Volume 5A (Filing ID A3S1Q9) provides a detailed discussion of the potential Project interactions with the mammal indicators, and how those interactions will affect mammal habitat, movement and mortality risk. A summary of the main Project interactions relevant to each effect pathway (*i.e.,* change in habitat, movement and mortality risk) is provided in Table 2.05.4b-1 for each Project phase, including construction, operations, and decommissioning or abandonment.

TABLE 2.05.4B-1

SUMMARY OF PROJECT INTERACTION WITH MAMMAL INDICATORS CAUSING RESIDUAL EFFECTS ON HABITAT, MOVEMENT AND MORTALITY RISK

Project Activities	Residual Effect	Project Interaction Causing Effect	Grizzly Bear	Woodland Caribou	Moose	Forest Furbearers	Coastal Riparian Small Mammals	Bats
CONSTRUCTION PHASE [1]								
• Vegetation clearing in forest, riparian, wetland, aquatic, grassland, and shrub habitats. • Grubbing, grading and soil handling. • Strung pipe and open trench. • Traffic, equipment operation, human activity.	Combined Project effects resulting from habitat loss or alteration, changes in movement and increased mortality risk.	Loss of effective habitat, including cover, thermal, foraging or dispersal habitat	✓	✓	✓	✓	✓	✓
		Loss or alteration of critical habitat[3]		✓			✓	
		Disturbance of site-specific habitat features	✓		✓	✓	✓	✓
		Loss of coarse woody debris	✓			✓	✓	
		Soil compaction					✓	
		Fragmentation of habitat patches	✓		✓	✓	✓	✓
		Creation of edge habitat	✓		✓	✓	✓	✓
		Sensory disturbance and potential temporary displacement to less suitable habitat	✓	✓	✓	✓	✓	✓
		Barriers to movement (*e.g.,* strung pipe, open trench, soil, slash or snow piles)	✓	✓	✓	✓	✓	
		Increased access for humans and predators	✓	✓	✓	✓	✓	
		Human-wildlife conflict (*e.g.,* vehicle collisions, attraction of wildlife to active construction work or camp sites)	✓	✓	✓	✓	✓	
OPERATIONS PHASE [1]								
• Vegetation clearing and maintenance of the right-of-way to low, early seral vegetation (including periodic mowing of regenerating vegetation). • Operation of facilities, including the pipeline, pump stations, powerlines, tanks, and the expanded Westridge Marine Terminal. Periodic maintenance activities such as in-line testing or digs.	Combined Project effects resulting from habitat loss or alteration, changes in movement and increased mortality risk.	Long-term maintenance of early seral vegetation	✓	✓	✓	✓	✓	✓
		Disturbance of critical habitat[3]		✓			✓	
		Disturbance of site-specific habitat features			✓		✓	
		Soil compaction					✓	
		Sensory disturbance and potential displacement	✓	✓	✓	✓	✓	✓
		Filters to movement (*e.g.,* hesitance to cross open habitat within right-of-way)	✓	✓	✓	✓	✓	
		Attraction of wildlife to the right-of-way (*e.g.,* for forage or easy movement) and potential change in predator-prey dynamics or increased mortality risk	✓	✓	✓	✓	✓	✓
		Increased access for humans and predators, and potential increased mortality risk	✓	✓	✓	✓	✓	
		Human-wildlife conflict (*e.g.,* vehicle collisions, attraction of wildlife to facilities)	✓	✓	✓	✓	✓	

TABLE 2.05.4B-1

SUMMARY OF PROJECT INTERACTION WITH MAMMAL INDICATORS CAUSING RESIDUAL EFFECTS ON HABITAT, MOVEMENT AND MORTALITY RISK (continued)

Project Activities	Residual Effect	Project Interaction Causing Effect	Grizzly Bear	Woodland Caribou	Moose	Forest Furbearers	Coastal Riparian Small Mammals	Bats
DECOMMISSIONING OR ABANDONMENT PHASE[2]								
• Vegetation clearing, traffic, equipment operation, and human activity.	Combined Project effects resulting from habitat loss or alteration, changes in movement and increased mortality risk.	Loss of effective habitat, including cover, thermal, foraging or dispersal habitat	✓	✓	✓	✓	✓	✓
		Disturbance of site-specific habitat features			✓		✓	
		Loss of coarse woody debris	✓			✓	✓	
		Soil compaction					✓	
		Sensory disturbance and potential displacement	✓	✓	✓	✓	✓	✓
		Barriers to movement (*e.g.,* strung pipe, open trench, soil, slash or snow piles)	✓	✓	✓	✓	✓	
		Increased access for humans and predators	✓	✓	✓	✓	✓	
		Human-wildlife conflict (*e.g.,* vehicle collisions, attraction of wildlife to active work or camp sites)	✓	✓	✓	✓	✓	

Notes:

1 Refer to Section 2.0 of Volume 5A for a description of each Project phase (Filing ID A3S1L3).

2 Methods used for decommissioning or abandonment are difficult to predict given the expected operation lifetime of the Project, and are likely to change depending on the state of the body of scientific literature and accepted industry standards at the time of decommissioning or abandonment. Where deactivation and removal of Project infrastructure may be required, the effect mechanisms are expected to be similar to those during construction. However, it is expected that most of the pipeline will be abandoned in-place (refer to Section 7.8 of Volume 5A [Filing ID A3S1R0]). Therefore, the spatial extent of residual effects and potential impacts to mammal indicators during the decommissioning or abandonment phase is expected to be greatly reduced relative to the construction phase.

3 Project interaction with critical habitat is determined based on currently available information for critical habitat (including candidate critical habitat). Trans Mountain understands from the information provided in recovery strategies and through consultation with Environment Canada that critical habitat mapping for some species is likely to change. Confirmation of the occurrence of biophysical attributes of critical habitat may also affect the identification of Project interaction with critical habitat presented in this table.

c) As described in Section 7.2.10.9 of Volume 5A (Filing ID A3S1Q9), the Project parallels existing disturbances for most of its length and is not predicted to impede wildlife movement to such a degree that wildlife populations become isolated. Some individuals may locally alter their territories in response to the Project, leading to a small spatial shift in local population distribution. However, other individuals may not and may integrate it into their territories, or use the habitat in a different manner than prior to construction and operation of the Project. Additionally, large portions of the Project will be constructed within zones of influence that already exist adjacent to existing disturbance features (e.g., those portions of the Project that parallel highways). These existing disturbances are likely reducing habitat use by wildlife to varying degrees, independent of the Project. Further information on zones of influence is provided in the GoC EC IR No. 2.041a. Considering these factors, the Project is unlikely to measurably alter wildlife population distribution.

Many of the key effects associated with linear developments will be avoided due to the Project paralleling existing disturbance for most of its length, and planning construction to minimize new disturbance and fragmentation. The predicted residual effects of the Project will be reduced through implementation of appropriate mitigation to ensure that the combined effects of habitat loss or alteration, changes in movement patterns, and mortality risk do not have a measurable effect on wildlife population sizes at the local and regional scales. The magnitude of the combined residual effects is predicted to be low for most mammal indicators, but is predicted to be medium for those that are more sensitive and/or given the ecological and regulatory context associated with them (e.g., conservation status; refer to Volume 5A, Section 7.2.10.9 [Filing ID A3S1Q9] and Volume 5A, Section 8.9.6 [Filing ID A3S1R2]). However, with implementation of the proposed mitigation (Volume 5A, Section 7.2.10.6 [Filing ID A3S1Q9]), including continued consultation with provincial and federal regulatory agencies to develop and implement mitigation that aligns with regulatory requirements, the long-term residual effect of the Project is not predicted to affect any of the mammal indicator populations such that population viability is threatened or that stated or management objectives cannot be attained as a result of the Project. In other words, the Project is not expected to have a measurable effect on wildlife population sizes within the Wildlife RSA.

2.05.5 Undefined mitigation measures for species at risk

Reference:

Trans Mountain, Volume 5A Sections 8.9.6.4 page 8-152, Section 8.9.7.3 page 8-160; Trans Mountain response to ALIB IR No. 1.5.5 and 1.5.8

Preamble:

TM stated in their responses to ALIB that they are continuing consultation with the British Columbia Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO) to discuss mitigation and field surveying for Spotted Owl habitat, Williamson's sapsucker, and Lewis's woodpecker. TM further stated that they are consulting with Environment Canada on Woodland caribou. According to TM, the information made available in these meetings forms the basis for their rationale to predict a 'medium' impact on these indicator species. However, the information made available to the ALIB in Volume 5A suggests that the proposed Project is inconsistent with existing management policies for these species. For example, the pipeline route intersects critical habitat for these species and CEAA (2009) states that "it is insufficient to assert that implementation of an unidentified future measure, developed as a result of adaptive management, constitutes mitigation of a predicted adverse environmental effect." Currently, Trans Mountain has not sufficiently identified how it will mitigate the effects of this project on individual species-at-risk.

Request:

a) Please provide detailed summary of the consultations with Environment Canada regarding proposed mitigation measures for woodland caribou.

b) Given the stated consultations between TM and BC MFLNRO regarding mitigation for species-at-risk, and that BC MFLNRO has provided direction on mitigation plans, species-specific mitigation plans for SAR should be available now. Please provide to the ALIB for review.

c) Given that TM is relying on mitigation that has been used on previous projects within spotted owl habitat as a basis for their impact conclusions, TM is requested to provide the scientifically-based evidence that the mitigation used for the previous projects are effective in minimizing impacts to spotted owl.

Response:

a) A summary of consultation related to wildlife and wildlife habitat is provided in Table 2.2.1 of the Technical Report 5C-10 in Volume 5C, Wildlife Technical Report (TERA Environmental Consultants 2013, Filing ID A3S2Q3) and in Table 2.2.1 of the Supplemental Wildlife Technical Report (refer to the attachment to the response to GoC EC IR No. 2.034a [Filing ID A4H6C8]). Consultation with Environment Canada related to caribou is ongoing. Key meetings conducted to date are listed below:

Oct 30, 2013 (Meeting in Delta, BC): At this meeting the proposed pipeline route was shown using immersive video. The routing within caribou range was reviewed, and it

was noted that routing is one of the primary mitigation mechanisms for avoiding or reducing Project effects on wildlife. The proposed route is located in a transportation corridor adjacent to existing linear disturbances in the Wells Gray and Groundhog caribou ranges, and is preferred over an alternate route that attempts to avoid caribou range.

July 3, 2014 (Meeting in Delta, BC): Discussion related to critical habitat for all species with identified biophysical attributes and recovery planning; and mitigation measures to reduce potential impacts such as routing.

Oct 10, 2014 (Meeting in Vancouver, BC): This meeting was specific to caribou and the purpose was to address questions from Environment Canada. It was noted that since the Application was filed, the proposed revised route in the Groundhog caribou range is approximately 4.9 km shorter than the originally proposed alignment, and avoids the creation of the 1.6 km of new linear disturbance (*i.e.,* new cut) that was required for the previously proposed alignment (see the response to NEB IR No. 1.43 [Filing ID A3W9H8]). The revised route within the Groundhog caribou range is approximately 4.2 km in length, and is 100% parallel to the existing Trans Mountain Pipeline (TMPL), which follows the same transportation corridor as Highway 5. The meeting also discussed the release of the *Recovery Strategy for the Woodland Caribou, Southern Mountain Population* (*Rangifer tarandus caribou*) *in Canada* (Environment Canada 2014). Other discussion topics included the assessment approach to caribou; routing; mitigation tools available (such as line-of-sight); and activities in relation to critical habitat for caribou. Environment Canada encouraged discussions with BC Ministry of Lands, Forests and Natural Resources Operations (MFLNRO) related to ongoing mitigation and preparation of caribou-related planning (*i.e.,* NEB's Draft Condition 10) (NEB 2014, Filing ID A3V8Z8).

References:

Environment Canada. 2014. Recovery Strategy for the Woodland Caribou, Southern Mountain Population (*Rangifer tarandus caribou*) in Canada. Species at Risk Act Recovery Strategy Series. Ottawa, ON. 103 pp.

National Energy Board. 2014. Draft Conditions and Regulatory Oversight. Hearing Order OH-001-2014. Trans Mountain Pipeline ULC (Trans Mountain) Application for the Trans Mountain Expansion Project (Project). April 16, 2014.

b) Species-specific mitigation plans are in development and are not ready at this time for review. As suggested in NEB Draft Condition 9 of the NEB's *Letter – Draft Conditions and Regulatory Oversight (April 16, 2014)* (NEB 2014) (Filing ID A3V8Z8), a preliminary Caribou Habitat Restoration Plan (CHRP) will be filed with the National Energy Board (NEB) at least six months prior to commencing construction. Trans Mountain has committed to filing a Spotted Owl Mitigation Plan with the NEB at least six months prior to commencing construction (refer to the response to NEB IR No. 1.46c [Filing ID A3W9H8]), and filing mitigation plans for Pacific water shrew, Townsend's mole, coastal giant salamander, Lewis's woodpecker and Williamson's sapsucker at least four months

prior to commencing construction (refer to the responses to NEB F-IR Nos. 1.44c [Filing ID A3Z4T3], 1.44d [Filing ID A3Z4T4], 1.45c [Filing ID A3Z4T6] and 1.47c [Filing ID A3Z4T7]).

Trans Mountain is currently working on these plans in consultation with BC Ministry of Lands, Forests and Natural Resource Operations and will provide to ALIB for review once a Draft is complete.

Reference:

National Energy Board. 2014. Draft Conditions and Regulatory Oversight. Hearing Order OH-001-2014. Trans Mountain Pipeline ULC (Trans Mountain) Application for the Trans Mountain Expansion Project (Project). April 16, 2014.

c) The development of the mitigation measures for spotted owl is ongoing and is being completed in consultation with BC Ministry of Forests, Lands and Natural Resources Operations (MFLNRO's) Spotted Owl Recovery Coordinator, who will review the measures and modify based on their knowledge and experience. The measures will also be based on the provincial best management practices for managing spotted owl habitat (Blackburn *et al.* 2009). The Spotted Owl Mitigation Plan will be filed with the National Energy Board (NEB) 6 months prior to commencing construction within the Sowaqua spotted owl wildlife habitat area (WHA). Since development of mitigation and offsets will be completed in consultation and under the guidance of BC MFLNRO's Spotted Owl Recovery Coordinator, the measures will align with provincial recovery and management objectives. Therefore, the residual effect of the Project is expected to be within regulatory and environmental standards (*i.e.,* medium magnitude).

Reference:

Blackburn, I., B. D'Anjou, J. Fisher, C. Galliazzo, J. Jonker, A. Peter and L. Waterhouse. 2009. Best Management Practices for Managing Spotted Owl Habitat. A Component of the Spotted Owl Management Plan 2. Chilliwack Forest District. Squamish Forest District. Prepared for BC Ministry of Environment and Ministry of Forests and Range.

