National Energy Board | Office national de l'énergie

National Energy Board Report

Trans Mountain Pipeline ULC

OH-001-2017

April 2018

Route Realignment

Canada

National Energy Board

National Energy Board Report

In the Matter of

Trans Mountain Pipeline ULC

Application dated 27 March 2017 for the Chilliwack BC Hydro Route Realignment

OH-001-2017

April 2018

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Glossary of Terms and Abbreviations

OH-001-2014	Trans Mountain Expansion Project Hearing
OH-001-2017	Chilliwack BC Hydro Route Realignment Hearing
AC	Alternating Current
AIA	Archaeological Impact Assessment
ALARP	As low as reasonably practicable
Applicant, Trans Mountain or the Company	Trans Mountain Pipeline ULC
Application	Trans Mountain application for the Chilliwack BC Hydro Route Realignment dated 27 March 2017, pursuant to subsection 21(2) of the NEB Act.
ATP	Application to Participate
BC	Province of British Columbia
Board or NEB	National Energy Board
CEAA 2012	Canadian Environmental Assessment Act, 2012
Certificate	Certificate of Public Convenience and Necessity granted under section 54 of the National Energy Board Act and in this case referring to Certificate OC-064 for the Trans Mountain Expansion Project.
CHOA	Cultural Heritage Overview Assessment
City	City of Chilliwack
Commenter	A person who is directly affected and/or has relevant information or expertise regarding the Chilliwack Realignment and who has been approved by the Board to provide a letter of comment
CCO	Control Centre Operator

CPM	Continuous Pipeline Monitoring
CSA Z662-15	Canadian Standards Association Z662-15, Oil and Gas Pipeline Systems
EA	Environmental Assessment
e-file	Filing documents electronically with the Board.
EMP	Emergency Management Program
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ESA	Environmental and Socio-Economic Assessment
Evidence	Reports, statements, photographs, and other material or information that Participants file as part of the record. Evidence is used to support their position on the Application.
File	A formal way of filing documents with the Board.
for approval	When a condition requires a filing with the Board "for approval", Trans Mountain must not commence the indicated action or activity until the Board issues its written approval of the filing.
GIS	Geographic Information System
GRP	Geographic Response Plan
Governor in Council or GiC	The Governor General acting on the advice of the Federal Cabinet
HDD	Horizontal Directional Drill
Hearing or public hearing	A public process we use to gather and test evidence so we can make fair and transparent decisions. This hearing included a written portion and an oral portion.
Intervenor	A person who is directly affected, has relevant information or has expertise regarding the Chilliwack Realignment and whose Application to Participate has been approved. Being an Intervenor is the fullest way to participate in the hearing process.

IR or Information Request	A written question about Trans Mountain or an Intervenor's evidence.
List of Issues	The List of Issues that were considered in this hearing, as referenced in Section 2.4.
LSA	Local Study Area
MC	Master of Ceremony
MOP	Maximum Operating Pressure
NEB Act	*National Energy Board Act*
NPS	Nominal Pipe Size (in inches)
OPR	*National Energy Board Onshore Pipeline Regulations*
Order	A Board order made under the NEB Act.
OTE	Oral Traditional Evidence
P1 or approved TMEP corridor	Corridor approved during the TMEP OH-001-2014 Hearing. P1 is the detailed route found within the approved TMEP corridor. These terms are very close in meaning and are sometimes used interchangeably within this Report
P1A	A pipeline route found partly outside (on the south side) of the approved TMEP corridor
P2 or Chilliwack Realignment	The proposed route alignment found within the TMPL easement. P2 is interchangeably used with Chilliwack Realignment.
Participant	A person who has applied to participate in the hearing and whose Application to Participate has been approved by us. The term Participants includes Trans Mountain, Intervenors, and Commenters.
Parties	Includes the Applicant and Intervenors; does not include Commenters
PRRO	People of the River Referral Office
PFP	Participant Funding Program

post-construction	Activities to take place once construction is complete, following final clean-up through to the completion of reclamation activities; including monitoring to evaluate the success of reclamation activities, compliance with commitments, and the stability of the disturbed lands.
Public registry	An online document repository for the evidence filed in the hearing. It is the record that is available to the public. In this case the public registry and the record include the same information. However, in exceptional circumstances, the Board may decide that certain information can be filed confidentially. This information is part of the record, but not available on the public registry.
RAP	Remedial Action Plan
Record	The record includes all relevant submissions and evidence filed or given orally in the proceeding, including documents such as the Application and the Hearing Order.
Regulatory Officer	Board staff who assist Participants, manage documentation before, during and after the hearing, perform court clerk duties at the hearing and manage the post hearing process.
Report	A report prepared by us to the Governor in Council that includes our decisions as to whether the Order should be granted for the Chilliwack Realignment and the reasons for the decisions. When making the decisions, we will take into account whether the Chilliwack Realignment is and will be required for the present and future public convenience and necessity.
Rules	*National Energy Board Rules of Practice and Procedure, 1995*
SRRMC	Stó:lō Research and Resource Management Centre
STSA	S'ólh Téméxw Stewardship Alliance
TCH	Trans Canada Highway
TEK	Traditional Ecological Knowledge
TLRU	Traditional Land and Resource Use
TLU	Traditional Land Use

TMEP	Trans Mountain Expansion Project – The approved pipeline from Alberta to British Columbia twinning the existing Trans Mountain Pipeline. The project was approved under Certificate of Public Convenience and Necessity OC 64.
TMPL	Trans Mountain Pipeline – The existing and operational Trans Mountain pipeline from Alberta to British Columbia.
TWG	Technical Working Group
TWS	Temporary Workspace
WaterWealth	The WaterWealth Project
We or Us	The Board

List of Units

Bbl/d	Barrels per day
ft	feet
km	Kilometre
Kb/d	Thousands barrels per day
kPa	Kilopascal (one thousand pascals)
kV	Kilovolt
L	Litre
m	Metre
m^3/d	Cubic metres per day
mg/L	Milligrams per litre
mm	Millimetre
Mcf	Thousand cubic feet
MMcf/d	Million cubic feet per day
MPa	Megapascal (one million pascals)
¢/Mcf	Cents per thousand cubic feet
%	Per cent
10^3m^3	Thousand cubic meters
$10^3m^3/d$	Thousand cubic meters per day
yr	Year

Recital and Appearances

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

IN THE MATTER OF an application dated 27 March 2017 by Trans Mountain Pipeline ULC for the Chilliwack BC Hydro Route Realignment, pursuant to section 21 of the *National Energy Board Act,* filed with the National Energy Board under File No. OF-Fac-Oil-T260-2013-03 13; and

IN THE MATTER OF National Energy Board Hearing Order OH-001-2017 dated 31 August 2017;

HEARD in Chilliwack, British Columbia on 15 to 18 January 2018;

BEFORE:

L. Mercier	Presiding Member
J. Ballem	Member
S. Parrish	Member

Appearances	**Participants**	**Witnesses**
T. Chrzanowski J. Fontaine T. Oleniuk	Trans Mountain Pipeline ULC	S. Bond S. Foley R. Gummow J. Macleod J. Mihell J. Smith P. Symington G. Toth
J. Teillet	S'ólh Téméxw Stewardship Alliance	S. Roberts
O. Rivkin R. Vallance	City of Chilliwack	R. Sanderson G. Wendling
I. Stephen	The WaterWealth Project	I. Stephen
L. Bell L. Sherret	National Energy Board	

Oral Traditional Evidence

S'ólh Téméxw Stewardship Alliance	Chief M. Point E. Victor S. James Elder A. McHalsie D. Douglas (MC)

Chapter 1

Decision

This National Energy Board Report (Report) constitutes the National Energy Board's (NEB or Board) decision and reasons in respect of the Trans Mountain Pipeline ULC (Trans Mountain) application pursuant to section 21 of the *National Energy Board Act* (NEB Act) seeking a variance to Certificate of Public Convenience and Necessity OC-064 (Certificate). The Chilliwack BC Hydro Route Realignment (Chilliwack Realignment) would change the general pipeline corridor of the Trans Mountain Expansion Project (TMEP) for a short section and would relocate the TMEP to be within the existing Trans Mountain pipeline (TMPL) right-of-way. The realignment is outside the approved TMEP corridor for approximately 1.8 kilometres (km).

This chapter summarizes the benefits and burdens associated with the Chilliwack Realignment in comparison to the approved TMEP corridor, and provides the Board's overall decision with respect to the applied-for variance based on a weighing of those benefits and burdens. The Board notes the importance of the whole Report and cautions readers against reading individual chapters in isolation.