Summary of New Commitments:

- Trans Mountain will provide Draft species-specific mitigation plans to Adams Lake Indian Band (ALIB) for review.

2.06.0 MONITORING AND FOLLOW-UP ROUND 2 IRS

2.06.1 Demonstrate effectiveness of mitigation

Reference:

Trans Mountain Response to ALIB IR No. 1 – 1.6.01

Preamble:

As TM is clearly aware, monitoring and follow-up programs are critically important in order to determine whether project-related and cumulative impacts have been effectively mitigated, regardless of the predictions from the impact analyses. Having comprehensive monitoring programs in place helps hedge against uncertainty, especially regarding effectiveness of mitigation measures. Relying solely on compliance monitoring is not an appropriate approach to evaluating the effectiveness of mitigation measures as outlined in the CEAA Policy on Follow-up Programs (CEA Agency 2011). TM states that effectiveness of mitigation measures have been demonstrated through construction of other pipelines but TM presents no concrete examples or demonstrations of effectiveness other than a preliminary report for the TMX Anchor Loop Project. This report does not provide evidence of success beyond a single year of monitoring (see IR 6.7 below). TM does state that the baseline data and field information gathered for the proposed Project "*provides a benchmark for Post-Construction Environmental Monitoring Programs*." (pg 106) This is a good intention, but requires that TM acquire high quality, quantitative baseline data to act as the "*benchmark*". ALIB has expressed concerns throughout the EA review process that TM has not collected appropriate baseline data to be used as benchmark for monitoring programs (see IRs 2.2, 2.3, 2.4, 3.2, 3.3, 3.5, 3.6, 3.15, 3.16, 5.2 above).

Request:

a) Please provide detailed methodology for how the baseline and field data collected by TM to date will be quantitatively used as a benchmark and compared to data collected in the PCEM programs in order to assess effectiveness of mitigation measures.

b) In order to demonstrate to ALIB how the PCEM program will work, please consider providing a theoretical example using the methodology outlined in 6.1a) above for fisheries, wetlands, wildlife, or reclamation data.

c) Please provide benchmarks and targets for VECs of key concern to ALIB against which future monitoring results could be compared so as to concretely indicate to ALIB that residual impacts to traditional resources and lands are at or below predicted levels.

Response:

a) Most mitigation measures proposed for the Project are industry accepted best practices and have been used in many similar pipeline projects in western Canada. In general, mitigation measures will be considered to have been successful if the objectives of the post-construction monitoring program are met (refer to Volume 6A, Section 9.0 Filing ID A3S2S1).

Trans Mountain notes that ALIB asked a similar question regarding quantifiably measuring mitigation effectiveness in the first round of Information Requests and a response was provided (refer to Trans Mountain's response to ALIB IR No. 1.6.09a [Filing ID A60781]). Trans Mountain also notes that the National Energy Board denied ALIB's motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H5). Accordingly, Trans Mountain provides no further response.

b) Data collected for all biophysical disciplines (*e.g.*, wetland habitat and hydrological function data, watercourse crossing measurements) and photographs of sensitive areas will be used as an indication of the baseline state of the environment during the post-construction environmental monitoring program. However, areas disturbed by the construction of the Project will not necessarily be monitored until they are identical to pre-construction conditions. Rather, they will be monitored until a satisfactory trajectory is established, and environmental issues such as sedimentation and weeds have been resolved, within the confines of operational requirements (refer to response to ALIB IR No. 2.06.6e for more information). More detailed information about the state of the environment prior to construction would not necessarily improve the post-construction monitoring program or reclamation practices.

Example: Wetlands

At all wetlands observed during the 2012 and 2013 helicopter overflights, the following information was collected for wetlands crossed by the proposed pipeline corridor, where possible.

- Wetlands were geo-referenced using GPS (UTM) and legal location and sketches were prepared.
- Wetlands were photo documented and any existing alterations either on or adjacent to the site were noted.
- Wetlands were classified depending on vegetation, hydrology and soils present, and signs of modification (*e.g.*, beaver and/or human) were documented.

At all wetlands where access was available during the 2012, 2013 and 2014 ground-based wetland surveys, the following information was collected: habitat, hydrological and biogeochemical function.

The hydrological function of wetlands is dependent on several factors. The source and movement of water can indicate the type of wetland as well as its importance to surrounding waterbodies and wetlands. For the purpose of this wetland evaluation during the collection of existing data, comments were made regarding surface water presence, movement and depth.

The habitat function of wetlands can be determined based on several factors that can be documented in the field. For this wetland evaluation, the existing data for the following parameters was collected: presence of vegetation indicator species and/or communities; wildlife observations; and habitat suitability.

Biogeochemical cycling includes the transport and transformation of chemicals through physical, chemical and biological processes. Wetland biogeochemical function can be defined as material inflows (sink), outflows (source) and intrasystem cycling. Biogeochemical characteristics, such as litter quality, soil moisture regime, as well as standing or open water turbidity, were identified.

The information collected/observed in the field was then applied to wetland landscape functional assessment and it is this assessment, based on ocular observations, photo documentation, field observations including but not limited to vegetation coverage information (*e.g.*, species list and percent cover) that provides a quantitative outcome (*i.e.,* functional condition score). Information on the criteria used to obtain quantitative outcomes for the wetland landscape functional assessment is provided in the response to NEB IR No. 2.051a (Filing ID A3Z4T9). This functional assessment produces a quantifiable measurement of wetland function through a ranking system. The total ranking of a particular wetland yields its functional condition category and its ranking percentage. The results of the functional assessment are reported on the premise that disturbed wetlands would be revisited in the years following construction to document the progress of function returning to the wetland system after pipeline construction. Wetland function documented during the existing (*i.e.*, pre-construction) condition ground-based wetland surveys will be compared to wetland function observed along the reclaimed (*i.e.*, post-construction) construction right-of-way. The results of this comparison will be used to measure the effectiveness and efficiency of mitigation and reclamation measures, to ensure that wetlands are on the trajectory to returning to pre-construction functional condition and provide support to the determination of loss or "no net loss" of wetland function. The wetland function ranking system is also fully described in the Preliminary Wetland Compensation Plan (Filing ID A3Z4V3).

Refer to the responses to ALIB IR No. 2.06.1a, 2.06.6c, and 2.06.6k for more details on post-construction environmental monitoring.

c) Refer to the responses to ALIB IR No. 2.06.1a, 2.06.6a, and 2.06.6e.

2.06.2 Adaptive environmental management threshold and options

Reference:

Trans Mountain Response to ALIB IR No. 1 – 1.6.02

Preamble:

ALIB continues to seek information and clarity about TM's stated plans for adaptive management throughout all Project phases because having proven adaptive management programs in place is critical in order to alleviate unintended or unexpected project effects. The Contingency Plans provided by TM were reviewed by MSES and ALIB but are too vague to be concretely assessed for adequacy. TM has not yet provided concrete information on how and when adaptive management measures will be designed and what the triggers and corrective actions might be in order to safely and adequately respond to ineffective mitigation measures. This is a particularly urgent gap.

Request:

a) Please clearly list how TM will satisfy CEAA (2009) policy on Adaptive Management.

b) Adaptive action thresholds will vary depending on the issue and biophysical element being considered; please list action thresholds for key ALIB environmental parameters (such as salmonid populations).

c) Please also provide information on how these action thresholds were determined for each biophysical element.

d) If action thresholds have not yet been determined please provide information on how and when these action thresholds will be determined for each biophysical element.

e) TM places confidence in their PCEM programs by stating that results will be able to "*identify the cause of the issue*". Please clearly explain, using examples for key issues or biophysical elements that are important to ALIB, how the PCEM programs will be able to "*identify the cause of the issue*".

f) Please explain the actions that could be taken by TM should the cause of an environmental issue remain unknown.

Response:

a) The *Operational Policy Statement for Adaptive Management Measures under the Canadian Environmental Assessment Act* (Canadian Environmental Assessment Agency, 2009) was published prior to the changes to the *Canadian Environmental Assessment Act, 2012*. The Application for the Project fulfills the requirements of the *Canadian Environmental Assessment Act, 2012* through meeting the requirements of the National Energy Board *Filing Manual* (NEB 2014) in regards to adaptive management.

Trans Mountain notes that ALIB asked a similar question regarding adaptive management in the first round of Information Requests and a response was provided (refer to response to ALIB IR No. 1.06.2 [Filing ID A60781]). Trans Mountain also notes that the National Energy Board denied ALIB's motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H5). Trans Mountain will not be providing further information on this question.

References:

Canadian Environmental Assessment Agency. 2009. Operational Policy Statement for Adaptive Management Measures under the Canadian Environmental Assessment Act. Calgary, AB.

National Energy Board. 2014. Filing Manual. Inclusive of Release 2014-03 (November 2014). Calgary, AB.

b) Environmental Inspectors will be onsite during construction and qualified resource specialists will be conducting post-construction environmental monitoring to determine if any additional action is needed to prevent or mitigate environmental effects. If potential environmental issues arise, the Environmental Inspectors and resource specialists will determine if additional mitigation is warranted and if so, the mitigation or reclamation measures to be implemented. Where available, published guidelines and regulatory guidance will also be used to determine if additional mitigation is needed (*e.g.*, the Canadian Water Quality Guidelines for the Protection of Aquatic Life [Canadian Council of Ministers of the Environment 2007]). Due to the nature of construction and the natural variability of the environment along the proposed pipeline corridor, pre-determined thresholds for implementation of additional mitigation cannot be determined. Refer to response to ALIB IR No. 2.06.2a.

Reference:

Canadian Council of Ministers of the Environment. 2007. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Table. Updated in December 2007 from the Canadian Environmental Quality Guidelines, 1999. Canadian Council of Ministers of the Environment. Winnipeg, MB.

c) Refer to the responses to ALIB IR No. 2.06.2a and 2.06.2b.

d) Refer to the responses to ALIB IR No. 2.06.2a and 2.06.2b.

e) Environmental issues identified during post-construction environmental monitoring (PCEM) will be compared to potential issues identified during experience on previous projects (for examples, please see the response to ALIB IR No. 1.6.09a, Filing ID A3X5V6). Potential environmental issues that are likely to be identified during PCEM, such as poor revegetation of the right-of-way, erosion of the bed and banks of a watercourse crossing or impaired wetland function can be linked to Project construction activities and effectively mitigated. Qualified resource specialists will be retained to complete monitoring to ensure recent industry experience and specialized knowledge of

how environmental effects occur to wildlife, wetlands, fish and fish habitat, etc. is captured during PCEM.

f) Environmental issues will be addressed and mitigated until reclamation is considered satisfactory (refer to the responses to ALIB IR No. 2.06.6a and 2.06.6e). If an environmental issue is not responsive to mitigation or continues to occur, further research will be conducted to identify the underlying cause. In the event that construction-related issues persist past five years of monitoring, post-construction monitoring will continue until remediation measures are considered to be effective and issues are resolved.

2.06.3 Commitment to understand ALIB concerns and needs lacking

Reference:

Trans Mountain Response to ALIB IR No. 1 – 1.6.03

Preamble:

TM states that "*Although some of the residual effects are long term, it does not preclude the ALIB from using the land for traditional subsistence purposes*" (pg. 109) and that they "*do not believe it would be necessary for ALIB to suspend their traditional land use activities in parts of their traditional territory for many decades as the result of the Project*." (pg. 109). TM should substantiate both of these statements with evidence. Overall, statements such as these indicate a glaring lack of understanding by TM of Aboriginal land use activities and resource use needs. TM states that they will continue to engage Aboriginal communities through all phases of the Project and that they are interested in incorporating site-specific concerns in project planning. However, concrete engagement commitments with ALIB have yet to be made and consideration of only site-specific mitigation measures is inadequate to allow for continued traditional resource and land use by ALIB community members.

Request:

a) Please explain the process of how TM has developed their stated understanding of what ALIB requires in order to exercise their traditional rights now and in the future.

b) Please substantiate using concrete evidence the statement that "*Although some of the residual effects are long term, it does not preclude the ALIB from using the land for traditional subsistence purposes.*" (pg. 109).

c) Please demonstrate how TM plans to take advantage of the opportunities at this stage of Project development to:

   i. develop an understanding of ALIB community concerns;
   ii. meaningfully address ALIB concerns;
   iii. provide the information requested by ALIB.

Response:

a) Baseline information gathered through the Aboriginal Engagement Program in Volume 3B (Filing IDs A3S0U5 to A3S0U11) is used for assessment of potential adverse effects as a result of the Project and since April 2012, Trans Mountain has engaged with Aboriginal communities that may be affected by the Project or that may have an interest in the Project based on the proximity of their community, and their assertion of Aboriginal rights and title governing traditional and cultural use of the land along the proposed pipeline corridor to maintain a traditional lifestyle (Volume 5A; Filing IDs A3S1L2 to A3S1R3). The goals of engagement with Aboriginal communities are to share information to assist in their understanding of the Project, to provide opportunities to raise and understand any concerns and interests, and to discuss how these may be

appropriately addressed by Trans Mountain. Please refer to ALIB IR No. 2.08.04 for details regarding the studies that Adams Lake Indian Band was invited to participate in.

As provided in Table 7.2.2-4 of Volume 5B (Filing ID A3S1S7) and in the Environmental Protection Plans (EPPs) for the pipeline and facilities (Volumes 6B and 6C of the Application; Filing IDs A3S2S2, A3S2S3, A3S2S4, A3S2S5, A3S2S6, and A3S2S7),Trans Mountain will implement a comprehensive suite of mitigation measures to reduce the effects of the Project on the environment and in turn, on the use of those lands by others, including the TLRU locations identified by ALIB (Table 2.06.3a-1).