1.1 Benefits, Burdens, and Decision

The Board generally weighs the benefits and burdens of a proposal in deciding whether it is in the public interest. Most benefits and burdens of the TMEP are the same as assessed during the OH-001-2014 Hearing and as described in the NEB's May 2016 TMEP Report, with or without the Chilliwack Realignment. For example, as noted in Chapter 7: Environment and Socio-Economic Matters, for a number of environmental and socio-economic issues, there are no predicted material differences between the Chilliwack Realignment and the originally assessed TMEP.

Some differences are detailed in the following chapters, however. Expected benefits of the Chilliwack Realignment compared to the approved TMEP corridor include:

- avoidance of proximity concerns with BC Hydro infrastructure;
- the proposed fibre-optic leak detection system could potentially detect ground disturbances for the existing TMPL given the proximity between the two pipelines in the Chilliwack Realignment area;
- 500 metres (m) shorter in length and within or adjacent to the existing TMPL easement, which reduces the potential area of environmental disturbance and the overall risk of a spill; and
- leverages the knowledge and experience of landowners already familiar with living in proximity to an existing pipeline.

On the other hand, expected burdens of the Chilliwack Realignment compared to the approved TMEP corridor include:

- one additional road crossing and 20 additional utility crossings;
- slightly higher probability that oil from a pipeline leak or spill that makes its way to the groundwater would then make its way to the City water wells; and
- construction would take place close to existing residential housing.

Trans Mountain said that the pipeline alignment within the approved TMEP corridor was not acceptable to BC Hydro from a technical and operational perspective, and so it reverted to its first routing principle of utilizing the existing TMPL easement which represents the best possible alignment for TMEP in this area.

In contrast, the City of Chilliwack (City) said that while routing within or alongside the BC Hydro transmission alignment (i.e. the P1 and P1A routing) may increase pipeline construction costs and may impact City property owners, the increased separation to the City's drinking water wells is simply more important. The City said that impacts to the homes and properties can be mitigated, but that impacts of a potential accident on the aquifer around the wells likely cannot.

Decision

The Board considered and weighed all of the evidence before it in making its decision on the Chilliwack Realignment. Taking the benefits and the burdens associated with the Chilliwack Realignment into account, the Board is of the view that the Chilliwack Realignment is in the public interest and is consistent with the requirements of the NEB Act. In particular, and as detailed in Chapter 3: Facilities and Emergency Response Matters and in Chapter 7: Environment and Socio-Economic Matters:

- despite crossing more roads and utilities, and construction taking place close to existing housing, the Board is satisfied that Trans Mountain's proposed mitigations during construction appropriately address the potential safety concerns associated with constructing in densely populated areas, and that construction can therefore be undertaken safely; and
- given Trans Mountain's commitments and the Board's conditions from both the original TMEP hearing and this variance hearing, any increase in risk to the City water wells is minimal, and the Board finds it is outweighed by the above benefits such as avoidance of proximity concerns with BC Hydro infrastructure and the lower overall risk of a spill.

In addition, and as described in Chapter 6: Land Matters, the Board notes that no residents along the Chilliwack Realignment raised objections with the Board.

The Board also took into account the routing criteria Trans Mountain developed in OH-001-2014, which the Board found were appropriate, and the consistency here with Trans Mountain's first principle of co-location with the TMPL where possible.

As detailed in Chapter 5: Aboriginal Matters, the Board is of the view that there has been adequate consultation and accommodation with regard to potentially affected Aboriginal groups for the purpose of the Board's decision on the Chilliwack Realignment.

The Board therefore approves Trans Mountain's variance application for the Chilliwack Realignment.

In assessing Trans Mountain's Application, the Board has included conditions in addition to the pipeline integrity, safety and environmental protection legislation as well as standards and conditions to which the Chilliwack Realignment is already subject under the Certificate. The Board's additional conditions specific to the Chilliwack Realignment are provided in Appendix 1. The Board takes the commitments made by applicants seriously and throughout its deliberations the Board carefully considered all commitments made by Trans Mountain in this proceeding. For these reasons, the Board has also included **Condition 1** in Appendix 1, which requires Trans Mountain to track and fulfil all the commitments it made during the OH-001-2017 proceeding.

1.2 Next steps

The Board's decision to approve Trans Mountain's variance application for the Chilliwack Realignment comes into effect if approved by Governor in Council (GiC), pursuant to subsection 21(2) of the NEB Act. Should the variance be approved by GiC, Trans Mountain would be required to fulfill its commitments and satisfy the Board's requirements.

Trans Mountain is engaged in a detailed route approval process as of the writing of this decision for the whole of the TMEP pipeline. As noted previously by the Board, holding of the detailed route hearings for the areas affected by this variance will occur after GiC issues its decision on this matter. If any changes to the detailed route hearing process are required after the GiC decision, the Board will respond accordingly.

The Board's role does not end once a hearing process is complete; the Board takes a lifecycle approach to regulation, holding its regulated companies accountable so that the public and the environment are protected. The Board is present for all stages of a pipeline's lifecycle – from before a company applies for a project, to the assessment of that project, to the construction and operation of a project, and finally to the oversight and approval of abandonment, reclamation plans and post-abandonment conditions. This would include the Board monitoring Trans Mountain's compliance with the Board's requirements throughout the lifecycle of the TMEP, including the Chilliwack Realignment.

L. Mercier
Presiding Member

J. Ballem
Member

S. Parrish
Member

Chapter 2

Application and Hearing Process

2.1 Background

The NEB conducted a hearing (OH-001-2014) on the proposed TMEP, from April 2014 to May 2016. The Board's May 2016 Report recommended TMEP be approved and described 157 conditions to be attached to any such approval. On 1 December 2016, the NEB issued the Certificate, and Amending Orders AO-003-OC-2 and AO-002-OC-49. On 6 June 2016, the Board issued Orders XO-T260-007-2016, XO-T260-008-2016, XO-T260-009-2016, XO-T260-010-2016, and MO-015-2016, which took effect upon the issuance of the Certificate. The Certificate and Orders authorize the construction and operation of the TMEP, subject to the 157 conditions.

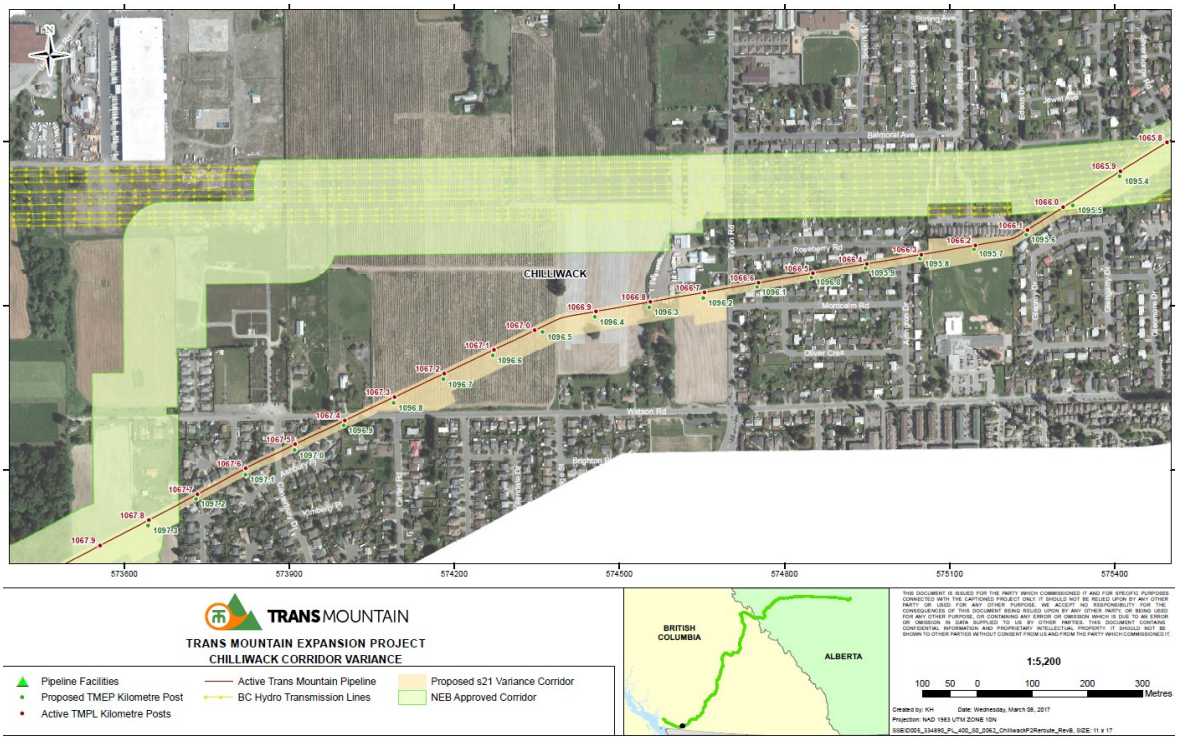
2.2 What did Trans Mountain apply for?

On 27 March 2017, Trans Mountain applied under section 21 of the NEB Act to vary the Certificate to change the approved TMEP pipeline corridor for the Chilliwack Realignment. If approved, the Chilliwack Realignment would relocate the TMEP corridor within the existing Trans Mountain pipeline right-of-way (see Figure 2-1).

Specifically, in its Application, Trans Mountain requested that the Board:

- vary the Certificate pursuant to subsection 21(1) of the NEB Act approving a revised pipeline corridor for the Chilliwack Realignment, as described in the Application;
- determine that the potential adverse effects associated with the proposed variance are consistent with those already assessed during the TMEP proceeding (OH-001-2014) leading to the issuance of the Certificate and taking into account the implementation of Trans Mountain's environmental protection procedures and mitigation measures and the Board's recommendations and conditions included in the Certificate, the proposed variance is not likely to cause significant adverse environmental effects; and
- grant such further and other relief as Trans Mountain may request or the Board may consider appropriate.

Figure 2-1: Project Location Map



2.3 Alternative Routes

Trans Mountain generally referred to the routing within the approved TMEP corridor as P1 ('approved TMEP corridor' or 'P1' in this Report), and the proposed Chilliwack Realignment within the TMPL easement as P2 ('the Chilliwack Realignment' or 'P2' in this Report). As detailed in Chapter 6: Land Matters, two other alternative routes were discussed by participants during the hearing:

- P1A: Trans Mountain said that it considered a route on the south side of the BC Hydro corridor, which would be outside of the approved TMEP corridor for approximately 605 m, but said it did not proceed with that route because of difficulties such as impacts to residences; and
- TCH: The City raised the possibility of a different route along the Trans-Canada Highway (TCH), which lies to the north of the approved TMEP corridor. Trans Mountain said it was unable to find a TCH routing that was clearly feasible from an engineering perspective and acceptable to the BC Ministry of Transportation and Infrastructure.

2.4 What did the Board consider?

The Board considered the following issues:

1. The potential environmental and socio-economic effects of the proposed Chilliwack Realignment, as set out in the NEB's Filing Manual.
2. The appropriateness of the general route and land requirements for the proposed Chilliwack Realignment.
3. The suitability of the design of the proposed Chilliwack Realignment.
4. Potential impacts of the Chilliwack Realignment on Aboriginal interests.
5. Potential impacts of the Chilliwack Realignment on landowners and land use.
6. Contingency planning for spills, accidents or malfunctions, during construction and operation of the Chilliwack Realignment.
7. Safety and security during construction of the proposed Chilliwack Realignment and operation of the Chilliwack Realignment, including emergency response planning and third-party damage prevention.
8. The terms and conditions to be included in any approval the Board may issue in relation to the Chilliwack Realignment.

The Board included in its consideration the differences in benefits and burdens between the approved TMEP corridor (i.e. P1 routing) and the Chilliwack Realignment routing (i.e. P2 routing). The Board was presented with some evidence regarding the alternative P1A and TCH routes. The Board notes those alternative routes were not the subject of this variance application, although the Board discusses them as appropriate in this Report.

As noted in Section 1.2 above, should the Chilliwack Realignment be approved by GiC, the detailed routing provisions of the NEB Act would remain to be satisfied, which would include determination of the best possible detailed route of the pipeline and the most appropriate methods and timing of constructing the pipeline.

2.5 How did the Board process the Application?

On 26 June 2017, the Board issued a letter to Trans Mountain which established a comment period for the Board to receive feedback from potentially affected persons related to the process the Board would use to consider the Application. The letter also provided information on how interested parties could file comments with the Board on that process. The Board required Trans Mountain to serve a copy of the letter and its appendices on all persons consulted for the Chilliwack Realignment, including landowners and Aboriginal groups.

The Board received letters of comment from the WaterWealth Project (WaterWealth) and the City. As a result of the comments received, although the NEB Act does not mandate a public hearing for variance applications, the Board decided to hold a public hearing for the Chilliwack Realignment.

On 31 August 2017, the Board issued Hearing Order OH-001-2017 establishing the process for the Board's consideration of the Application, including filing deadlines for evidence, information requests and information responses. The Hearing Order included the List of Issues that the Board would consider during its assessment of the Application, which was amended on 5 December 2017.

2.5.1 NEB Hearing Order and Hearing Process

As set out in Hearing Order OH-001-2017, the Board established both written and oral components in this proceeding. The Board held the oral portion in Chilliwack, BC, during the week of 15 January 2018, where the Board heard oral traditional evidence, oral cross-examination and oral argument. Three Intervenors actively participated in all hearing steps. The Board also received 11 letters of comment.

2.5.2 Participation

To be eligible to participate in the Chilliwack Realignment hearing, interested persons or groups were instructed to request participation and demonstrate in their Application to Participate (ATP) that they were directly affected by the proposed variance or had relevant information or expertise.

Those who wished to participate in the hearing process for the Chilliwack Realignment were required to submit ATPs to the Board between 31 August 2017 and 21 September 2017. The Board received 21 ATPs for the Chilliwack Realignment (six requests for Intervenor status and 15 requests to submit a Letter of Comment). In its Ruling No. 2, dated 3 October 2017, (A86483) the Board issued its decision on participation, indicating that:

- all 15 of the ATPs that requested Commenter status were granted Commenter status;
- four of the six ATPs that requested Intervenor status were granted Intervenor status; and
- the remaining two ATPs that requested Intervenor status were granted Commenter status.

2.5.3 Oral Traditional Evidence (OTE)

As detailed in Chapter 5: Aboriginal Matters, the S'ólh Téméxw Stewardship Alliance (STSA) provided oral traditional evidence at the oral portion of the hearing.

2.5.4 WaterWealth Motion (Motion)

On 10 February 2018, the Board received a notice of motion from WaterWealth requesting that the Board re-open the hearing to include examination of a report filed by Trans Mountain after the closing of the record. WaterWealth's main contention with the report is that information and conclusions contained within it conflict with evidence filed in the hearing with respect to the technical feasibility of the P1A route.

By letter dated 14 February 2018, the Board invited Trans Mountain to comment on the Motion by 20 February 2018 and WaterWealth to file any reply by 23 February 2018. The Board received these filings on the referenced dates. On 21 February 2018, the Board also received a letter of support for the Motion from the City.

After considering the filings, on 8 March 2018, the Board denied the Motion in Ruling No. 4. The Board noted that the report was filed as part of Trans Mountain's ongoing condition compliance work and that it was not considered in reaching this Decision.

2.5.5 Participant Funding

The Board administers a Participant Funding Program (PFP), which provides financial assistance to support participation of individuals, Aboriginal groups, landowners, incorporated non-industry not-for-profit organizations, or other interested groups to facilitate public participation in certain project hearings and environmental assessments of designated projects. The applications for PFP are reviewed by the Funding Review Committee, which operates independently from the regulatory review process.

On 31 August 2017, PFP made available $100,000 to facilitate participation in the regulatory process for the Chilliwack Realignment. The Board received one eligible application from the STSA with a total funding request for $79,993. The amount requested was awarded to the STSA.

Chapter 3

Facilities and Emergency Response Matters

3.1 Risk Assessment and Prevention / Mitigation Measures

Views of Trans Mountain

Trans Mountain provided a comparative risk assessment for P1, P1A and P2 routes. Trans Mountain indicated that the risk of a spill associated with P1 is 9.7% higher than that associated with P2. The risk of a spill associated with the P1A route is 13.0% higher than P2 (Table 1 shows a summary of the risk results for the three route alternatives). The approximate 500 m (20%) shorter length of the Chilliwack Realignment is the main driver in reducing in the overall risk.

Table 1 – Risk Results

Route Option	Length (km)	Failure Frequency (/km.yr)	Mean Failure Return Period Over Segment (Yrs)	Consequence Score (Index)	Integrated Risk Value (Index/yr)
P1	2.453	3.978E-05	10,249	51.3	5.009E-03
P1A	2.386	4.128E-05	10,154	52.8	5.197E-03
P2	1.949	4.422E-05	11,606	52.5	4.521E-03

Trans Mountain acknowledged concerns regarding the protection of the Sardis-Vedder Aquifer, water wells and their capture zones, and the need to implement additional risk mitigation measures. Trans Mountain said that it made a number of engineering and construction related commitments at the request of the City. As a result of ongoing consultation with the City, Trans Mountain committed to treat the Sardis-Vedder Aquifer as if it were a river crossing, including the use of the associated mitigation measures, to drive the risk to as low as possible.