TABLE 2.06.3A-1

TLRU LOCATIONS IDENTIFIED BY ADAMS LAKE INDIAN BAND

Site Description	Age
Fisheries where the Fraser River and the South Thompson River drain into the ocean.	Current
Fisheries and fishing along the South Thompson River	Current
Trails and travelways along the Adams River to Adams Lake, along the South Thompson River, all the way up to Tum Tum, over the mountain to Shuswap Lake.	Past
Sacred area – Samadusa Mountain	Current
Sacred area – Sloco Mountain	Current
Plant gathering in the vicinity of Indian Point	Current
Fishing for salmon in Adams River	Current
Fishing in Adams Lake	Current
Old village site at Wildwood (on private land now)	Past
Reserve lands in the Adams Lake Valley	Current
Historic gathering place at Green Lake	Past
Current annual gathering place at Sepwepemc Mountain	Current
Fishing at Star Lake	Past
Fishing at Aylmer Lake	Past
Pictographs in Adams Lake Valley	Current
Camping at Adams Lake	Current
Special ochre in Adams Lake Valley	Current
Historic village sites at MacLeod Point on Adams Lake	Past
Fishing in the Columbia Valley	Past
Plant gathering in the Columbia Valley	Past
Hunting in the Columbia Valley	Past
Quesnel Lake – nursery lake for salmon	Current
Small nursery lake for salmon	Current
Hunting in the Castlegar region	Past
Fishing at Canoe Creek	Current
Fishing at Farwell Canyon	Current

As such, although some of the residual effects are long term, it does not preclude participating First Nations using the land for traditional subsistence purposes. Accordingly, Trans Mountain has facilitated Traditional Land Use (TLU) studies and

Traditional Ecological Knowledge (TEK) studies with Aboriginal communities to assist in assessing the potential impacts of the Project on Aboriginal interests and generally inform the Environmental and Socio-Economic Assessments. The methodology used to assess potential adverse effects of the Project on valued components supporting the exercise of Aboriginal rights and interests can be found in Section 7.0 of Volumes 5A and 5B of the Application (Filing IDs A3S1Q9, A3S1R0, A3S1S7, and A3S1S8). This assessment considers: the potential environmental and socio-economic effects of the Project; ways in which these effects can be minimized or avoided altogether; and key mitigation strategies in place that will further reduce these effects.

Trans Mountain respects the Aboriginal and treaty rights, unique culture, diversity, languages, and traditions of Aboriginal peoples. Trans Mountain acknowledges the importance of teaching, the significance of culture and language, and the considerable traditional knowledge that has been passed on for generations. As such, Trans Mountain will continue engagement with Aboriginal communities to provide updates on the status of the Project and discuss proposed mitigation and enhancement measures. Information updates will continue to be sent to Aboriginal communities. Trans Mountain is committed to the continuation of an effective engagement program that satisfies all parties (Volume 5B, Section 3.2.4; Filing ID A3S1R5).

b) Refer to the response to ALIB IR No. 2.03.3a.

c) Adams Lake Indian Band provided field participants on biophysical field studies for the Project as indicated in Appendix A-2-15 of Consultation Update No. 1 and Errata (Filing ID A3V3L9). However, Adams Lake Indian Band elected not to share TEK with TERA facilitators for the purpose of the Project. Traditional land and resource (TLRU) information pertaining to Adams Lake Indian Band was not submitted to Trans Mountain to contribute to the overall effects assessment for the Project. However, Adams Lake Indian Band presented evidence on November 17, 2014 during the Aboriginal Oral Traditional Evidence Hearings for the Project, which will be incorporated into Project planning.

Trans Mountain will continue engagement with Aboriginal groups to provide updates on the status of the Project and discuss proposed mitigation and enhancement measures. Additional traditional resource use information received from participating Aboriginal groups will also be reviewed in order to confirm literature results and mitigation measures including those found in the Environmental Protection Plans (Volume 6B [Filing IDs A3S2S2, A3S2S3 and A3S2S4], Volume 6C [Filing IDs A3S2S5, A3S2S6 and A3S2S7] and Volume 6D [A3S2S8 and A3S2S9]) will be implemented. Any additional site-specific mitigation measures resulting from these studies will be provided in the updated Environmental Protection Plans to be filed with the NEB 90 days prior to construction as per NEB Draft Conditions No. 29 to 31 of the NEB's Letter – Draft Conditions and Regulatory Oversight (Filing ID A3V8Z8).Trans Mountain is committed to the continuation of an effective engagement program that satisfies all parties (Volume 5B, Section 3.2.4; Filing ID A3S1R5).

2.06.4 ALIB ability and capacity to have input into project beyond employment unclear

Reference:

Trans Mountain Response to ALIB IR No. 1 – 1.6.04

Preamble:

In response to questions regarding ALIB's requested involvement in monitoring and adaptive management programs, TM states that Aboriginal individuals or groups will play a role as environmental monitors during construction. However, ALIB is not seeking information about employment opportunities; ALIB needs TM to explain potential involvement of ALIB, beyond employment or business opportunities. For the design and implementation of adaptive management strategies and monitoring programs restricting Aboriginal input to just using Aboriginal monitors is not appropriate.

Request:

Please explain concretely, not conceptually, how ALIB would be involved through all phases of the design and implementation of monitoring and follow-up programs (excluding employment or business opportunities).

Response:

Trans Mountain's Aboriginal Engagement Program allows for engagement with Aboriginal groups prior to, leading up to and post-construction and Trans Mountain welcomes the opportunity to discuss the interests of ALIB in regard to monitoring. Once finalized, Trans Mountain will meet with Aboriginal groups as requested to discuss the Environmental Protection Plans (EPP) and the application of the Environmental Alignment Sheets for construction. If environmental questions or concerns are identified by the Aboriginal group, a plan will be developed and mutually agreed upon between the Aboriginal group and Trans Mountain regarding the methods to address the specific questions or concerns. An engagement timeline for addressing questions or concerns may be established and a framework in which the questions or concerns are documented, schedules for activities are communicated; and, monitoring roles, responsibilities and plans are defined.

Through the Aboriginal Engagement Program, Trans Mountain will maintain participation and a communication structure throughout construction, reclamation and post construction phases to ensure satisfactory involvement.

2.06.5 Commitments for consultation with ALIB

Reference:

Trans Mountain Response to ALIB IR No. 1 – 1.6.04

Preamble:

TM makes numerous statements and conceptual commitments regarding consultation with First Nations on various initiatives. For example TM states that "*the Construction Monitoring and Inspection plan, which will include consultation with affected Nations, is currently under development and will be completed by the spring of 2015.*" (pg. 111) TM also states that they are "*…committed to engaging First Nations in locations along the right of way in the ongoing emergency response programs and Pipeline monitoring*" (pg. 111) and that they "*…welcomes the opportunity to hear from Adams Lake Indian Band in this regard*." (pg. 111)

Request:

a) Please provide a comprehensive list of all plans, programs, and initiatives that TM intends to consult with ALIB on.

b) Please provide associated timelines for the activities listed in 6.5a) above.

c) Please list the total amount of funding committed to ALIB for participation in each of these initiatives listed in 6.5a) above.

d) Please provide an update on consultation activities with ALIB for the draft Construction Monitoring and Inspection Plan.

e) Please provide an update on consultation activities with ALIB for the draft Emergency Response Programs.

f) Please provide an update on consultation activities with ALIB for the draft Monitoring Programs and any other plans that involve consultation with First Nations.

g) Will TM commit to developing a concrete community engagement plan to work with ALIB throughout the life of the proposed Project including commitment to provide necessary information and capacity to allow ALIB to continue their engagement and to go beyond the input that they have already provided in the course of the IRs.

h) Please state whether capacity will be provided to ALIB by TM in order to meaningfully engage in the consultation process.

i) If no capacity will be provided, please explain how TM expects ALIB to be able to participate in meetings or retain technical experts in the absence of funding?

Response:

a) Trans Mountain has embarked on an extensive program to engage Aboriginal communities and will continue to do so throughout the construction and operation of the

pipeline. Existing plans, programs and initiatives that Trans Mountain intends to consult ALIB on, for the construction phase of the project include:

- Revisions to the scope of pipeline construction plans, including reclamation, and the sharing of final routing information;
- Methods for sharing environmental information and providing information updates;
- Participation in pre-job meetings prior to commencement of construction on each pipeline construction spread;
- Training and employment opportunities;
- Changes to established Project procedures;
- Strategies for effectively communicating the construction schedule and work areas to communities;
- Notification procedures if Heritage Resources or Traditional Land Use sites are discovered during construction;
- Retaining access to Traditional Use Areas;
- Sharing of wildlife encounter information;
- Sharing Procurement information and developing an Aboriginal Business list; and
- Discussing vegetation management options for the right-of-way during operations.

Trans Mountain welcomes the opportunity to engage with ALIB and discuss other plans and initiatives that will be developed throughout the project.

b) Trans Mountain does not have an associated timeline to discuss the plans, programs and initiatives as set out in ALIB IR No. 2.05.5a.

Trans Mountain welcomes the opportunity to meet with ALIB at a time that is mutually agreeable by both parties.

c) Trans Mountain is not able to commit to providing funding for ALIB to participate in the initiatives outlined in ALIB IR No. 2.06.5a.

At this time, Trans Mountain commits to further engagement with ALIB in regard to the plans, programs, initiatives and timelines outlined in ALIB IR No. 2.06.5a.

d) Engagement with ALIB in regard to the Environmental Protection Plan ("EPP") (as referred to as the "Construction Monitoring and Inspection Plan" in the response to ALIB IR No. 1.6.04 [Filing ID A3X5V6]) has not taken place to date. Also refer to response to ALIB IR No. 2.03.16a.

Trans Mountain welcomes the opportunity to engage with ALIB on the EPP. Refer to response to ALIB IR No. 2.06.5b.

e) Engagement with ALIB in regard to the Emergency Response Program has not taken place to date.

Trans Mountain is in the planning stages for a workshop series to communicate information regarding the emergency response and management plans (including the improvements to the plans).The series is expected to commence in 2015 and Aboriginal

groups with an interest in the Project or Aboriginal interests potentially affected by the Project, including ALIB, will be invited to attend.

f) Engagement with ALIB in regard to Monitoring Programs has not taken place to date.

Trans Mountain welcomes the opportunity to engage with ALIB on the Monitoring Plan. Refer to response to ALIB IR No. 2.06.5b.

Additional information regarding the roles and responsibilities for Monitors is included in NEB IR No.1.20a (Filing ID A3W9H8).

g) Trans Mountain is committed to the continued implementation of the Trans Mountain Expansion Project Aboriginal Engagement Program ("the Program"). The Program provides the platform for Trans Mountain to engage with Aboriginal groups to provide comprehensive information to them and seek feedback from them on the Project and to identify potential impacts of the Trans Mountain Expansion Project on the assertion of Aboriginal rights and title governing traditional and cultural use of the land and marine environment.

Refer to response to ALIB IR No. 2.03.16a. Trans Mountain is not able to commit to providing capacity to ALIB at this time. Should ongoing engagement determine that capacity funding is required then Trans Mountain will consider it at such time.

h) Refer to response to ALIB IR No. 2.06.5g.

i) Trans Mountain does not use strict criteria for Aboriginal groups to qualify for capacity funding. Each group is considered on a case by case basis and Trans Mountain offered and provided capacity funding to Aboriginal groups along the proposed Project corridor to facilitate their meaningful participation in Project consultation through Letters of Understanding ("LOU") and Memorandums of Understanding ("MOU") after an expressed interest was received to establish a formal relationship with Trans Mountain.

Trans Mountain reminds ALIB that multiple engagement letters were shared with ALIB throughout 2012 and 2013, inviting ALIB to engage on the Project and a response was not received until October 16, 2013. Engagement logs with ALIB are included in Appendix A of Volume 3B (Filing ID A3S0U6), Appendix A of Consultation Update No. 1 (Filing ID A3V3L9), Appendix A of Consultation Update No. 2 (Filing ID A3Z8Q2) and NEB IR 3.008a - Attachment 1 (Filing ID A65693).

2.06.6 Incorporating site specific information into mitigation and monitoring plans

Reference:

Trans Mountain Response to ALIB Round 1 Intervenor IR Motion (07-2014) IR No. 1.6.05(a)

Preamble:

TM provides some indication of how site specific information collected during the additional pre-construction surveys will be used to inform mitigation and monitoring plans. For example, TM states that for fish-bearing watercourse crossings, photographs and measurements were taken as a record of pre-construction conditions. These photos and measurements will then be used to guide reclamation immediately following construction and as a post-construction monitoring reference to assess the effectiveness of reclamation measures at fish-bearing watercourse (pg. 96-99). The collection of measurements, rather than just photographs, is encouraging but further information is requested below. For wetlands, at each site visited during pre-construction surveys, TM states that quantitative measurements of "*overall wetland function*" will be determined so that existing (i.e., pre-construction) conditions can be compared to post-construction conditions over time (pg. 99). However, without clearly defined targets, the definition of success seems open to interpretation. This is not acceptable to ALIB and further information is requested below.

TM also states that for post-construction monitoring of wetlands, the program will demonstrate whether a wetland is "*on the trajectory towards achieving the goal of "no net loss" of wetland function within the post-construction monitoring timeframe (i.e., is of the same functional condition as documented during pre-construction surveys), or whether additional remedial action is required to assist the wetland recovery and achieve this goal.*" (Pg. 99)

Request:

a) Using the example provided of fish-bearing watercourse crossings, please describe the methodology that will be used by TM to assess effectiveness of reclamation when comparing photographs of pre- and post-construction conditions. Will this be a qualitative analysis only?

b) Please list all measurements that will be collected at fish-bearing watercourse crossings to document pre-construction conditions. Are all of the measurements quantitative?

c) Please provide the list of quantitative measurements collected by TM at wetlands that will be used to assess "*overall wetland function*".

d) Using the example of fish-bearing watercourse crossings, please describe the methodology that will be used to assess effectiveness of reclamation when comparing measurement values for pre- and post-construction conditions.

e) What are the goals, thresholds, or targets for similarity between pre- and post-construction conditions i.e., how similar is 'good enough' according to TM?

f) What degree of dissimilarity would trigger additional remedial actions?

g) Please list actions that would be taken by TM if pre-construction (existing) conditions at a fish-bearing watercourse or wetland were already degraded or of poor quality due to existing disturbances.

h) In the scenario presented above in 6.6g), will TM reclaim to the highly disturbed pre-construction condition or will TM commit to reclaiming these sites to pre-disturbance conditions?

i) Please provide a list of potential remedial actions that could be taken by TM to assist in wetland recovery in terms of returning to the same "*functional condition*" as documented during pre-construction surveys.

j) Please provide a definition according to TM, of "*no net loss*" of wetland function.

k) Please provide a set of end point criteria, of "*no net loss*" of wetland function.

Response:

a) While pre-construction photographs can and will be used to determine if the site has returned to similar conditions following construction, there are other methods that will be used to assess the effectiveness of reclamation. These methods are in keeping with previous similar pipeline projects that are regulated by the National Energy Board (NEB) (refer to response to ALIB IR No. 1.6.09a, Filing ID A3X5V6). Post-construction environmental monitoring (PCEM) will be qualitatively based (as defined by standard industry practise) and used to verify the success of, and potential remediation needs for, reclamation measures. Trans Mountain remains confident that the proposed PCEM program is sufficient to achieve this objective, but will take into consideration any additional or alternative PCEM requirements that may be requested by the NEB.

Monitoring at fish-bearing watercourses will include an evaluation of the terrain stability, soil productivity and erosion control on the banks and approach slopes (in relation to contour re-establishment and the erosion and sediment control measures that were implemented), and the success of riparian vegetation re-establishment (please see Section 9.0 of Volume 6A [Filing ID A3S2S1] for more details regarding PCEM). Qualified resource specialists will evaluate the state of the watercourse to determine if in-stream habitat conditions similar to pre-construction conditions exist, or if further restoration measures are needed. For example, bank and streambed contours, substrate type and general fish habitat quality will be assessed to determine if habitat quality and type is equivalent, or different to pre-construction conditions.