Trans Mountain identified risk mitigation methods it will apply that are incremental to the requirements of CSA Z662-15 Standard, Oil and Gas Pipeline Systems, hence above the minimum design requirements, for the Chilliwack Realignment, at approximately KP 1095 to 1097, as follows:

- leak prevention measures, which include:
  - heavy wall pipe;
  - marker tape installed just above the buried pipeline; and
  - deeper depth of burial; and
- mitigation of volume of fluid released, which includes:
  - installation of an additional mainline isolation valve upstream of the aquifer. While the valve has limited downstream mitigation due to the relatively flat terrain, it does mitigate backflow in the event of a release upstream of the isolation valve; and
  - enhanced leak detection system in the segment between the Kinkora Golf Course and Vedder River isolation valves, which involves a three layer system including an external leak detection system based on fibre optic technology. (Refer to Section 3.3 Leak Detection During Operations.)

Pipe Wall Thickness

Pipe wall thickness is a factor used in the determination of third party damage rupture frequency. In order to demonstrate the effect of increased wall thickness on third party damage rupture frequency, Trans Mountain completed a sensitivity analysis showing that increases in wall thickness are associated with incremental reductions in third party damage rupture frequency. Trans Mountain relied on its sensitivity analysis to further suggest that beyond 14.7 millimetre (mm), increasing wall thickness provides diminishing returns on risk mitigation. Trans Mountain stated that in its review of available databases, it had not identified any pipeline failures with wall thickness of 14.7mm or greater as a result of third party damage.

Trans Mountain's standard wall thickness is 11.8 mm for NPS 36 Grade 483 MPa pipe for a design pressure of 9,930 kPa. As an outcome of Trans Mountain's risk-based design initiative, Trans Mountain has adopted a practice of installing 14.7 mm wall thickness pipe in populated areas that are more susceptible to third party interference. This is in recognition of the benefit that increasing wall thickness has on mitigating risk associated with third party damage and the objective of managing risks to levels that are As Low As Reasonably Practicable (ALARP). Trans Mountain clarified that the use of additional heavy wall pipe (14.7 mm) was from approximately KP 1095 to KP 1097, not for the entire Sardis-Vedder Aquifer.

Depth of Cover

Trans Mountain indicated that the Chilliwack Realignment would have minimum depths of cover of 0.9 m and 1.2 m for residential and agricultural areas, respectively. The depth of cover of 0.9 m in residential areas was proposed after initial consultation with the City, which requested

that the TMEP be constructed as shallow as possible over the Sardis-Vedder Aquifer. Trans Mountain provided the results of a theoretical study that showed a 68 per cent decrease in hit frequency for a 1.2 m depth of cover versus a 0.9 depth of cover. Trans Mountain indicated it was still in consultation with the City on the relative risk of a 0.9 versus 1.2 m depth of cover, but indicated if the City ultimately prefers a 0.9 m depth of cover it would install the pipe to that depth where possible. Trans Mountain committed to update the Board with the results of consultation with the City on this matter.

For the Chilliwack Realignment, Trans Mountain committed to installing a fibre optic cable leak detection system on this segment, which it indicated can detect ground disturbance activity over and immediately adjacent to the pipeline (up to 5 m each side of the pipe). Trans Mountain considers the fibre optic detection system to be an offset mitigation measure to deeper burial in this area. See Section 3.3, Leak Detection During Operations.

Trans Mountain said that the sections of the Chilliwack Realignment that have a higher risk of third party damage are at crossings of roads and underground utilities. At these crossings the pipeline will have a minimum 1.5 m depth of cover.

Trans Mountain said it would install concrete slabs between the TMEP pipeline and buried utilities at crossings where the construction method is open cut to further mitigate the possibility of a hit on the TMEP pipeline during third party maintenance of utilities. Trans Mountain said it will consult with the City on additional protection measures with respect to the crossing of buried utilities.

In response to WaterWealth's suggestion that the existing TMPL be moved to join the TMEP in the P1A route, Trans Mountain responded that the route of the TMPL is not the subject of this hearing.

Alternating Current (AC) Interference Mitigation

For the Chilliwack Realignment, including the 200 m section where it crosses the BC Hydro right-of-way, the total number of arcing events in a 100 year period in respect of the BC Hydro structures is 0.761, which meets BC Hydro standards (*i.e.* lower than 1.0) and indicates that no mitigation is required.

Although BC Hydro's criteria indicate that AC interference mitigation is not required, Trans Mountain committed to implement the following mitigation measures to protect the pipe from any potential damage caused by lightning:

- KP 1095+280 to 1096+240 – Install one 960 m run of 2/0 gauge copper wire connected to the pipe via direct current decouplers; and
- KP 1095+240 – Install grounding to decrease tower voltage rise below 175 kV.

Views of Participants

WaterWealth stated that placing an oil pipeline over groundwater drinking water sources is not safe and the Board should reject the Application. WaterWealth relied on modeling from the Bemidji Crude-Oil Spill site, in Minnesota for this and proposed that it was similar to the proposed Chilliwack Realignment. WaterWealth recommended that the Board require thorough modeling of likely spill scenarios as requested by the Province of BC in the certificate hearing. WaterWealth further recommended that the existing TMPL be moved to join the P1A route.

WaterWealth asked for confirmation as to whether the wall thickness of the pipe would be increased over the entirety of the Sardis-Vedder Aquifer. WaterWealth recommended that, should the Chilliwack Realignment be approved, extra heavy wall pipe (19 mm) be used for the pipeline segment defined as extra sensitive by the City.

The City did not provide additional comments on these issues.

Views of the Board

The Board has considered the potential for damage to the pipeline and the ability of Trans Mountain to detect the consequences of any damage and finds that the risk of damage to the pipeline for the Chilliwack Realignment is minimal.

The Board accepts Trans Mountain's evidence that because the Chilliwack Realignment is approximately 500 m shorter than other proposed alignments, the likelihood of third-party damage is reduced and consequently so is the risk of a spill. As well, the Board is satisfied that the mitigation measures proposed by Trans Mountain help reduce the risk of damage to the pipeline and any consequential leaks and ruptures for the Chilliwack Realignment. The Board will verify Trans Mountain's compliance with the requirements of CSA Z662 – Oil and Gas Pipeline Systems, the National Energy Board Onshore Pipeline Regulations, the relevant conditions of the Certificate and any Order approving the Chilliwack Realignment through inspections and audits.

To further reduce the likelihood of damage to the pipeline for the Chilliwack Realignment, Trans Mountain has committed to using heavy walled (14.7 mm) pipe and installing marker tape above the pipe. Trans Mountain provided evidence to show that incremental reductions in third party damage rupture frequency are associated with increases in wall thickness. Trans Mountain demonstrated that the incremental reduction in rupture frequency is much greater for an increase from 11.8 mm to 14.7 mm wall thickness than for an increase from 14.7 to 19.0 mm wall thickness. The Board finds the use of 14.7 mm wall thickness pipe to be consistent with Trans Mountain's efforts to manage risk to levels according to ALARP principles as committed in the OH-001-2014 Hearing.

The Board acknowledges Trans Mountain's commitment to ongoing consultation with the City regarding the minimum depth of cover across the Chilliwack Realignment, the installation of concrete slabs between the pipeline and other buried utilities, and to additional protection measures with respect to the crossing of buried utilities, as well as

Trans Mountain's commitment to update the Board with the results of consultation with the City. The Board notes that the risk to the aquifer is directly linked to the likelihood of third party damage which, in turn, can be effectively mitigated by increasing the depth of cover and encourages this to be taken into account in consultations with the City.

The Board notes that although AC Interference mitigation is not required for the Chilliwack Realignment on the basis of BC Hydro's criteria, Trans Mountain committed to implement mitigation measures to protect the pipe from any potential damage caused by lightning.

For the Chilliwack Realignment, Trans Mountain has also committed to the installation of an additional mainline isolation valve upstream of the aquifer and an enhanced leak detection system to be able to respond to potential leaks and ruptures. The Board accepts that the engineering measures that Trans Mountain has committed to will help mitigate potential concerns with the Chilliwack Realignment route being closer to the City's well-capture zones.

Regarding WaterWealth's reference to the Bemidji spill evidence and corresponding recommendation that the Board require thorough modeling of likely spill scenarios as requested by the Province of British Columbia (BC) in the OH-001-2014 Hearing, the Board already imposed Conditions 15 and 17 in the Certificate to address spill modelling. These two conditions apply to the Chilliwack Realignment.

The Board notes that some level of risk is inherent in the TMEP. However, should the TMEP be designed, constructed and operated in fulfillment of its certificate conditions and Trans Mountain's commitments, the probability of accidents and malfunctions associated with the TMEP resulting in a large spill is minimal. Trans Mountain's commitments will be enforced under the Board's regulatory regime.

3.2 Construction Safety and Security

Views of Trans Mountain

Trans Mountain has committed to ensure mitigation measures are consistently implemented throughout the pipeline construction phase at all times by complying with the City's bylaw requirements and groundwater impact mitigation best practices, and by adhering to the applicable provincial and federal regulatory requirements.

Trans Mountain stated that based on in-line tool geopig data and confirmation of TMPL locations at road crossings, the TMPL is on average about 7.1 m from the northern edge of the easement. Construction in the area of the Chilliwack Realignment will entail working over the TMPL to maximize use of available workspace.

Given the proximity of construction to residences, Trans Mountain committed to developing and implementing a site specific construction execution plan for residential areas and specific mitigation measures in order to construct safely, including the installation of fences along the workspace for a buffer between work area and houses.

Trans Mountain committed to reducing the size of the sidebooms and backhoes that would be used to install the pipe and provided the following mitigation measures during construction for the locations (see Section 6.2 in Chapter 6: Land Matters) where available work space will be less than 18.3 m:

- place a designated spotter, which would improve safety especially during heavy equipment operation);
- split topsoil storage, reducing storage area;
- use a small tie-in crew and a minimal amount of equipment to reduce congestion in the right-of-way; and
- use mobile construction fencing in the construction right-of-way to improve the safety of residents.

Trans Mountain completed a construction risk assessment, which outlines mitigation measures for all identified construction hazards, such as airborne dust, arc flashes, buried utilities / utility strikes, environmental contamination / spills, ignition sources, installation of sheet piling, noise, open excavation, proximity of construction to residence, tracked mud on public roadways, traffic interference and trespassing.

Trans Mountain expressed the view that its proposed construction mitigation measures (i.e. fencing) will provide clear delineation between the work site and private land use, while isolating the public from construction hazards.

Based on the analysis and survey information provided, Trans Mountain and its construction contractor stated that they are confident that in the areas in question, construction can be done safely with the proper equipment and mitigation measures.

With regard to safety in relation to construction of the pipeline through the school yard,

Trans Mountain's proposed mitigation measures include:

- scheduling of pipeline construction activities for the months of July and August to minimize the impact and potential number of children attending school during construction of the pipeline;
- restricted access to the construction zone using fencing around the entire construction area. The fenced area will be clearly signed as a construction area with cautionary and danger signage. Equipment will be parked within the fenced area during off-work hours and the area will be patrolled by security personnel. Materials will be stored within the fenced area;
- contractor Traffic Management plans requiring that marked School Zone and Playground Zones will be avoided where possible and requiring adherence to posted speed limits. Speed limits will be strictly enforced by project safety personnel when passage through these areas with vehicles is required; and

- contractor vehicles, equipment or deliveries vehicles backing up from public areas into the work zone must have a spotter to ensure neither workers nor members of the public, including school children, are in the path of reverse travel.

In response to photographs provided by WaterWealth regarding its concerns with uncontrolled access at a Trans Mountain excavation site, Trans Mountain did not address the specifics of the photographed site. Trans Mountain did state the site specific Security Plan will be implemented by the General Contractor, in accordance with the Trans Mountain Security Management Plan which has been assessed by the Board. Additionally, Trans Mountain stated that security measures such as, but not limited to, static security and patrols, fencing, gates, lighting and video surveillance may be considered for deployment to each construction site consistent with the results of a Construction Site Security assessment.

Views of Participants

WaterWealth stated that the safety of residents and particularly children cannot be assured during construction. WaterWealth provided photographs that were indicated to have been taken in October 2013 of a Trans Mountain excavation site. WaterWealth stated that there were no warning signs and no Trans Mountain personnel were present to prevent public entry into the excavation site. WaterWealth was concerned about the consequences if this approach was taken near an elementary school and residential backyards.

Ms. Symington requested details on mitigating the impact on students learning and playing during the construction of the pipeline through their school yard.

No landowner directly affected by the Chilliwack Realignment raised concerns regarding construction safety during this hearing.

Views of the Board

The Board acknowledges WaterWealth's concerns that the Chilliwack Realignment would pass through dense residential areas with limited available workspace for construction. The Board shares these concerns. The Board notes that although many of these concerns can be resolved through standard mitigation and the mitigation identified during the OH-001-2014 Hearing, Trans Mountain has committed to implementing additional mitigation measures in this hearing. These include but are not limited to:

- developing a site specific construction execution plan prior to starting construction activities;
- installing fences along the workspace;
- using short swing radius excavators; and
- hiring a contractor that has recent experience constructing a pipeline in a restricted urban environment similar to the Chilliwack Realignment area.

These mitigations appear to the Board to appropriately address the potential safety concerns associated with constructing in densely populated areas. The Board also notes that the Chilliwack Realignment leverages the knowledge and experience of landowners already familiar with living in proximity to an existing pipeline.

The Board shares WaterWealth's concerns with open and unsupervised excavations. Based on the limited information provided with the 2013 photos, the Board is of the view that the photos and accompanying information lack sufficient details to determine the full context, which would include any potential follow-up the Board may have undertaken. However, with respect to the Chilliwack Realignment, the Board finds that Trans Mountain has proposed a comprehensive suite of safety and security measures that will be undertaken in accordance with the TMEP Security Plan and General Contractor Security Plan, which the Board assessed under Conditions 47 and 64 of the Certificate. Implemented appropriately, these plans and measures will protect the public.

The Board will verify Trans Mountain's compliance with the requirements of CSA Z662 – Oil and Gas Pipeline Systems, the National Energy Board Onshore Pipeline Regulations, and the construction-related conditions of the Certificate and any Order approving the Chilliwack Realignment through its compliance verification activities.

3.3 Leak Detection During Operations

Views of Trans Mountain

As committed in the OH-001-2014 Hearing, Trans Mountain said it will use a multi-faceted approach to leak detection in the area of the Sardis-Vedder Aquifer. While current regulations in Canada require only a single leak detection system, in an effort to continuously improve leak detection, Trans Mountain said it will be installing a second complementary continuous pipeline monitoring (CPM) system that will operate in parallel with the existing system. The new CPM system will use a different technology to recognize leaks ensuring that Trans Mountain not only meets, but exceeds regulatory requirements and maximizes CPM leak detection capability.

In addition to the CPM systems, other leak detection safeguards Trans Mountain is proposing include:

- monitoring by the Control Centre Operator (CCO) using the supervisory control and data acquisition system;
- scheduled line balance calculations;
- surveillance patrols, both aerial and ground; and
- in-line inspection tools, which can identify small defects.

Trans Mountain stated that it has been actively researching external leak detection systems in a joint industry-government partnership over the last five years. This research included testing an

external fibre-optic leak detection technology along the length of an approximately one km long pilot installation with two simulation techniques.

Although the first simulation technique did not accurately simulate a product release from a through-wall defect along the pilot installation, a second simulation method involving the controlled discharge of water at a point along the pipeline, using acoustical, temperature, and strain signals, was successful.

As regards the Chilliwack Realignment, Trans Mountain said it will be installing this external fibre optic leak detection system in the Sardis-Vedder Aquifer area between block valves at Kinkora golf course and the Vedder River. Trans Mountain said this is expected to significantly improve the timely detection of small leaks, and that its detection time is within seconds to minutes of the leak starting.

The fibre optic based leak detection system will be contained within a polymer duct that will be placed in the trench with the new pipeline, either on the pipe or adjacent to it. As noted above, Trans Mountain said early research has shown this fibre optic cable is capable of sensing very small changes in temperature, has sonic and ultrasonic capabilities, detects vibration, and measures strain from ground movement.

With these sensory capabilities, the system can detect abnormal strain (e.g. vehicles crossing above the pipeline five m away, and also security intrusions from unauthorized ground disturbance activities, earthquake monitoring, and leak detection.

The signals from the fibre optic cable in this pipeline segment will be processed in a locally installed computer and events such as leaks, strain, intrusion and temperature changes will be monitored and interpreted by the system provider in a remote monitoring centre and will be relayed to the Trans Mountain Pipeline Control Centre in Edmonton. Event details, as well as location, will be alarmed at the Control Centre, acknowledged and responded to by the Trans Mountain Control Centre Operator.