The evaluation of the success of riparian vegetation re-establishment will be determined by monitoring riparian vegetation (installed and naturally regenerating plants) as compared to a similar reference plant community located adjacent to, or within, the vicinity of the construction right-of-way and pre-construction conditions. Resource specialists will determine if the riparian plant community has initiated an early successional trajectory that will in time resemble the reference plant community, while recognizing the requirements of pipeline operations vegetation management (*i.e.,* clearing of trees over the trench area for access and monitoring).

b) Information and data were collected at crossings of potential fish habitat using qualitative and quantitative methods. For a complete list of data collection methods used, please refer to information as described Section 3.6 of Fisheries (Alberta) Technical Report 5C-6 in Volume 5C (Filing ID A3S1W6) and Section 3.2 of Fisheries (British Columbia) Technical Report 5C-7 in Volume 5C, (Filing ID A3S2C1).

c) Along with desktop review (*i.e.*, satellite imagery interpretation), ocular observations made during helicopter overflights and ground-based field surveys were used to inform wetland classification and delineation.

At all wetlands observed during the 2012 and 2013 helicopter overflights, the following information was collected for wetlands crossed by the proposed pipeline corridor, where possible.

- Wetlands were geo-referenced using GPS (UTM) and legal location and sketches were prepared.
- Wetlands were photo documented and any existing alterations either on or adjacent to the site were noted.
- Wetlands were classified depending on vegetation, hydrology and soils present, and signs of modification (*e.g.*, beaver and/or human) were documented.

At all wetlands where access was available during the 2012, 2013 and 2014 ground-based wetland surveys, the following information was collected: habitat, hydrological and biogeochemical function.

The hydrological function of wetlands is dependent on several factors. The source and movement of water can indicate the type of wetland as well as its importance to surrounding waterbodies and wetlands. For the purpose of this wetland evaluation during the collection of existing data, comments were made regarding surface water presence, movement and depth.

The habitat function of wetlands can be determined based on several factors that can be documented in the field. For this wetland evaluation, the existing data for the following parameters was collected presence of vegetation indicator species and/or communities; wildlife observations; and habitat suitability.

Biogeochemical cycling includes the transport and transformation of chemicals through physical, chemical and biological processes. Wetland biogeochemical function can be defined as material inflows (sink), outflows (source) and intrasystem cycling. Biogeochemical characteristics, such as litter quality, soil moisture regime, as well as standing or open water turbidity, were identified.

The information collected/observed in the field was then applied to wetland landscape functional assessment and it is this assessment, based on ocular observations, photo documentation, field observations including but not limited to vegetation coverage information (*e.g.*, species list and percent cover) that provides a quantitative outcome

(*i.e.,* functional condition score). Information on the criteria used to obtain quantitative outcomes for the wetland landscape functional assessment is provided in the response to NEB IR No. 2.051a (Filing ID A3Z4T9). This functional assessment produces a quantifiable measurement of wetland function through a ranking system. The total ranking of a particular wetland yields its functional condition category and its ranking percentage. The results of the functional assessment are reported on the premise that disturbed wetlands would be revisited in the years following construction to document the progress of function returning to the wetland system after pipeline construction. Wetland function documented during the existing (*i.e.*, pre-construction) condition ground-based wetland surveys will be compared to wetland function observed along the reclaimed (*i.e.*, post-construction) construction right-of-way. The results of this comparison will be used to measure the effectiveness and efficiency of mitigation and reclamation measures, to ensure that wetlands are on the trajectory to returning to pre-construction functional condition and provide support to the determination of loss or "no net loss" of wetland function. The wetland function ranking system is also fully described in the Preliminary Wetland Compensation Plan (Filing ID A3Z4V3).

d) Refer to the response to ALIB IR No. 2.06.6a.

e) The goal for similarity between pre- and post-construction conditions is considered to have been achieved when the environment has been assessed to be functionally comparable to pre-construction conditions or adjacent conditions off the right-of-way, or if a community or disturbed area has achieved an early trajectory that will in time resemble the pre-construction condition. That is, the long-term target of PCEM is to return the disturbed portion of the construction footprint to a state where it can be used by the same species or for the same purposes as were used in a similar manner prior to construction, with operational considerations in mind. The state of PCEM is dependent on the requirements of operational management and safety (*e.g.*, clearing of trees over the trench area for access and monitoring). In the event that construction-related issues persist past five years of monitoring, post-construction monitoring will continue until remediation measures are considered to be effective and issues are resolved.

f) If a trajectory as discussed in the response to ALIB IR No. 2.06.6e is not established in a timely manner as compared to experience on past projects (for examples, please see the response to ALIB IR No. 1.6.09a, Filing ID A3X5V6), additional remedial actions will be considered. In addition, direct environmental issues such as sedimentation or weed infestation would trigger additional remedial actions to prevent the undesirable conditions from becoming established or deteriorating.

Wetland information collected/observed in the field is applied to the wetland landscape functional assessment and it is this assessment, based on photo documentation, field observations including but not limited to vegetation coverage information (*e.g.*, species list and percent cover) that provides a quantitative outcome (*i.e.,* functional condition score). Information regarding the criteria used to obtain quantitative outcomes for the wetland landscape functional assessment is provided in the response to NEB IR No. 2.051a (Filing ID A3Z4T9). This functional assessment produces a quantifiable

measurement of wetland function through a ranking system. The total ranking of a particular wetland yields its functional condition category and its ranking percentage. The results of the functional assessment are reported on the premise that disturbed wetlands would be revisited in the years following construction to document the progress of function returning to the wetland system after pipeline construction. Wetland function documented during the existing (*i.e.*, pre-construction) condition ground-based wetland surveys will be compared to wetland function observed along the reclaimed (*i.e.*, post-construction) construction right-of-way. The results of this comparison will be used to measure the effectiveness and efficiency of mitigation and reclamation measures, to ensure that wetlands are on the trajectory to returning to pre-construction functional condition and provide support to the determination of loss or "no net loss" of wetland function. The wetland function ranking system is also fully described in the Preliminary Wetland Compensation Plan (Filing ID A3Z4V3).

g) Trans Mountain intends to restore watercourses and wetlands where they are impacted by the Project to their pre-construction functional condition or better within the Project footprint. Where wetlands or watercourses have been previously degraded at the proposed crossing location (*i.e.,* within the Project footprint), it is anticipated that the mitigation and reclamation measures that Trans Mountain will implement on the Project footprint during construction will promote the enhancement of habitat conditions at the previously degraded location. In areas where wetlands or reaches of a watercourse adjacent to the Project footprint are found to be in poor ecological condition and are directly attributed to the existing Trans Mountain pipeline, Trans Mountain may consult with landowners or applicable Crown Land Managers to discuss the development of appropriate reclamation strategies. Additional enhancements to watercourses or wetlands adjacent to the Project footprint which were not the result of the existing Trans Mountain pipeline system, may become opportunities for compensation offsets, if deemed necessary by the NEB.

h) Refer to the response to ALIB IR No. 2.06.6g.

i) Project mitigation will be implemented during construction to allow affected wetlands to return to the same functional conditions as documented during the existing assessment. Wetland Function Post-Construction Monitoring (PCM) will be conducted during subsequent years during the growing season to review the area of disturbance and identify any wetlands where remedial measures should be implemented to assist with the wetland function recovery.

Based on the findings of the Wetland Function PCM Program, recommendations for remedial measures will be provided, if warranted, to promote the successful return of wetland function to the pre-construction conditions as quickly as practical and within the duration of the PCM Program. If a wetland is not determined as having at least the same functional conditions as documented during the pre-construction assessment (*e.g.*, pre-construction wetland ranked as High Functional Condition and post-construction it ranked as Low-Moderate Functional Condition due to pipeline construction), Trans Mountain will continue to monitor those specific wetlands in years

three and five after construction as described in the Preliminary Wetland Compensation Plan (Filing ID A3Z4V3).

Following the Wetland Function PCM Program, should it be determined that additional remedial measures are needed to promote the successful return of wetland function to the pre-construction conditions recommended remedial measures will be identified on a case-by-case basis and will depend on the site-specific conditions. Potential remedial measures may include, but are not limited to: re-contouring to re-establish pre-construction drainage should an unanticipated impediment occur; shrub staking to enhance woody vegetation establishment; and supplemental planting.

If permanent loss or alteration of wetland function is identified upon completion of the Wetland Function PCM Program and following the implementation of additional remedial measures, these locations may then become sites where potential compensation measures may be applied. Trans Mountain will consult with Environment Canada regarding potential compensatory measures to offset functional loss, if warranted.

j) The definition or goal of "no net loss" of wetland function that Trans Mountain recognizes aligns with the stated goals in the Federal Policy on Wetland Conservation (FPWC) and is influenced by the information provided in *No Net Loss: Implementing "No Net Loss" Goals to Conserve Wetlands in Canada* (Lynch-Stewart 1992). The goal of "no net loss" of wetland function used by Trans Mountain is the understanding that alterations to wetland function, both natural and imposed on, may not always be avoidable but the intention and goal is to seek to reach a balance between any losses and gains of wetland function with the anticipation that wetland function will recover over time. The goal also includes that there be no permanent loss of wetland habitat, hydrologic or biogeochemical function caused by Project construction. Ideally this will occur through mitigation and remediation measures, with compensation implementation as warranted.

Reference:

Lynch-Stewart, P. 1992. No Net Loss: Implementing "No Net Loss" Goals to Conserve Wetlands in Canada. Sustaining Wetlands Issues, Paper No. 1992-2. North American Wetlands Conservation Council (Canada). Ottawa, ON.

k) Permanent loss or alteration of wetland function is not anticipated at wetlands that will be crossed by the final pipeline construction right-of-way or power line rights-of-way since pipeline construction through wetlands is considered a temporary disturbance and experience indicates that residual effects on wetland function can be mitigated and compensation will be considered for any permanent disturbance (e.g., power line structures) within wetlands. The post-construction condition of disturbed portions of wetlands will be compared to existing (*i.e.*, pre-construction) condition data and the condition of any wetlands located adjacent to the construction right-of-way. Criteria assessed (see Sections 2.2 and 3.1.3 as well as Appendix B in the Preliminary Wetland Compensation Plan [Filing ID A3Z4V3]) will be a comparison of grade, substrate composition, surface water presence/absence, water quality and hydrophytic vegetation re-establishment to those observed during the existing (*i.e.*, pre-construction) condition

evaluation and those evident off of the construction right-of-way. The results of this comparison will be used to measure the effectiveness of mitigation measures and to determine if there is indication of impediment or loss of wetland function. After the completion of the Wetland Function PCM Program, wetland ecosystems that are on a trajectory to or have returned to at least existing (*i.e.*, pre-construction) functional conditions, on and adjacent to the construction right-of-way, due to mitigation measures implemented during construction would be considered "successful" (*i.e.,* "no net loss" of wetland function). These wetland ecosystems would not be considered as potential sites where compensation measures may be required. Wetland ecosystems that are determined to not be on a trajectory to recovering to existing (*i.e.*, pre-construction) functional condition upon the completion of the Wetland Function PCM Program would be considered "unsuccessful" (*i.e.,* net loss of wetland function*)* and would then become potential sites where compensation measures may be applied.

2.06.7 Reclamation monitoring and evidence of success

Reference:

Trans Mountain Response to ALIB Round 1 Intervenor IR Motion (07-2014) IR No. 1.6.10

Preamble:

ALIB was provided with a non-peer reviewed report prepared for a 2009 conference entitled, "The Restoration of the TMX - Anchor Loop Project in Jasper National Park" prepared by TERA Consultants. The report discusses a pipeline project where reclamation activities began in 2008. Preliminary results from a single year (2009) were provided but no data was presented for review by ALIB nor any information about the subsequent 4 years of monitoring. TM also states that reclamation monitoring is ongoing on the TMX Anchor Loop project during the maintenance and operations phases of the Project and that "*monitoring of the effectiveness of mitigation implemented during the PCEM program continues regularly*" (pg. 107). However, beyond stating that effectiveness of mitigation is being monitored, TM does not discuss the results of this monitoring or provide data or results.

TM states commits to working with Aboriginal groups and to use their input to develop details of reclamation and monitoring plans. However, TM's reticence in providing meaningful and necessary information to ALIB in order to assist them in fully understanding potential impacts to their land and resources calls their commitments into question.

Request:

a) Please provide the results, data, analysis and discussion of the subsequent four years of post-construction monitoring (2010, 2011, 2012, 2013) for the TMX Anchor Loop Project as well as an assessment of overall reclamation success.

b) Please provide current results, data, analysis and discussion of the stated ongoing monitoring program occurring during the maintenance and operations phase of the TMX Anchor Loop Project. This information is necessary in order for TM to concretely demonstrate effectiveness/success of proposed mitigation techniques to ALIB.

c) Please provide a discussion regarding whether the various restoration techniques used at the TMX project are applicable to the proposed Project.

d) In instances where the reclamation techniques are not deemed applicable, effective, practical or economically feasible, a discussion of alternative techniques should be provided.

e) TM states that Parks Canada Agency was involved in development and ongoing review of management objectives and desired end results on the TMX project and TM states that they are committed to working with Parks to work towards restoring "*ecological integrity*" (pg. 106). Is TM willing to extend the same level of commitment and cooperation towards ALIB on the proposed Trans Mountain Expansion pipeline in terms of working together to set mutually agreeable management objectives and desired end points in their traditional territory?

Response:

a) All post-construction monitoring reports completed for the TMX Anchor Loop Project are available on the National Energy Board web site. A summary of the findings is provided below. The focus of the summary is on the results of the 4th and 5th years of post-construction monitoring. A brief overview of the TMX Anchor Loop is presented to provide some context.

Kinder Morgan Canada Inc. (Kinder Morgan), owner of Trans Mountain Pipeline L.P., operates the Trans Mountain Pipeline (TMPL) system, a 1,146 km, 610 mm O.D. (NPS 24) pipeline from Edmonton, Alberta to Burnaby, British Columbia (BC). On November 23, 2006, the National Energy Board (NEB) issued Certificate OC-49 for construction of the TMX - Anchor Loop Project (the Project) to loop a portion of TMPL oil pipeline system. The TMX - Anchor Loop Project involved the construction of 7 km of 762 mm O.D. (NPS 30) and 151 km of 914 mm O.D. (NPS 36) diameter pipe from the Hinton Pump Station near Hinton, Alberta, to a location near Rearguard, BC. The Project traversed federal, provincial and private lands, including Jasper National Park in Alberta and Mount Robson Provincial Park in BC, both of which are part of the Canadian Rocky Mountain Parks United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site. The Project also included installation of two new pump stations, one in Alberta (Wolf Pump Station at KP 188.0) and one in BC (Chappel Pump Station at KP 555.5), as well as two new scraper traps, one within the Hinton Pump Station at KL 317.7 (Hinton Scraper Trap) and one at KL 468.0 (Hargreaves Scraper Trap). These permanent facility sites are outside park boundaries, located on provincial Crown lands and private lands in Alberta and BC.