According to Trans Mountain, after commissioning the pipeline, the fibre optic cable based leak detection system will be calibrated to learn how to eliminate false alarms. Trans Mountain expects to spend approximately one month calibrating the system due to the length of the Chilliwack Realignment.

Trans Mountain stated that the TMPL will also benefit from the installation of the fibre optic cable on the Chilliwack Realignment as any ground vibration could be detected on the right-of-way.

Views of Participants

The City asked about leak detection mechanisms that Trans Mountain will use to detect leaks in the area of the Sardis-Vedder Aquifer. The City stated that Trans Mountain did not provide a comprehensive analysis of its leak detection system. The City noted that some of the system components – such as fibre optic technology – were not brought to the City's attention until Trans Mountain's response to the City's Information Request No. 1. The City asserted that this

suggests Trans Mountain did not design a comprehensive leak detection system for the Sardis-Vedder Aquifer.

Views of the Board

The Board has considered the three-tiered leak detection system proposed by Trans Mountain for the Chilliwack Realignment and finds that the built-in redundancies provide additional confidence in Trans Mountain's ability to appropriately monitor for potential leaks on the Chilliwack Realignment.

The Board recognizes that the use of fibre optics for leak detection is a relatively new application of the technology and alone would be insufficient, as its reliability has not adequately been demonstrated for this purpose. However, the Board takes into account that it is the tertiary method for monitoring and, based on the information provided, it appears to hold value in assisting with the detection of potential leaks.

The Board notes there is also a potential benefit for detecting ground disturbance with fibre optics for both for the Chilliwack Realignment and the existing TMPL, given the proximity of the two lines in this area. The Board will continue to monitor the implementation and effectiveness of fibre optic technology for leak detection and ground disturbance monitoring.

The Board will verify Trans Mountain's compliance with the requirements of CSA Z662 – Oil and Gas Pipeline Systems, the National Energy Board Onshore Pipeline Regulations, and the operations-related conditions of the Certificate and any Order approving the Chilliwack Realignment through compliance verification activities.

3.4 Emergency Response

Views of Trans Mountain

Trans Mountain said that it has a comprehensive Emergency Management Program (EMP) in place that covers all aspects of preparedness, response and recovery. The EMP provides a documented, all hazards, and structured approach to ensuring readiness to respond to all potential emergency scenarios that may occur. Trans Mountain said that it has developed and implemented a comprehensive strategy for the development of in-land based geographic response plans (GRPs). GRPs provide detailed information to assist spill responders in the containment and recovery of released product, should an incident occur. These unique plans also identify and describe environmental sensitivities, including natural and cultural resources. In addition, the GRPs locate and classify control points. Control points are pre-determined locations where responders could intercept spilled product, either on land or in watercourses, in order to establish a spill response strategy and deploy spill response equipment to remove product from the environment. Identifying control point locations ahead of time enables Kinder Morgan to

respond more effectively limiting potential impacts to sensitive areas downstream of a release point.

Trans Mountain said it has conducted an extensive consultation and engagement process in the development of the enhanced emergency response plans. One of the key principles of this engagement has been to gather local input and knowledge including gathering information on high consequence areas.

Trans Mountain said it has had a concerted engagement program with first responders and First Nations, specific to its emergency response plans and the enhancements the company is making to the plans. Engagement will include discussions with the City on Sardis-Vedder Aquifer so that it is captured in the GRP.

High consequence areas are captured in the Trans Mountain Geographic Information System and consist of high populated areas, low populated areas, aquifer areas, ecological areas, drinking water, water wells, points of diversion, and commercially navigable waters. The GRPs also identify inlets and water intakes, natural resources at risk, cultural resources at risk and economic resources at risk.

Trans Mountain said that without treatment or physical removal, oil would be a long-term source of groundwater contamination if it contacted the water table. For this reason, spill response efforts 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. With this focus on timely clean-up activities, Trans Mountain stated impacts to aquifers can be minimized.

Trans Mountain said its proposed mitigation includes the availability of contracted emergency response organizations and readily available spill equipment in Hope and Abbotsford to further reduce risks to the Sardis-Vedder Aquifer.

Trans Mountain also said that it is working with School District 33, which represents Watson Elementary School and Vedder Middle School, to review and confirm health and safety protocols in an emergency, and discuss a coordinated response, should a pipeline incident occur.

Trans Mountain said that it is guided by legal and regulatory requirements and the company's practice is to first minimize any potential damages to the extent practical through initial emergency response and by providing mitigation to reverse or treat any remaining impacts. Should residual impacts remain, Trans Mountain would be responsible for additional monitoring and remediation of impacts directly related to and caused by the incident.

Trans Mountain said that in the event of a release, the company will follow the remedial steps outlined in the NEB Remediation Process Guide (2011) to ensure that the groundwater contamination is remediated to applicable remediation standards. Trans Mountain would first conduct an assessment to determine the hydrogeological conditions, source and extent of contamination. Once this information has been obtained, Trans Mountain would develop a Remedial Action Plan (RAP). The RAP would be reviewed by the NEB and other interested parties. The aim of the RAP would be to remove the source of the contamination. Potential remedial strategies include pump and treat systems using various filtering or cleaning methods,

such as activated carbon, clay, oxidisers or air strippers. Remediation often involves the use of a combination of these strategies. These strategies are industry standard practices and have been proven to be effective as remediation techniques.

Trans Mountain committed to work with the City to develop viable assumptions of what a potential loss would be if one or two wells in proximity of the pipeline were impacted, and then assess alternative water sources to help inform the GRP and the City's emergency response plan. As described in Chapter 7: Environment and Socio-Economic Matters, Section 7.3.8, Trans Mountain said that, if a pipeline release impacts the community's use of the aquifer, it would source and pay for an alternate water supply to meet the needs of the community until groundwater remediation was complete, and groundwater quality met provincial and federal criteria for its intended use.

Views of Participants

The City requested confirmation on whether Trans Mountain intends to prepare a specific spill response plan for the Sardis-Vedder Aquifer area and said that it requires the monitoring and spill response plans be developed in close cooperation with and to the satisfaction of the City.

The City also asked, in the event of a spill, how long it would take for Trans Mountain to start remediation after a leak in the Sardis-Vedder Aquifer area.

The City stated that it has an emergency response plan that contemplates alternate water sources for various site-specific scenarios relating to pipeline releases given the existence of the current TMPL. The City said that it exercises this plan with the fire department and with Trans Mountain.

Ms. Rachel Symington said that the existing and proposed realigned twinned pipeline runs through Vedder Middle School's playing field and continues on to Watson Elementary School. Once they are of age, Ms. Symington's children will be attending one of these schools. Ms. Symington said that neither the City nor the administration at these schools have any practiced emergency plan of action should there be a leak or a spill. Ms. Symington asked Trans Mountain to provide details of communications and resources provided to both Watson Elementary and Vedder Middle Schools outlining health and safety protocols and a coordinated emergency response plan.

Ms. Symington questioned Trans Mountain about the adequacy, effectiveness and the cleanup strategies should there be a leak into the Sardis-Vedder Aquifer.

Views of the Board

The Board understands that participants have concerns and questions regarding emergency prevention, management, and response.

The Board notes that given the potentially high consequences of spills on the City's water resources that, even if highly unlikely, specific consultation and modeling on this matter must continue to take place between Trans Mountain and the City.

The Board accepts that Trans Mountain's commitments to identify areas of high risk and to implement additional risk mitigation measures where needed, can address the concerns around emergency preparedness and response that participants have raised. Trans Mountain has committed to enhancing its EMP to address the needs of the TMEP and the Board requires Trans Mountain to report on the consultation and implementation of the enhancements. For example, enhancements will include the development of tactical response plans for sensitive areas and will include information gained through municipal engagement and consultation.

The Board heard from Trans Mountain that the company will develop a GRP specific to the Sardis-Vedder Aquifer area and commit to continued engagement with the City. The Board is satisfied that Trans Mountain has considered and will continue to consider issues raised in this hearing in its response planning and development of GRPs as well as tactical response plans. The Board is of the view that adequate preparation and planning can lead to an effective response, but the ultimate success of the response would not be fully known until the time of the spill event due to the many factors which could inhibit the effectiveness of the response. The Board is satisfied that Trans Mountain is being proactive in its planning and preparation for effective spill response.

The Board acknowledges Ms. Rachel Symington's concerns regarding coordinating emergency plans of action with Watson Elementary and Vedder Middle Schools, should there be a leak or a spill. The Board notes that Trans Mountain has consulted with School District No. 33, which include Watson Elementary and Vedder Middle Schools, and committed to continue working with School District No. 33 in order to discuss a coordinated response, should a pipeline incident occur.