Construction of the Project was completed in two spreads from August 2007 to November 2008. Restoration activities commenced in June 2008 and were completed in fall 2009. Construction of the permanent facilities associated with the Project was completed between June 2007 and June 2008. Restoration activities were initiated in June 2008.

Two separate Post-Construction Environmental As-built Reports (pipeline and facilities) were submitted in January 2009 summarizing activities that occurred during the construction phase of the TMX – Anchor Loop Project. The 2009 post-construction monitoring report was submitted in January 2010. The 2010 PCMP report was submitted in January 2011 and summarized 2010 monitoring of environmental issues encountered during construction of the pipeline and facilities, steps taken towards their resolution and their status.

<u>Summary of 2011 Post Construction Monitoring</u>

In 2011, the PCMP commenced in March and was completed in September. A high winter snowpack created an avalanche risk that reduced the number of sites that could be safely visited during the Winter Wildlife Track Survey. Moisture from snow and timely rain events contributed to above average growth of vegetation on the Project right-of-way, temporary facilities and access roads. Dormant deciduous (willow, balsam poplar)

hardwood cuttings, coniferous (white spruce) seed and deciduous (silverberry) seed were collected during the fall of 2010 and the winter of 2011. The plant material was successfully propagated and shipped to the Project in spring and summer 2011. A pre-season right-of-way survey was conducted in May 2011 to identify any areas of terrain instability and low vegetation establishment. The summary of this survey served as the tracking document for environmental issues resolution and monitoring in 2011.

A restoration crew installed 920 riparian plants at 5 watercourse crossings in Jasper National Parks (JNP) and 495 plants at 3 watercourse crossings in Mount Robson Provincial Park (MRPP). To encourage successful plant establishment, plantings at riparian areas were collared with coir disks, mulched with cedar bark and irrigated as warranted.

Upland plantings were implemented at KL 317.85 (Hinton Pump Station) and the Jasper main and staging yards (located adjacent KL 369.0 and KL 369.25, respectively). At the Hinton Pump Station, 270 white spruce plants were installed across the right-of-way and approximately 10 m west of the chain-link fencing located along the west side of the Pump Station enclosure. In spring 2011, restoration of the Jasper main and staging yards commenced. Subsoil was de-compacted and recontoured to match the adjacent off-site topography. Topsoil was replaced to a depth of approximately 20 cm at the main yard and 15 cm at the staging yard, and was track packed (textured) to prepare a suitable seed bed. The yards were seeded with a native grass seed mix, fertilized and 840 woody rooted plants were installed. The trees were irrigated through the season, where warranted, to facilitate establishment success.

At the Haller's Apple Moss site located at KP 407.5, 70 large (1.25 m to 1.5 m high) coniferous trees (white spruce and lodgepole pine) and 50 large (3 m to 4 m high) deciduous trees (balsam poplar and trembling aspen) were installed adjacent to the population screen (west, north and east sides). The purpose of the installation was to expedite the establishment of a mixed forest canopy by supplementing the existing woody plants with larger deciduous and coniferous trees as outlined in the 2011 Restoration Plan for the Haller's Apple Moss Fitzwilliam Spur Site. Trees installed in 2011 were irrigated through the season as warranted.

For those locations identified with low grass establishment during the May survey, seeding occurred prior to the middle of June 2011 to take advantage of seasonal spring rains. Locations identified during the July 2011 survey were seeded in September 2011 in anticipation of suitable soil moisture conditions in the spring of 2012. All areas were hand seeded with a native grass seed mix, while select locations also receiving native cover crop seed and/or slow release fertilizer (an Environmental Issues Tracking List for locations was developed and maintained).

The results of the Calcareous Soil Follow-up Program sample analysis have identified trends of vegetation cover establishment resulting from treatments implemented at the various sites. One of these trends identified the hydroseed treatment used adjacent the calcareous soil plots as performing approximately equivalent to the plot treatment with the highest observed native plant cover (*e.g.*, incorporated light compost). In addition,

the sites located adjacent the Highway 16 right-of-way were recorded with higher levels of non-native grass species than sites located adjacent the Celestine Lake Road.

During 2011 monitoring, the sampling intensity used in the upland vegetation plot survey increased from one to three 5 m by 5 m plots. This level of sampling intensity has increased the robustness of the survey and the results of the sample analysis, of species similarity (between on and off right-of-way) and plant cover (native and non-native) data, and has contributed to the understanding of vegetation community establishment dynamics across the Project right-of-way. All the JNP Vegetation Management Objectives/Desired End Results (A3.1.1 to A3.1.9) have either been met, or are on trajectory to be met in the future.

The 2011 rare *vascular* plant monitoring has determined that 68% of rare vascular sites were successfully mitigated, 15% were unsuccessfully mitigated and 17% require another growing season to determine whether mitigation was successful.

The 2011 rare *non-vascular* plant monitoring has determined that 60% of sites were successfully mitigated, 24% unsuccessful mitigated and 16% of sites should be revisited in 2012 to confirm mitigation status. Non-native plant monitoring and management is a key component of Project restoration.

In 2011, approximately 52 chemical and 56 mechanical weed treatments were conducted at upland sites or segments along the 158 km Project right-of-way, and represent approximately half the number of treatments that were required in 2010. All Project riparian areas located adjacent to waterbody crossings were monitored for weed infestations and received mechanical and chemical (JNP only) weed control, where warranted.

The 2011 Forest Health Pathogen Follow-up Monitoring Program (the Program) has determined that forest health factors observed adjacent the Project right-of-way are operating at background levels. Barring a major wind event, only occasional windthrow is currently anticipated as sufficient time has passed to allow the forested edge to become wind-firm. The Program is now considered complete, and only monitoring of current spruce and Douglas-fir windthrow and sanitation, where warranted, prior to April 1, 2012, is required.

Instream habitat and riparian vegetation monitoring at fish-bearing watercourses has determined that all instream mitigation used during construction was effective and all habitats are functioning as intended. Seven watercourses (KP 336.85, KP 375.0, KP 379.1, KP 383.2, KP 390.3, KP 411.6 and KP 458.05) received supplemental rooted stock plantings in the spring and fall of 2011. Plant installations will be monitored through 2012 for establishment success.

All 11 wetlands monitored in 2011 as part of the Wetland Follow-up Monitoring Program were classified as having Proper Functional Conditions. Supplemental Wetland Function Monitoring was completed in 2011 at four wetlands (KL 332.0, KL 357.7, KL 362.0 and KL 407.1 to 407.4). All are classified as having Proper Functional Conditions and

monitoring to verify wetland functionality and vegetation establishment will continue in 2012. Due to deep snow conditions at the time of the winter wildlife track survey, the number of recorded tracks was lower than in previous years. Tall grass vegetation observed on the right-of-way in summer 2011, impeded the determination of ungulate grazing levels. A survey of visual barriers identified many small mammals utilizing these structures for cover and movement. During the wildlife tree survey, 6 trees were observed with signs of bird use. The wildlife assessment will continue in 2012. Non-vascular plant specialists monitored the Haller's Apple Moss population in summer 2011 and determined that following an improvement in the condition of the population in 2010, the population continues to remain stable in 2011.

Summary of 2012 Post Construction Monitoring

In May 2012, Parks Canada indicated that results of the 2011 Calcareous Soil Follow-up Monitoring Program and the three years of sample data collection and analysis has provided sufficient information to identify trends of vegetation cover establishment resulting from treatments implemented at the various sites. As a result of this decision, no monitoring of calcareous soil sites was conducted in 2012 and plot stakes were removed and conventional right-of-way vegetation management techniques were employed.

Results of the 2011 Calcareous Soil Follow-up Monitoring Program can be found in the 2011 Post-Construction Monitoring Program Report. At locations identified with low grass establishment during the May 2012 survey, seeding occurred prior to the commencement of the seasonal rainy season and locations identified with low grass establishment during the July 2012 survey were seeded in fall 2012 in anticipation of suitable soil moisture conditions in the spring of 2013. All areas were hand seeded with a native grass seed mix and a native cover crop species.

During 2012 monitoring, 50 upland vegetation plots located along the right-of-way were re-sampled. The results of the sample analysis of native plant density, plant cover (native and non-native) data and species similarity (between on and off right-of-way) has contributed to the understanding of current vegetation community establishment dynamics across the Project right-of-way. Additional wind fencing was installed at KL 317.85 (Hinton Pump Station) adjacent to wind fencing that was installed in 2011. Wind fencing was installed at the slope shoulder of Little Windy Point (KL 347.7). Wind fencing installations at the Hinton Pump Station and Little Windy Point sites are expected to assist with the establishment of native cover and white spruce trees, respectively. In 2012, the installation of container-grown woody plants for the Project was limited to the access road located at KL 434.2. At the base of the access road cut slope, 75 one-gallon balsam poplar trees were installed to stabilize surface soils and reduce the visual scar of this disturbance to visitors. Irrigation was implemented at the Cottonwood Creek (KL 375.0) riparian plantings. Woody plants installed in 2011 were irrigated at the watercourse crossing and DFO compensation areas located along adjacent reaches of Cottonwood Creek to the north and south of Highway 16 in July and August 2012 to provide supplemental soil moisture.

The 2012 rare vascular plant monitoring determined that 69% of rare vascular sites were successfully mitigated and 31% were unsuccessfully mitigated. The 2012 rare non-vascular plant monitoring determined that 72% of sites were successfully mitigated and 28% were unsuccessful mitigated. Non-native plant monitoring and management is a key component of Project restoration.

In 2012, vegetation management was implemented on the Project right-of-way, temporary facilities, permanent facilities and net gain sites. Chemical and manual/mechanical vegetation management techniques were implemented to achieve the most cost effective and long-lasting weed eradication, control or suppression results.

All Project riparian areas located adjacent to waterbody crossings were monitored for weed infestations and received manual and mechanical weed management, where warranted. For 2013, Parks Canada has requested that Kinder Morgan continue monitoring and, where warranted, implement vegetation management at three temporary facilities (Trade Waste Pit, Fiddle North Pit and Clairvoux South Pit) as part of the Operational Vegetation Management Program for the TMPL system.

Results of the 2011 Forest Health Pathogen Follow-up Monitoring Program identified the need for sanitation (felling of trees, bucking and burning of bark) of five trees at three locations. On March 29 and 30, 2012, the trees identified during 2011 monitoring were felled, bucked and then burned on the Project right-of-way at three locations. During 2011 monitoring, it was determined that forest health factors observed adjacent to the Project right-of-way were operating at background levels and for this reason, the Forest Health Follow-up Monitoring Program was considered complete. Results of the 2011 Forest Health Follow-up Monitoring Program can be found in TERA 2012.

Instream Habitat and Riparian Vegetation Monitoring at fish-bearing watercourses determined that all instream mitigation used during construction was effective and all habitats are functioning as intended. As a result of high water flows during the 2012 spring freshet, the banks of two watercourses (KL 390.2 and KL 453.7) and the channel and banks of one watercourse (KL 409.1) were damaged. Kinder Morgan is currently developing a plan to restore the banks at the watercourse crossing at KL 453.7 and the bed and banks of the watercourse crossing at KL 409.1 prior to the 2013 spring freshet. Kinder Morgan has not made any commitments regarding the restoration of the right bank of the watercourse crossing at KL 390.2. Any restoration works at the right bank and upstream edge of the bridge abutment at the KL 390.2 watercourse crossing would be undertaken in conjunction with Alberta Transportation and Parks Canada. All 10 wetlands monitored in 2012 as part of the Wetland Follow-up Monitoring Program were classified as having Proper Functional Conditions. In 2013, monitoring will continue at all 10 wetlands monitored in 2012.

Supplemental Wetland Function Monitoring was completed in 2012 at four wetlands (KL 332.0, KL 357.7, KL 362.0 and KL 407.1 to 407.4). All are classified as having Proper Functional Conditions and monitoring to verify wetland functionality and vegetation establishment will continue in 2013.

During the winter wildlife track surveys, most of the wildlife tracks observed in 2005 were observed in 2012 with the exception of red fox and river otter. Vegetation grazing observations were greater in 2012 than in 2005. Browsing of vegetation in 2012 was less than browsing observed in 2005. Sub-canopy cover was higher in 2012 than in any other year since 2005. In 2012, 9 of the 22 installed wildlife trees showed sign of wildlife use including excavations by primary cavity nesters and raptor use. Winter observations of the visual barriers included abundant squirrel tracks entering the visual barrier enclosures and crossing the right-of-way at the visual barrier locations. Some trees located around the base of the visual barriers showed signs of browsing that were presumed to be from snowshoe hare. Summer observations of the visual barriers showed high browse activity near the visual barriers.

Non-vascular plant specialists monitored the Haller's apple moss population in summer 2012 and determined that following an improvement in the condition of the population in 2010, the population continues to remain stable in 2012. Large coniferous and deciduous trees installed at the Haller's apple moss site (KP 407.5) in spring 2011 were observed as establishing well; with the loss of one tree. As a result of the west screen extension in 2010 and the large tree installation in 2011, Haller's apple moss populations have stabilized.

The 2012 Aesthetics Follow-up Monitoring Program report summarized the conditions apparent within preconstruction and post-construction photographs collected between 2005 and 2007 (preconstruction and baseline conditions), 2009 (second year of the Project PCM Program) and 2012 (fifth year of the PCM Program) at the observation viewpoints described in the 2007 Program report. Monitoring has determined that MO/DERs 3.8.1 and 3.8.2 have been met.

In 2012, Parks Canada determined that the Roche Miette Net Gain Pit would be released from the Project. The Fiddle North, Trade Waste and Clairvoux South Net Gain Pits require monitoring and, where warranted, vegetation management in 2013. The Sleepy Hollow Net Gain Pit was previously released from the Project in 2011. As a condition of approval, Kinder Morgan was to report on the effectiveness of mitigation and restoration that was implemented during and following construction as outlined in the Environmental Protection Plan and Restoration Plan for the Project. In subsection 1.19, Kinder Morgan has provided a summary of mitigation and restoration measures effectiveness as observed during five years of PCM in Alberta (including JNP) and British Columbia (including MRPP).

To ensure that outstanding "unresolved" or "measures implemented" issues identified in 2012 Post-construction Environmental Issues List are addressed in future years, beginning in 2013, Kinder Morgan operations will monitor these outstanding issues in concert with their monitoring responsibilities for the operation and maintenance of the Trans Mountain Pipeline.