The Board's regulatory requirements focus on preventing incidents and emergencies, and the Board promotes development of pipeline company safety culture as an important element in meeting this goal. While the prevention of incidents is the Board's top priority, the Board also believes that being prepared for any situation is a critical part of energy safety. NEB-regulated companies must have robust emergency management programs to manage conditions and reduce consequences during an emergency. Should an incident occur, the NEB investigates the incident and holds the company accountable for corrective actions and clean up.

The Board believes that no spill is acceptable from a facility that it regulates. If a spill does occur, the Board has developed guidelines to facilitate well-documented and successful remediation and will be the lead agency to ensure the most stringent criteria for remediation of soil and groundwater are met. Other regulators such as provincial environment and health departments, as well as municipalities, federal departments and Aboriginal groups may be involved and may be consulted at various stages in the remediation process.

Trans Mountain reiterated its commitment to work with and engage the City to discuss the company's proposed mitigation in the Sardis-Vedder Aquifer area as well as hazard identification to help inform not only its emergency management program and emergency response plans, but those of the City.

Chapter 4

Public Consultation

The Board's Filing Manual sets out the Board's expectations of applicants regarding consultation to support a project application. Applicants are expected to undertake an appropriate level of public involvement, commensurate with the setting, nature and magnitude of a project. The Board considers public involvement to be a fundamental component during each phase in the lifecycle of a project (project design, construction, operation and maintenance, and eventual abandonment) in order to address potential impacts of that project.

This chapter addresses Trans Mountain's public consultation program and project-specific consultation activities. Trans Mountain's Aboriginal consultation program and project-specific consultation activities with Aboriginal peoples are discussed in Chapter 5: Aboriginal Matters

4.1 Trans Mountain's Public Consultation Program

Views of Trans Mountain

Trans Mountain stated that the engagement and communications program for the Chilliwack Realignment was designed according to the NEB Filing Manual and was described in detail in Volume 3A of the TMEP Application (A55987), as well as four subsequent consultation updates filed with the Board during its regulatory review of the TMEP: Consultation Update No. 1 and Errata (A59343); Consultation Update No. 2 (A62087 and A62088); Consultation Update No. 3 (A4H1W2 and A4H1W8); and, Consultation Update No. 4 (A72224).

Trans Mountain noted that the objective of its Landowner Engagement Program was to obtain landowner acceptance and land rights grants for surveying, construction, restoration and transition to operations by providing fair compensation and addressing non-monetary issues in a respectful, sincere, and honest manner. Trans Mountain further submitted that issues identified through discussions with individual landowners were recorded by Trans Mountain representatives and entered into a TMEP landowner database to ensure landowner concerns were considered and addressed.

Trans Mountain committed to ensuring that its ongoing activities have and will continue to include:

- sharing results of any new studies or work being completed on the Chilliwack Realignment;
- communicating any changes and or updates to the Chilliwack Realignment plans;
- sharing information with stakeholders on the regulatory process; and
- engaging on potential construction effects and mitigation measures.

Trans Mountain further stated that it is committed to ongoing engagement throughout the lifecycle of the TMEP, including the Chilliwack Realignment, and its robust stakeholder engagement program was designed to foster participation from the public who have an interest in the Chilliwack Realignment.

Views of Participants

Participants did not raise concerns regarding Trans Mountain's consultation program.

4.2 Consultation Activities with the Public

Views of Trans Mountain

Trans Mountain submitted that stakeholder engagement for the Chilliwack Realignment commenced in January 2017. Trans Mountain noted that information provided to affected landowners respecting the proposed routing along the existing TMPL alignment (route P2) included newsletters and communication regarding the proposed routing change. Trans Mountain also noted that it held individual meetings with stakeholders in addition to presentations, public information sessions, routing workshops, online videos, written notifications, and advertisements in local newspapers.

As directed by the Board, Trans Mountain made a copy of the Chilliwack Realignment Application available for public viewing at the Chilliwack Library. In response to requests made by WaterWealth, Trans Mountain confirmed that it arranged for the Chilliwack Realignment Application and related documents to be available for viewing at the Sardis Library as well.

Trans Mountain filed detailed records of landowner engagement specific to the Chilliwack Realignment with the Board, including engagement materials, summaries of engagement activities held as well as the outcome of those activities. Trans Mountain noted that stakeholders raised the following concerns (which are discussed in detail in the other chapters of this Report):

- potential contamination of the Sardis-Vedder Aquifer and protection of the City's drinking water source;
- construction methods used for the Chilliwack Realignment, particularly through the Sardis-Vedder Aquifer (i.e., HDD vs. open trench);

- emergency response and pipeline integrity;
- property damage during construction;
- property values and compensation;
- noise and human health; and
- a preference for the pipeline to be constructed in the P1 route or TCH route rather than the proposed Chilliwack Realignment.

In its most recent consultation update, Trans Mountain stated that it had entered into an agreement with 66 of 75 landowners directly affected by the Chilliwack Realignment. Trans Mountain also indicated that four landowners had outstanding compensation concerns and one landowner elected to wait until the Chilliwack Realignment was approved before entering into an agreement. Trans Mountain noted that the remaining four parcels of land are owned by the City and the Board of Education School district No. 33, both of which have outstanding concerns regarding the potential environmental and socio-economic impacts of the Chilliwack Realignment (see Chapter 7: Environment and Socio-Economic Matters). Trans Mountain stated that it continues to consult and attempt to resolve any outstanding concerns or issues raised by landowners and will continue negotiations with the landowners who have not entered into an agreement with Trans Mountain.

Trans Mountain indicated that there will be a concerted engagement program built around landowners that are in close proximity to the TMEP, including the Chilliwack Realignment. Trans Mountain stated that it will have a land agent who is dedicated to engage with private landowners in close proximity to the pipeline. Trans Mountain also stated it will develop a site-specific work plan that will identify all the roles and responsibilities and the specific requirements and restrictions for each area including a work plan for communication of the construction schedule, the impacts of construction, what to expect, and what, if any, special requirements landowners would like to see in place. Trans Mountain also committed to conducting baseline monitoring of infrastructure along the Chilliwack Realignment in order to ensure that there are no impacts pre- or post-construction.

Views of Participants

No concerns were raised by participants.

4.3 Consultation Activities with Government Stakeholders

Views of Trans Mountain

Trans Mountain stated that engagement activities included extensive consultation and ongoing technical discussions with BC Hydro and the City.

Trans Mountain stated that it held technical working group (TWG) meetings with the City between September 2015 and February 2016 where routing and construction information was shared. Trans Mountain noted that following the issuance of the Board's recommendation to federal cabinet with respect to the TMEP, it revised the Terms of Reference for the TWGs and distributed the updated draft to all municipalities along the TMEP corridor starting in October 2016 inviting them to re-establish the TWGs. Trans Mountain indicated that at the first re-established TWG meeting with the City in December 2016, it provided information on the Chilliwack Realignment, construction methodology and environmental management plans. Subsequent to this meeting, Trans Mountain indicated that it met with the City in person and by conference call on three occasions in January and February 2017. Trans Mountain also indicated that it met with the City in June 2017, and filed, with the Board, correspondence between it and the City from January to May of 2017.

Trans Mountain stated that it engaged in extensive consultation with BC Hydro for over two years in an attempt to reach an agreement regarding a route within the approved TMEP corridor. Trans Mountain submitted that this consultation included weekly project interface meetings and several technical studies associated with the approved TMEP corridor within the vicinity of the existing BC Hydro electrical transmission line corridor. Trans Mountain submitted that as a result of this consultation, it concluded that the proposed pipeline alignment within the approved TMEP corridor was not acceptable to BC Hydro from a technical and operational perspective. BC Hydro was not a participant in this proceeding.

Trans Mountain stated that it will continue to engage with the City regarding the Chilliwack Realignment and will continue to address any issues raised.

Views of Participants

City of Chilliwack

The City stated that Trans Mountain has repeatedly been made aware of its concerns. The City was not satisfied with the responses received from Trans Mountain and stated that its reports were sparse on details and did not substantiate Trans Mountain's conclusions about the safety of the Chilliwack Realignment, alternate routes or protection of the Sardis-Vedder Aquifer.

Views of the Board

The Board recognizes that public involvement is a fundamental component throughout the lifecycle of a project in order to address potential impacts. The Board also recognizes the City's concerns regarding the timing and level of detail of Trans Mountain's responses to the City's concerns about the Chilliwack Realignment.