This is the fifth and final year of the PCM Program as outlined in the NEB issued Certificate OC-49. Monitoring will continue in 2013 to address Parks Canada's and BC

Parks request to continue the Supplemental Wetland Function Study in JNP and MRPP, and the Wetland Follow-up Monitoring Program in Alberta and BC.

References:

TERA Environmental Consultants. 2008. Post-Construction Environmental As-Built Report – Pipeline for the Trans Mountain Pipeline L.P. TMX - Anchor Loop Project. Prepared for Kinder Morgan Canada.

TERA Environmental Consultants. 2009. Post-Construction Monitoring Report for the Trans Mountain Pipeline L.P. TMX - Anchor Loop Project. Prepared for Kinder Morgan Canada.

TERA Environmental Consultants. 2010. Post-Construction Monitoring Report for the Trans Mountain Pipeline L.P. TMX - Anchor Loop Project. Prepared for Kinder Morgan Canada.

TERA Environmental Consultants. 2011. Post-Construction Monitoring Report for the Trans Mountain Pipeline L.P. TMX - Anchor Loop Project. Prepared for Kinder Morgan Canada.

TERA Environmental Consultants. 2012. Post-Construction Monitoring Report for the Trans Mountain Pipeline L.P. TMX - Anchor Loop Project. Prepared for Kinder Morgan Canada.

b) Trans Mountain notes that ALIB asked a similar question regarding ongoing monitoring of the TMX Anchor Loop Project in the first round of Information Requests and a response was provided (refer to response to ALIB IR No. 1.06.10e [Filing ID A60781]). Trans Mountain also notes that the National Energy Board denied ALIB's motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H5). Trans Mountain will not be providing further information on this question.

c) Trans Mountain notes that ALIB asked a similar question regarding adaptive management in the first round of Information Requests and a response was provided (refer to response to ALIB IR No. 1.06.10a [Filing ID A60781]). Trans Mountain also notes that the National Energy Board denied ALIB's motion to compel a further response from Trans Mountain on this response (Filing ID A4C4H5). Trans Mountain will not be providing further information on this question.

d) Refer to the response to ALIB IR No. 2.06.7c.

e) Many of the industry accepted best practices and mitigation strategies employed on the TMX Anchor Loop Project, over 10 years ago, were leading edge and are now routinely employed on pipeline construction projects in Canada. Several of the mitigation measures used on TMX Anchor Loop have been incorporated into the environmental protection plans for the Project. The environmental protection plans combined with the post-construction environmental monitoring plans and socio-economic management plan are the targets and objectives for construction and post-construction activities. These

plans will include all relevant commitments made during the NEB public hearing process, discussions with applicable regulatory agencies, agreements with Aboriginal groups, landowners, stakeholders, and common lease holders which will be included in the updated environmental protection plans and submitted to the NEB for approval prior to construction. Environmental permits that are obtained and required for construction and operation of the proposed Project will also have thresholds and conditions that will have to be met.

Jasper National Park and Mount Robson Provincial Park is a UNESCO World Heritage Site and affords a high level of protection. It is also important to note that TMX Anchor Loop was only 158 km of new pipe whereas the proposed Trans Mountain Expansion Project is approximately 6 times longer, the scope is much larger and the duration of construction is similar (i.e., approximately two years). Construction of the proposed pipeline needs to balance numerous environmental and socio-economic factors and constraints while ensuring safety, efficiency and constructability.

2.08.0 CONSULTATION

Reference:

i) A3SS0U5, Application Volume 3B: Aboriginal Engagement

ii) A59343, Consultation Update No. 1 – Errata

iii) List of Issues No. 9 – potential impacts of the project of Aboriginal interests.

Preamble:

The Crown has a constitutional obligation to consult with Aboriginal communities where their rights (including title) may be adversely impacted by proposed Crown conduct. In certain circumstances, procedural elements of this consultation obligation can be delegated to proponents. In Application Volume 3B, section 1.1, Trans Mountain states that its "submission... provides a comprehensive overview of the consultation that has taken place to date."

Request:

2.08.01) Please set out Trans Mountain's understanding of the territorial boundaries of Secwepemc territory (Secwepemulecw).

2.08.02) Please describe what Trans Mountain's understanding is of the political structure of the Secwepemc Nation in relation to Adams Lake Indian Band ("ALIB").

2.08.03) Please describe what Tran's Mountain's understanding is of Adams Lake Indian Band's stewardship responsibilities of the territory of the Secwepemc Nation.

2.08.04) Please describe what Tran's Mountain's understanding is of Adams Lake Indian Band's uses are of Secwepemc Nation's territory? Please list the uses.

2.08.05) In relation to each uses listed in Request 2.08.04, please list Tran's Mountain's understanding of the potential impact that an oil spill will have to the particular use.

2.08.06) Has the Crown has delegated all or part of the procedural aspects of its consultation obligations to Trans Mountain?

2.08.07) If the answer to Request 2.08.06 is yes, please:

2.08.07.1) Identify the Crown body and decision maker who delegated the duty to Trans Mountain;

2.08.07.2) Advise when were the procedural aspects of its consultation obligations to Trans Mountain; and

2.08.07.3) Provide all information and correspondence between Trans Mountain and the Crown related to the delegation. For clarity, please also list who exchanged the information and when the information was exchanged.

2.08.08) Has Trans Mountain had meetings or exchanged correspondence with Canada regarding the Project without the presence of intervenors?

2.08.09) If the answer to 2.08.08 is yes, please:

2.08.09.1) List the meeting dates;

2.08.09.2) List the persons who attended the meeting on behalf of Trans Mountain and on behalf of the NEB;

2.08.09.3) Describe the content of the meetings;

2.08.09.4) If minutes were created of the meetings, please provide the minutes; and

2.08.09.5) If any documents were exchanged, please provide the documents.

2.08.10) Has Trans Mountain had meetings or exchanged correspondence with the National Energy Board (the "NEB") regarding the Project without the presence of intervenors?

2.08.11) If the answer to 2.08.10 is yes, please:

2.08.11.1) List the meeting dates;

2.08.11.2) List the persons who attended the meeting on behalf of Trans Mountain and on behalf of the NEB;

2.08.11.3) Describe what took place at the meetings.

2.08.11.4) If minutes were created, please provide the minutes of the meeting; and

2.08.11.5) If any documents were exchanged, please provide the documents.

2.08.12) Has Trans Mountain made any determinations about ALIB Aboriginal rights and title in relation to the proposed pipeline assessment? If so, please provide all information used to assess the impacts of the project on ALIB rights and title.

2.08.13) Has Trans Mountain conducted any assessment of ALIB's strength of claim?

2.08.14) If the answer to 2.08.13 is yes, please:

2.08.14.1) Provide all documents and information referred to in conducting the assessment;

2.08.14.2) Provide the result of Trans Mountain's assessment; and

2.08.14.3) Provide Trans Mountain's assessment of ALIB's strength of claim.

2.08.15) If Trans Mountain has not conducted an assessment of ALIB's strength of claim:

2.08.15.1) What information is Trans Mountain relying on in order to assess the strength of ALIB's claim to title and rights in relation to the proposed Expansion Project?

2.08.15.2) What methodology is Trans Mountain using to assess potential adverse impacts to ALIB?

Response:

2.08.01) Trans Mountain's understanding of the territorial boundaries of the Secwepemc territory are illustrated in ALIB IR No. 2.08.01 - Attachment 1.

2.08.02) Trans Mountain understands that ALIB is a member of the Secwepemc Nation.

2.08.03) Trans Mountain understands that the Adams Lake Indian Band (ALIB) is a steward of the Secwepemc Nation traditional territory, a responsibility that has been delegated to ALIB by the creator. This understanding was gained by the information shared by ALIB at the NEB Oral Aboriginal Traditional Hearing on November 17, 2014 in Kamloops, BC.

Trans Mountain also understands that several other members of the Secwepemc Nation share a similar steward responsibility.

Specific areas for stewardship in regard to the asserted use of the territory by ALIB is outlined in the response to ALIB IR No. 2.08.04.

2.08.04) Trans Mountain's understanding of Adams Lake Indian Band's uses of the Secwepemc Nation Territory was developed from a number of sources, including:

- a desktop review consisting of publicly available harvest data,
- publically available ATK and TLU reports
- meetings and conversations with Adams Lake Indian Band
- environmental assessments for projects with a similar socio cultural context or regulatory context;
- published reports from regulatory authorities involved in administering or regulating a specified area or resource (e.g., integrated resource plans, land and resource management plans, etc.); and
- GIS tools to determine spatial relationships of source data to the Project, was conducted for participating Aboriginal groups.

Adams Lake Indian Band was provided with opportunities to provide TLRU through its participation in the following biophysical field studies as indicated in the Consultation and Update No. 1 and Errata (Filing ID A3V3L9) and Consultation Update No. 3 (Filing ID A4H1X0):

- geotechnical borehole drilling on October 21, 2013;
- Archaeological Impact Assessment from November 6 to 9, 2013;

- archaeological field study from September 7 to 9, 2014 and from September 10 to 16, 2014;
- archaeological field study from September 21 to 30, 2014; and,
- Archaeological field study from October 5 to 14, 2014.

In addition, Adams Lake Indian Band was invited to participate in a number of biophysical field studies, but declined to participate in them, as indicated in the Consultation and Update No. 1 and Errata (Filing ID A3V3L9) and Consultation Update No. 3 (Filing ID A4H1X0):

- archaeological geotechnical borehole drilling on October 21, 2013;
- archaeological geotechnical borehole drilling from October 25 to 30, 2013;
- archaeological geotechnical borehole drilling from October 29 to November 3, 2013;
- geotechnical field preparation from July 5 to 7, 2014;
- geotechnical field preparation from July 8 to 11, 2014;
- archaeological field study from July 13 to 22, 2014;
- geotechnical field study from July 15 to 24, 2014;
- geotechnical field study from July 17 to 26, 2014;
- archaeological field study from July 27 to 30, 2014;
- archaeological field study from August 10 to 19, 2014;
- archaeological pre-drill from on August 21, 2014 and on August 22, 2014;
- archaeological field study from August 24 to September 2, 2014;
- geotechnical field study from August 27 to 31, 2014 and from September 8 to 12, 2014;
- archaeological field study – PRF from October 8 to 17, 2014; and,
- North Thompson 7 from November 26 to 28, 2014.

To date, Adams Lake Indian Band has not shared or provided TEK to Trans Mountain for the purpose of the Project.

Adams Lake Indian Band presented evidence on November 17, 2014 during the Aboriginal Oral Traditional Evidence Hearings for the Project (Filing ID A4E9W3), which will be considered for incorporation into Project planning

The uses of Secwepemc Nation territory for TLRU activities presented by Adams Lake Indian Band on November 17, 2014 during the Aboriginal Oral Traditional Evidence Hearings for the Project (Filing ID A4E9W3) include historic and current TLRU places and related activities such as travelling, habitation, fishing (salmon and trout), hunting (elk, moose and deer), plant harvesting (timber, roots and berries), gathering and sacred areas. Site specific TLRU locations identified in the hearing transcripts are provided in Table 2.08.04-1.

TABLE 2.08.04-1

TLRU LOCATIONS IDENTIFIED BY ADAMS LAKE INDIAN BAND

Site Description	Age
Fisheries where the Fraser River and the South Thompson River drain into the ocean.	Current
Fisheries and fishing along the South Thompson River	Current
Trails and travelways along the Adams River to Adams Lake, along the South Thompson River, all the way up to Tum Tum, over the mountain to Shuswap Lake.	Past
Sacred area – Samadusa Mountain	Current
Sacred area – Sloco Mountain	Current
Plant gathering in the vicinity of Indian Point	Current
Fishing for salmon in Adams River	Current
Fishing in Adams Lake	Current
Old village site at Wildwood (on private land now)	Past
Reserve lands in the Adams Lake Valley	Current
Historic gathering place at Green Lake	Past
Current annual gathering place at Sepwepemc Mountain	Current
Fishing at Star Lake	Past
Fishing at Aylmer Lake	Past
Pictographs in Adams Lake Valley	Current
Camping at Adams Lake	Current
Special ochre in Adams Lake Valley	Current
Historic village sites at MacLeod Point on Adams Lake	Past
Fishing in the Columbia Valley	Past
Plant gathering in the Columbia Valley	Past
Hunting in the Columbia Valley	Past
Quesnel Lake – nursery lake for salmon	Current
Small nursery lake for salmon	Current
Hunting in the Castlegar region	Past
Fishing at Canoe Creek	Current
Fishing at Farwell Canyon	Current

Additional traditional resource use information, if received from Adams Lake Indian Band will also be reviewed in order to confirm literature results and mitigation measures including those found in the Environmental Protection Plans (Volume 6B [Filing IDs A3S2S2, A3S2S3 and A3S2S4], Volume 6C [Filing IDs A3S2S5, A3S2S6 and A3S2S7] and Volume 6D [A3S2S8 and A3S2S9]). Any additional site-specific mitigation measures resulting from this information will be provided in the updated Environmental Protection Plans to be filed with the NEB 90 days prior to construction as per NEB Draft Conditions No. 29 to 31 of the NEB's Letter – Draft Conditions and Regulatory Oversight (Filing ID A3V8Z8).Trans Mountain is committed to the continuation of an effective engagement program that satisfies all parties (Volume 5B, Section 3.2.4; Filing ID A3S1R5).

2.08.05) Refer to response to ALIB IR No. 2.08.04 for Trans Mountain's understanding of uses referred to in this request.

Due to the diversity and complexity of land and resource use by both Aboriginal and non-Aboriginal groups, Trans Mountain's assessment of the potential adverse effects of an oil spill is focused on land and resource use in relation to the tourism and recreation industry, human health and community well-being; rather than assessing for each individual land and resource use. With respect to Aboriginal groups, Trans Mountain's assessment of potential adverse impacts to land and resource uses in relation to the tourism and recreation industry, human health and community well-being in the event of an oil spill is discussed in , Sections 6.3.1, 6.3.2 and 6.3.3 of Volume 7; respectively (Filing ID A3S4V6). Further, Section 6.2 of Volume 7 (Filing ID A3S4V6) considers the potential adverse effects of an oil spill on the biophysical environment and Section 3.2 of Volume 5B (Filing ID A3S1R5) considers the environmental effects/residual effects of spills on traditional land and resource use, social and cultural well-being, and human occupancy and resource use.

In the Application, Volume 7.0 (Filing IDs A3S4V5 to A3S4X2) provides a comprehensive overview of risk assessment and management of pipeline and facility spills. The risk assessment methodology is provided in Section 3.1.1 of Volume 7.0 (Filing ID A3S4V5). A qualitative evaluation of potential environmental and socio-economic consequences based on evidence from past oil spills or documented in scientific reports and studies is provided in Section 6.0 of Volume 7.0 (Filing ID A3S4V6). More in-depth assessments of pipeline credible worst case oil spill scenarios are provided in Section 7.0 to supplement the qualitative evaluation of pipeline and facility spill effects provided in Section 6.0 of Volume 7.0 (Filing ID A3S4V6). The in-depth assessments include scenarios of spills in appropriate areas for credible worst case scenarios, i.e., the Upper Athabasca, North Thompson and Lower Fraser Rivers (Section 7.1 in Volume 7.0; Filing ID A3S4V6). Fate and transport of hypothetical releases, ecological and environmental effects and long term recovery of the freshwater environment were assessed for each of the scenarios.

2.08.06) The Crown has not advised Trans Mountain that it has formally delegated the procedural aspects of consultation.

2.08.07) 2.08.07.1) Refer to response to ALIB IR No. 2.08.06.

2.08.07.2) Refer to response to ALIB IR No. 2.08.06.

2.08.07.3) Refer to response to ALIB IR No. 2.08.06.

2.08.08) Trans Mountain has met and communicated with representatives and staff of the Government of Canada since the proposed Project was announced in 2012. Attached is ALIB IR No. 2.08.08 – Attachment 1 which lists in-person meetings held between Trans Mountain and various federal agencies since the Project was

announced in 2012, including a topic summary and date of said meeting. Separate emails, phone calls, and other less formal communications have not been included as part of this request, as not all such interactions have been tracked or documented. Additionally, all meetings held between Trans Mountain and Federal agencies were done in the course of those agencies' own mandate, therefore individual attendee names are not provided. Any meeting notes taken during in-person meetings would have been done for internal consideration and have not been shared or vetted with the other parties in attendance and are therefore not provided in in this request.

2.08.09) 2.08.09.1) Refer to response to ALIB IR No. 2.08.08.

2.08.09.2) Refer to response to ALIB IR No. 2.08.08.

2.08.09.3) Refer to response to ALIB IR No. 2.08.08.

2.08.09.4) Refer to response to ALIB IR No. 2.08.08.

2.08.09.5) Refer to response to ALIB IR No. 2.08.08.

2.08.10) Refer to ALIB IR No. 2.08.08 - Attachment 1. In the attachment, there is a table that identifies two pre-application meetings Trans Mountain Pipeline ULC (Trans Mountain) attended with the NEB in 2012. These meetings were held prior to the submission of the Application, prior to the Hearing Order for OH-001-20014, and prior to the established of intervenors in this proceeding.

2.08.11) 2.08.11.1) Refer to ALIB IR No. 2.08.08 - Attachment 1 and response to ALIB IR No. 2.08.10.

2.08.11.2) Refer to ALIB IR No. 2.08.08 - Attachment 1 and response to ALIB IR No. 2.08.10. The information requested is not relevant to the NEB's List of Issues for this proceeding and, therefore, has not been provided.

2.08.11.3) Refer to ALIB IR No. 2.08.08 - Attachment 1 and response to ALIB IR No. 2.08.10. As noted, the meetings were pre-application meetings.

2.08.11.4) Refer to ALIB IR No. 2.08.08 - Attachment 1 and response to ALIB IR No. 2.08.10. Trans Mountain Pipeline ULC (Trans Mountain) does not have meeting minutes that are agreed to by participants. Furthermore, the information requested is not relevant to the NEB's List of Issues for this proceeding.

2.08.11.5) Refer to ALIB IR No. 2.08.08 - Attachment 1 and response to ALIB IR No. 2.08.10. No documents were exchanged. The information requested is not relevant to the NEB's List of Issues for this proceeding and, therefore, has not been provided.

2.08.12) Trans Mountain does not presume to define the rights of Aboriginal groups and has not made a determination about ALIB Aboriginal rights. Rather, through the Aboriginal Engagement Program, Trans Mountain engages with Aboriginal groups to provide comprehensive information to them and seek feedback from them on the Trans Mountain Expansion Project ("Project") and to identify potential impacts of the Project on treaty and Aboriginal rights, title and interests and their traditional and cultural use of the land and marine environment.

2.08.13) Trans Mountain did not conduct any strength of claim assessments.

Through the Aboriginal Engagement Program, Trans Mountain engages with Aboriginal groups to provide comprehensive information to them and seek feedback from them on the Trans Mountain Expansion Project ("the Project") and to identify potential impacts of the Project on treaty and Aboriginal rights, title and interests and their traditional and cultural use of the land and marine environment.

2.08.14) 2.08.14.1) Refer to response to ALIB IR No. 2.08.13.

2.08.14.2) Refer to response to ALIB IR No. 2.08.13.

2.08.14.3) Refer to response to ALIB IR No. 2.08.13.

2.08.15) 2.08.15.1) Trans Mountain relies on the engagement activities through its Aboriginal Engagement Program ("Program"). Through the Program, Trans Mountain engages with Aboriginal groups to provide comprehensive information to them and seek feedback from them on the Project and to identify potential impacts of the Project on the assertion of Aboriginal rights and title governing traditional and cultural use of the land and marine environment.

Detail in regard to information considered to date is outlined in the response to ALIB IR No. 2.08.04.

2.08.15.2) Trans Mountain did not conduct any strength of claim assessments. Through the Aboriginal Engagement Program, Trans Mountain engages with Aboriginal groups to provide comprehensive information to them and seek feedback from them on the Trans Mountain Expansion Project (the Project) and to identify potential impacts of the Project on treaty and Aboriginal rights, title and interests and their traditional and cultural use of the land and marine environment.

Trans Mountain has attempted to obtain Traditional Knowledge from Adams Lake Indian Band through a series of engagement meetings, invitations to accompany archaeology and geotechnical study crews, and the offer to support a TLRU study. Funding for a TLRU study has been discussed but the parties have been unable to reach agreement to date.

The environmental and socio-economic effects assessment methodology is based on the National Energy Board (NEB) Filing Manual (2013), Canadian Environmental Assessment Act, 2012 and various guiding documents from the Canadian Environmental Assessment Agency as outlined in Section 7.1 of Volume 5A (Filing ID A3S1Q9). Detailed information regarding the methodology used to identify project effects using baseline information established through TLU studies can be found in Section 3.0 of Volume 5D1 (Filing ID A3S2G8).

The methodology used to assess potential adverse effects of the Project on valued components supporting the exercise of Aboriginal rights and interests can be found in Section 7.0 of Volumes 5A and 5B of the Application (Filing IDs A3S1Q9 and A3S1S7). This assessment considers: the potential environmental and socio-economic effects of the Project; ways in which these effects can be minimized or avoided altogether; and key mitigation strategies in place that will further reduce these effects.

Trans Mountain will continue engage with Adams Lake Indian Band with any additional site-specific mitigation measures resulting from this engagement being provided in the updated Environmental Protection Plans to be filed with the NEB 90 days prior to construction as per NEB Draft Conditions No. 29 to 31 of the NEB's *Letter – Draft Conditions and Regulatory Oversight* (Filing ID A3V8Z8). Any additional information that Adams Lake Indian Band is able to provide to Trans Mountain, will also be considered in Project planning and design.

2.09.0 ABORIGINAL ENGAGEMENT

Reference:

i) A3SOU6, Application Volume 3B: Aboriginal Engagement, Appendix A-2-01 at Adobe pages, Adams Lake Indian Band Engagement Log, Adobe pages 34, 36-38; and

ii) A59343, Consultation Update No. 1 – Errata; Adobe page 35.

Preamble:

In Application Volume 3B, section 1.3.4 Trans Mountain states that its Aboriginal Engagement Program is "comprehensive", "flexible, allowing each community and group to engage in meaningful dialogue in the manner they choose, and in a way that meets their objectives and values." Trans Mountain states that the Aboriginal Engagement Program focuses on, among other things, "enhancing trusting and respectful relationships", "identifying potential impacts and addressing concerns", and "discussing the adequacy of planned impact mitigation and opportunities."

Request:

2.09.1) Please confirm that you did not consult with ALIB before developing the Aboriginal Engagement Program.

2.09.2) If Trans Mountain did consult with ALIB prior to developing its Aboriginal Engagement Program, please provide:

2.09.2.1) Who from ALIB Trans Mountain consulted with;

2.09.2.2) The dates Trans Mountain consulted with ALIB; and

2.09.2.3) Any meeting minutes or information exchanged in this consultation.

2.09.3) Please provide Trans Mountain's updated record of engagement with ALIB in relation to the Project.

2.09.4) Please explain how ALIB's community and traditional knowledge have been incorporated into the Application for the proposed Project.

2.09.5) Please explain how ALIB's community and traditional knowledge will be incorporated into any Application updates for the proposed Project.

2.09.6) Please describe the process by which Trans Mountain determined that communities were in close proximity to the pipeline right-of-way, including the information relied on in making this determination.

2.09.7) Please confirm that Trans Mountain has not replied to ALIB's correspondence to Trans Mountain dated November 26, 2014 respecting the Fisheries Offset Program.

Response:

2.09.1) Trans Mountain did not consult with ALIB before developing the Aboriginal Engagement Program.

2.09.2) 2.09.2.1) Refer to response to ALIB IR No. 2.09.1.

2.09.2.2) Refer to response to ALIB IR No. 2.09.1.

2.09.2.3) Refer to response to ALIB IR No. 2.09.1.

2.09.3) Engagement logs for ALIB are included in Appendix A of Volume 3B (Filing ID A3S0U6), Appendix A of Consultation Update No. 1 (Filing ID A3V3L9), Appendix A of Consultaton Update No. 2 (Filing ID A3Z8Q2) and NEB IR No. 3.008a - Attachment 1 (Filing ID A65693).

2.09.4) In compiling the Traditional Land and Resource Use (TLRU) Report (Filing IDs A3S2G8, A3S2G9, A3S2H0 and A3S2H1), background research on Adams Lake Indian Band was conducted to determine historic and current TLRU within the study area. Background research consisted of a review of the following:

- publicly available Traditional Land Use (TLU) reports;
- meetings and conversations with Aboriginal community representatives;
- environmental assessments for projects with a similar geographic socio-cultural context or regulatory context;
- published reports from government agencies involved in administering or regulating a specified area or resource; and
- Geographical Information System (GIS) tools to determine spatial relationships of source data to the Project study area.

TLRU information pertaining to Adams Lake Indian Band was not submitted to Trans Mountain to contribute to the overall effects assessment for the Project. However, Adams Lake Indian Band presented evidence on November 17, 2014 during the Aboriginal Oral Traditional Evidence Hearings for the Project, which will be incorporated into Project planning. Adams Lake Indian Band provided field participants on biophysical field studies for the Project as indicated in Appendix A-2-15 of Consultation Update No. 1 and Errata (Filing ID A3V3L9). However, Adams Lake Indian Band elected not to share TEK with TERA facilitators for the purpose of the Project.

Additional traditional resource use information received from participating Aboriginal groups will also be reviewed and mitigation measures including those found in the Environmental Protection Plans (Volume 6B [Filing IDs A3S2S2, A3S2S3 and A3S2S4], Volume 6C [Filing IDs A3S2S5, A3S2S6 and A3S2S7] and Volume 6D [Filing IDs A3S2S8 and A3S2S9]) will be implemented. Any additional site-specific mitigation measures resulting from these studies will be provided in the updated Environmental Protection Plans to be filed with the NEB 90 days prior to construction as per NEB Draft Conditions No. 29 to 31 of the NEB's Letter –

Draft Conditions and Regulatory Oversight (Filing ID A3V8Z8).Trans Mountain is committed to the continuation of an effective engagement program that satisfies all parties (Volume 5B, Section 3.2.4; Filing ID A3S1R5).

2.09.5) Trans Mountain will continue engagement with ALIB to provide updates on the status of the Project and discuss proposed mitigation and enhancement measures. Additional traditional resource use information received from ALIB will be reviewed and any proposed mitigation measures will be aligned with those found in the Environmental Protection Plans (Volume 6B [Filing IDs A3S2S2, A3S2S3 and A3S2S4], Volume 6C [Filing IDs A3S2S5, A3S2S6 and A3S2S7] and Volume 6D [Filing IDs A3S2S8 and A3S2S9]). Any additional site-specific mitigation measures resulting from traditional resource use information will be provided in the updated Environmental Protection Plans to be filed with the NEB 90 days prior to construction as per NEB Draft Conditions No. 29 to 31 of the NEB's Letter – Draft Conditions and Regulatory Oversight (Filing ID A3V8Z8).Trans Mountain is committed to the continuation of an effective engagement program that satisfies all parties (Volume 5B, Section 3.2.4; Filing ID A3S1R5).

2.09.6) The process for determination has not been static, rather Trans Mountain has taken an inclusive and on-going approach in its process to determine the location of communities.

In 2012 and 2013, Trans Mountain relied on its past engagement with Aboriginal groups and its engagement with the Crown as outlined in the Volume 3B of the Facility Application (Filing ID A3S0U5). Throughout its engagement with Aboriginal groups, starting with the invitation for engagement on May 12, 2012 letter (Filing ID A3S0U9), Trans Mountains understanding has developed, based on the transfer of knowledge and territory maps from Aboriginal groups.

2.09.7) Trans Mountain notes that this is incorrect, a telephone conversation took place on December 22, 2014 with Trans Mountain Team Member, Georgia Dixon and ALIB Band Manager, Albert Quinn.

As extracted from the engagement log filed with NEB IR No. 3.008a - Attachment 1 (Filing ID A65693):

> "Team Member telephoned A. Quinn to advise that Trans Mountain Expansion Project (TMEP) was reviewing the concerns of Adams Lake Indian Band (ALIB) regarding the Aquatic Offset Program and reconsidering the capacity funding request of ALIB. A. Quinn advised that ALIB remained open to engaging with TMEP; however, ALIB had concerns with the lack of timely response to their need for capacity funding and to their concerns generally. Team Member acknowledged the engagement with ALIB needed to be more responsive and TMEP wanted to improve the engagement with ALIB. A. Quinn advised ALIB looked forward to an engagement plan with TMEP in the New Year that included addressing their concerns regarding

capacity funding, the Aquatic Offset Program, and ALIB's Aboriginal interests in the TMEP."

2.10.0 ENGAGEMENT LOGS

Reference:

i) A3SOU6, Application Volume 3B: Aboriginal Engagement, Appendix A-2-01 at Adobe pages 213 - 214, Adams Lake Indian Band Engagement Log;

ii) A3V3L9, Consultation Update No. 1 – Errata, Appendix A-2-01 at Adobe pages 66-67, Adams Lake Indian Band Engagement Log; and

iii) A3X8Q2, Technical Update; Adobe page 56.

Preamble:

The Engagement Logs are presented in tabular format with the following headings: Event Date; Event Type; Community Contacts; Team Members; Details; Concerns.

Request:

2.10.1) Please explain what the heading, “Concerns” means?

2.10.2) For each engagement event, please identify whether Trans Mountain’s representatives asked the Adams Lake Indian Band contact engaged if they had any concerns.

2.10.3) Does Trans Mountain consider each entry in the engagement log for Adams Lake Indian Band consultation with Adams Lake Indian Band?

Response:

2.10.1) Trans Mountain interprets “concerns” (as used as a column heading in the Aboriginal Engagement Logs) to be broad and includes not only the expression of activity with the potential to effect the assertion of Aboriginal rights and title governing traditional and cultural use of the land and marine environment but also expressed interests in Project opportunities.

2.10.2) As used as a column heading in the Aboriginal Engagement Logs, the use of the title “concern” is broad and includes not only the expression of activity with the potential to effect the assertion of Aboriginal rights and title governing traditional and cultural use of the land and marine environment but also expressed interests in Project opportunities.

During engagement with Aboriginal groups Trans Mountain records the expression of potential Project effects and expressed interests in Project opportunities. The records are utilized to produce the Aboriginal Engagement Logs, the activities are summarized and the stated expressions are populated within the “concerns” column of the log.

2.10.3) Trans Mountain considers each entry in the engagement log for Adams Lake Indian Band (ALIB) to be engagement with ALIB.

Trans Mountain utilizes the term “engagement” rather than “consultation” due to the legal nature associated with the term “consultation”.

2.11.0 HUMAN HEALTH RISKS

Reference:

i) A3S1R7, A3S1R9 Application Volume 5B, Section 5; and

ii) A3S1S7 Application Volume 5B, Section 7.

Preamble:

Volume 5B of the Application sets out the Proponent's assessment of the socio-economic setting, and establishes "socio-economic elements", against which the impacts of the Project are assessed. Section 7.1.1 of the Application states that "[t]he potential socio-economic elements interacting with the Project include heritage resources, traditional land and resource use (TLRU), traditional marine resource use (TMRU), social and cultural well-being, human occupancy and resource use (HORU (including visual aesthetics), infrastructure and services, navigation and navigation safety, employment and economy, community heath and HHRA [Human Health Risk Assessment]".

Request:

2.11.1) Has Trans Mountain conducted a separate assessment of each socio-economic element for Aboriginal communities, or are Aboriginal peoples assessed with all other stakeholders?

2.11.2) How has Trans Mountain assessed the health of ALIB members?

2.11.3) Has Trans Mountain conducted an assessment on the unique health impacts to ALIB in the event of a spill?

2.11.4) If the answer to 11.3 is yes, please advise:

2.11.4.1 Where did Trans Mountain get this information?

2.11.4.2 What was the outcome of this assessment?

2.11.4.3 Where did Trsns Mountain get this information?

Response:

2.11.1) The assessment of the Traditional Land and Resource Use (TLRU) and Traditional Marine Resource Use (TMRU) elements are specific to Aboriginal people. The assessment related to other socio-economic elements considered effects that would be experienced by both Aboriginal and non-Aboriginal residents and land and resource users in the study area of the Trans Mountain Expansion Project (Project).

However, within certain other socio-economic elements (i.e., social and cultural well-being, human occupancy and resource use [HORU], community health), some indicators specific to Aboriginal peoples and unique potential residual effects for Aboriginal peoples were identified, as noted further below.

The assessment indicators selected for all socio-economic elements represent components of the socio-economic environment that are of particular importance or interest to regulators, Aboriginal communities, regulatory authorities, local communities, and other interested groups and individuals. The indicators have been selected based on: the National Energy Board (NEB) Filing Manual guidelines; experience gained during previous projects with similar conditions/potential issues; feedback from Aboriginal communities, regulatory authorities and stakeholders; feedback from participants in ESA Workshops; public issues raised through media; and the professional judgment of the assessment team.

2.11.2) The Application presented an assessment of the potential changes in health to populations in Socio-economic Regional Study Area (RSA) from the proposed Project in Technical Report 5D-8 of Volume 5D, Community Health Technical Report (Habitat Health Impact Consulting Corp. 2013; Filing ID A3S2L9). Conclusions about changes in community health were drawn in the areas of socio-economic health effects, infectious diseases, environmental health effects, public safety, health care infrastructure and diet and nutritional outcomes for Aboriginal populations. Results of the community health assessment are presented by geographical segment, and/or in relation to specific factors that would influence health outcomes (*e.g.,* location of construction worker camps). The ALIB is included as part of the Fraser-Fort George/Thompson Nicola Region. Community health effects are not predicted separately for the ALIB.

In addition, an human health risk assessment (HHRA) aimed at identifying and understanding the potential health effects that might be experienced by people under a set of simulated pipeline oil spill scenarios was completed and provided in Human Health Risk Assessment of Pipeline Spill Scenarios Technical Report (Intrinsik June 2014) (Filing ID A3X6U1). The focus of the assessment was on the potential health effects that could occur among people, including Aboriginal peoples, found in the area at the time of the spill from inhalation exposure to the hydrocarbon and other chemical vapours released from the surface of the spilled oil during the early stages of the incident, before the arrival of first responders and the implementation of emergency and spill response measures. If conditions warrant, local and/or provincial authorities can implement controls or issue advisories to protect public health. These measures would further reduce the potential opportunities for exposure of Aboriginal groups and individuals to the chemicals released initially from the oil via inhalation, but also through secondary pathways on both a short- and long-term basis.

Based on the weight-of-evidence, the major conclusions that emerged from the assessment were that:

- there was no obvious indication that people's health would be seriously adversely affected by short-term inhalation exposure to the chemical vapours released from the pooled oil during the early stages of a spill;
- the health effects that could be experienced by people in the area would be confined to minor, transient sensory and/or non-sensory effects, including minor

discomfort, irritability, mild irritation of the eyes, nose and/or throat, mild cough, and symptoms consistent with central nervous system involvement such as mild headache, light headedness, minor vertigo, dizziness, and/or nausea;

- mild, transient, localized skin irritation could occur in the event that the spilled oil was to contact the skin; and
- odours could be apparent to some individuals. The odours would be dominated by a hydrocarbon-like smell, with some potential for other distinct odours due to the presence of sulphur containing chemicals in the vapour mix. The odours could contribute to added discomfort and irritability among these select individuals.

Although the simulated pipeline oil spill scenarios that were examined in the HHRA involved the spillage of oil to land within Metro Vancouver, the above conclusions would be expected to apply to smaller communities along the pipeline corridor, including the ALIB and other Aboriginal Communities. It is worth noting that the area within which these health effects could be experienced was relatively limited, and not predicted to extend beyond approximately 1 km from the damaged pipeline segment. It also is worth noting that the above findings and conclusions are consistent with those of an independent literature review recently completed for Vancouver Coastal Health. This literature review focused on historical oil spills and found that the short-term health effects witnessed among people living in the area consisted of mild, transient sensory and/or non- sensory effects, including headache, nausea, sore eyes, sore throat, nasal irritation and other symptoms similar to those mentioned in the HHRA (Eykelbosh 2014).

Reference:

Eykelbosh, A. 2014. Short- and long-term health impacts of marine and terrestrial oil spills. Literature review prepared for the Regional Health Protection Program, Office of the Chief Medical Office, Vancouver Coastal Health by Institute for Resources, Environment and Environmental Sustainability.

2.11.3) Trans Mountain did not undertake an assessment of the specific short- and long-term health effects of an oil spill on ALIB or any other individual Aboriginal group. The following response is provided to respond to this request and other similar Information Requests regarding potential health effects on Aboriginal groups. Some of this response is copied from the more detailed response to GoC IR No. 2.03.2 (Filing ID A4H6A5) that describes potential effects of an oil spill on Aboriginal health, culture, spiritual and traditional activities and proposed measures that could mitigate these effects.

A description of the risk-based approach used to evaluate the potential effects of pipeline and terminal spills is provided in the introductory comments included in Section 6.0 of Volume 7 (Filing ID A3S4V6). The evaluation provided by Trans Mountain was patterned on the structured risk assessment approach developed to support the Aleutian Islands Risk Assessment (Transportation Research Board 2008) and included three key elements:

- The first element involved a quantitative risk assessment to define the risk of spills from pipelines, the Westridge Marine Terminal, and Project-related marine vessels, the size of spills that could credibly occur, and credible locations for those incidents.

- The second element involved a qualitative assessment of potential environmental and socio-economic consequences based on evidence from past oil spills and studies. This discussion considered a wide range of spill volumes. Where possible, the information provided in this section reflected issues identified by Aboriginal groups and others.

- The third element involved more detailed quantitative analysis of environmental and human physical health outcomes. These analyses were based on credible worst-case and smaller spill scenarios developed for representative locations along the pipeline corridor and tanker transit route and at the Westridge Marine Terminal. These quantitative evaluations relied on the well-established and widely accepted Ecological Risk Assessment (ERA) and Human Health Risk Assessment (HHRA) methods to evaluate the ecological and physical human health outcomes for these hypothetical spill scenarios. A more quantitative approach was not adopted for predicting effects on other socio-economic indicators, including local and regional economies, community well-being, and Aboriginal health, culture, spiritual and traditional activities. No widely accepted method exists for predicting oil spill socio-economic effects due to the inherent complexity resulting from the role of human interpretation and its influence on individuals' experiences of social effects and their ability, willingness and confidence to respond to change.

Physical health effects of credible worst case and smaller pipeline spill scenarios in Metro Vancouver were evaluated in the technical report - Human Health Risk Assessment of Pipeline Spill Scenarios (Intrinsik Environmental Sciences Inc. 2014; Filing ID A3X6U1; hereafter referred to as the Pipeline Spill Scenarios HHRA). This scenario was selected in part because of the large number of people potentially at risk in an urban centre such as Metro Vancouver, including greater numbers of sensitive individuals, compared to smaller communities. In addition, participants at various community meetings and the Fraser Health Authority and Vancouver Coastal Health Authority expressed an interest in understanding the potential human health effects that could result from an oil spill in an urban area. Aboriginal group concerns about potential health effects were similar to those of other urban and rural residents, and the potential health effects identified through this HHRA are considered to be representative of the types of physical health effects that could be experienced within Aboriginal communities and other smaller communities along the pipeline corridor.

The focus of the Pipeline Spill Scenarios HHRA was on determining the nature and extent of the potential health effects that could occur from short-term inhalation exposure to the chemical vapours released from the surface of pooled oil. This situation could occur during the early stages of the event before the arrival of first responders and the implementation of emergency and spill response measures aimed at quickly isolating and recovering the spilled oil and protecting public health and safety. Exposure to the

vapours would be via inhalation on a short-term basis, with the likelihood and extent of exposure declining as responders arrive on scene and emergency response measures are taken.

In addition to the implementation of the emergency and spill response measures, if conditions warrant, local, provincial and/or federal authorities can implement controls or issue advisories to protect public health. Examples of such controls include closure of commercial and recreational fisheries, beach closures, forced evacuation of people off shore and/or on shore if public health and safety are threatened, and the issuance of fish, shellfish or other seafood consumption advisories. In this regard, once a spill has occurred, Fisheries and Oceans Canada (DFO) is notified. DFO along with other regulatory authorities such as Environment Canada and the Canadian Food Inspection Agency (CFIA) will assess the spill and, based on its location, size and the potential opportunities for people to be exposed to the oil through different exposure pathways, will determine the types of added control measures, if any, that may be necessary. These measures will further reduce the potential opportunities for exposure of people to the chemicals released during a spill not only via inhalation, but also through secondary pathways on both a short- and long-term basis.

Based on the weight-of-evidence and the findings of the Pipeline Spill Scenarios HHRA, there is no obvious indication that people's health would be seriously affected by short-term inhalation exposure to the chemical vapours released from the pooled oil during the early stages of a spill. The findings and conclusions of the HHRA indicate the health effects that could be experienced by people in the area immediately downwind of the potential spill would be confined to mild, transient sensory and/or non-sensory effects. Effects might include discomfort, irritability, mild irritation of the eyes, nose and throat, mild cough, and symptoms associated with central nervous system involvement such as mild headache, light headedness, minor vertigo, dizziness, and/or nausea. These conclusions are consistent with conclusions of an independent literature review recently completed for Vancouver Coastal Health (Eykelbosh 2014)

The Vancouver Coastal Health literature review (Eykelbosh 2014) also confirms Application conclusions provided in the qualitative evaluation of potential socio-economic effects in Section 6.3 of Volume 7 (Filing ID A3S4V5). Both conclude that spills have resulted in short-term effects on physical health and short- to long-term effects on mental health and community well-being. Evidence from past spills also suggests that the most vulnerable groups are: clean-up workers (with improper or inadequate training or personal protective equipment use); Aboriginal groups who participate in subsistence activities; and individuals and communities dependent on natural resources affected by a spill. Finally, the Vancouver Coastal Health literature review also found evidence that effective approaches to mitigate effects on mental health and community well-being include: easing financial uncertainty through timely and satisfactory compensation, implementing mechanisms that encourage or utilize social support, and public engagement and risk communication about a spill and food safety in particular.

This response shows that while Trans Mountain did not undertake a specific assessment of the health effects of an oil spill on the ALIB or any other individual Aboriginal group, the risk-based information provided by Trans Mountain provides information about the effects that could result from a large oil spill at almost any location along the proposed pipeline corridor, including locations close to Aboriginal communities. The assessment provided in the Application demonstrates that, although the probability of a credible worst case crude oil spill is low, some prospect exists for people to experience short-term physical health effects of a minor, transient nature that could still be annoying and uncomfortable and for community mental health and well-being to be negatively affected on both a short-term and longer-term basis if prompt and effective measures are not taken to mitigate the immediate impacts by containment, recovery, and appropriate public health and safety measures. This confirms that spill prevention, preparedness, and effective response activities must always be a primary focus to reduce the probability of an oil spill, and to have adequate oil spill response plans and procedures in place that have proven capability to reduce the magnitude and extent of actual effects on people and the environment.

References:

Eykelbosh, A. 2014. Short- and long-term health impacts of marine and terrestrial oil spills. Literature review prepared for the Regional Health Protection Program, Office of the Chief Medical Office, Vancouver Coastal Health by Institute for Resources, Environment and Environmental Sustainability.

Transportation Research Board. 2008. Risk of vessel accidents and spills in the Aleutian Islands, Designing a comprehensive risk assessment. Prepared for the Transportation Research Board of the National Academies by the Committee on the Risk of Vessel Accidents and Spills in the Aleutian Islands: A study to design a comprehensive risk assessment Risk Assessment. Transportation Research Board Special Report 293.

2.11.4) Refer to the response to ALIB IR No. 2.11.3.

2.11.4.1 Refer to the response to ALIB IR No. 2.11.3.

2.11.4.2 Refer to the response to ALIB IR No. 2.11.3.

2.11.4.3 Refer to the response to ALIB IR No. 2.11.3.