The Board is of the view that the design and implementation of Trans Mountain's consultation activities was adequate given the scope and scale of the Chilliwack Realignment. The Board is satisfied that Trans Mountain adequately identified stakeholders, developed engagement material, notified stakeholders of the Chilliwack Realignment and responded to concerns raised.

The Board notes that Trans Mountain committed to continuing its consultation activities throughout the lifecycle of the TMEP to ensure that issues are addressed and that all potentially affected parties remain informed and involved. The Board expects Trans Mountain to maintain an active role in communicating with the 75 directly affected landowners along the Chilliwack Realignment as well as with the City, and to continue to be responsive to, and to address to the extent possible, any concerns raised. The Board notes that Trans Mountain committed to develop a site-specific work plan that would include communication of Trans Mountain's construction schedule, what to expect during construction, and special requirements that individual landowners would like to see in place. The Board encourages landowners to raise project-related concerns directly with Trans Mountain, but also notes that the Board has a landowner complaint process that can be used to resolve outstanding concerns.

The Board acknowledges Trans Mountain's and the City's ongoing participation in the TWGs (Certificate Condition 49) and encourages all parties to continue to use this mechanism to resolve any outstanding issues and concerns. The Board also acknowledges Trans Mountain's extensive efforts to engage with BC Hydro in order to develop a route in the approved TMEP corridor.

Chapter 5

Aboriginal Matters

5.1 Trans Mountain's Consultation Program with Aboriginal groups

Trans Mountain was required to make all reasonable efforts to consult with potentially affected Aboriginal groups and to provide information about those consultations to the Board as per the Board's Filing Manual. This included evidence on the nature of the interests potentially affected, the concerns that were raised and the manner and degree to which those concerns were addressed. Trans Mountain was expected to report to the Board on all concerns that were expressed to it by Aboriginal groups, even if it was unable or unwilling to address those concerns. Therefore, even if an Aboriginal group chose not to participate in the subsequent hearing process, any concerns could be brought to the attention of the Board through the applicant's evidence.

Trans Mountain indicated that it conducted a robust Aboriginal engagement program related to the TMEP since the filing of its TMEP Application in December 2013. Trans Mountain confirmed that this program continues and included engagement with more than 100 Aboriginal communities and groups who had an interest in the TMEP or interests potentially affected by the TMEP. Trans Mountain submitted that agreements were executed with Aboriginal communities including Letters or Memoranda of Understanding, capacity funding agreements, integrated cultural assessments and Mutual Benefit Agreements. As part of this engagement program, Trans Mountain indicated that 45 Aboriginal communities have participated in Kinder Morgan Canada funded Traditional Land Use (TLU) and Traditional Marine Use studies, and 25 communities have participated in Kinder Morgan Canada funded Traditional Ecological Knowledge (TEK) studies.

Trans Mountain stated that there were no new Aboriginal groups affected by the Chilliwack Realignment and consultation is ongoing with Aboriginal groups potentially affected by the TMEP. Trans Mountain confirmed that approximately 100 Tzeachten Indian Reserve residents received a newsletter and fact sheet in January 2017 providing an update on routing and construction methodology, including highlighting the Chilliwack Realignment and proposed measures to protect the Sardis-Vedder Aquifer. Trans Mountain noted that the Seabird Island Band and the STSA, were notified of the Chilliwack Realignment on 28 February 2017.

5.2 The Board's Hearing Process and Participation of Aboriginal Groups

The Board's hearing process was designed to obtain as much relevant evidence as possible on Aboriginal concerns regarding the Chilliwack Realignment, the potential impacts on Aboriginal

interests (as noted in the Board's List of Issues), and possible mitigation measures to minimize adverse impacts on Aboriginal interests. The Board was provided with and considered information about concerns related to the Chilliwack Realignment, and the measures that would be required to address those concerns, as brought forward through consultation undertaken by Trans Mountain and through the participation of potentially affected Aboriginal groups.

5.2.1 Participant Funding Program

As noted in Chapter 2: Application and Hearing Process, independent of the hearing process, the Board administered a PFP for the Chilliwack Realignment, which allocated funding to assist Intervenors with their participation.

On 31 August 2017, the PFP announced an allocation of $100,000 to facilitate participation of individuals, Indigenous groups, landowners, and non-industry not-for-profit groups in the hearing. The STSA applied for and was awarded $79,993. More information on PFP, including funding reports for this hearing, can be found on the Board's web-site at www.neb-one.gc.ca/pfp.

5.2.2 Participation of Aboriginal Groups

Aboriginal groups who were concerned with potential project-related impacts on their interests, including rights, had opportunities to present their views directly to the Board. While the Board required Trans Mountain to implement a consultation program and undertake an assessment of the Chilliwack Realignment's potential effects, including its environmental and socio-economic effects, the Board also took steps to facilitate the direct participation of these groups in its proceedings.

As noted in Chapter 2: Application and Hearing Process, on 26 June 2017, the Board established a comment period to receive feedback specifically related to the process it should use to decide on the Chilliwack Realignment. No Aboriginal groups submitted comments.

On 14 August 2017, the Board sent a letter to each Aboriginal group identified as potentially affected by the Chilliwack Realignment.[1] The letter explained that the Application may be set down for public hearing and provided information on the Board's PFP program.

Board staff followed up on the letters with a phone call to each of the ten groups and offered to meet with groups in their community. None of the Aboriginal groups requested a meeting.

[1] Aitchelitz First Nation, Kwaw-kwaw-Apilt First Nation, Leq'a:mel First Nation, Shxwhá:y Village, Skowkale First Nation, Skwah First Nation, Squiala First Nation, Tzeachten First Nation, Yakweakwioose First Nation and Chilliwack Métis Association.

On 31 August 2017 the Board issued Hearing Order OH-001-2017 which outlined the process to be followed in the Board's adjudication of the Chilliwack Realignment. The STSA applied to participate in the hearing and was granted Intervenor status, as requested.

During the proceeding, the STSA was able to obtain further information about the Chilliwack Realignment and present their views to the Board in numerous ways. Aboriginal intervenors could submit written evidence, provide OTE, ask written questions of Trans Mountain (information requests), respond to any written questions asked of them by the Board and Trans Mountain, conduct oral cross-examination of Trans Mountain, provide comments on draft conditions and provide final argument. STSA availed itself of all of these opportunities, with the exception of commenting on draft conditions.

The Board understands that Aboriginal peoples have an oral tradition for sharing information and knowledge from generation to generation and that this information cannot always be shared adequately in writing. The opportunity to provide OTE was unique to Aboriginal intervenors.

On 24 October 2017, the Board issued Procedural Update No. 2, asking the STSA to file a Notice of Intent to provide OTE at the hearing.

On 7 November 2017, the STSA responded to the Board's Procedural Update No. 2 and indicated that some of the procedures the Board outlined for OTE were contradictory to Stó:lō customs around the oral tradition of sharing and teaching, and declined to present OTE as offered by the Board.

On 24 November 2017 the Board responded to the STSA's letter, stating that it is interested in furthering relationships with Aboriginal peoples and understands the importance of incorporating Aboriginal perspectives into its regulatory decision making. To achieve such an objective, the Board offered to facilitate a pre-hearing discussion with the STSA and Trans Mountain to explore procedural modifications for the presentation of OTE that would better reflect Stó:lō customs, while still meeting the requirements for procedural fairness.

On 30 November 2017, the STSA filed a letter stating that, given the new process the Board was willing to implement based on concerns raised by the STSA, they agreed to participate in a facilitated process.

On 10 January 2018 the Board issued Procedural Update No. 4, outlining the OTE process agreed upon with the STSA. The Board heard OTE from the STSA on 15 January 2017 at the Coast Chilliwack Hotel in Chilliwack, BC. Given the cultural protocols shared by the STSA, the Board and Trans Mountain agreed to submit any questions on OTE in writing rather than asking them orally. The Board transcribed and provided an audio broadcast of the oral hearing, including the OTE session. Before OTE began, a dinner was hosted by the STSA.

The STSA expressed the following views regarding the new OTE process during the oral hearing:

> ***Mr. Darwin Douglas***
>
> *"We wanted to -- my sister here has asked that she wanted to have this situated and they wanted to do this in more of a Stó:lō fashion. They felt it was important that we carry out this work in a way that's consistent with our culture. So she wanted to -- we wanted to have the seating like this. It more represents our -- the way that we sit when we come to our longhouses, when we come to our gatherings, that we have everybody facing inside, facing one another, rather than table seating where people's backs are often to each other. So thank you for helping out with the rearrangement of our seating tonight. We feel more comfortable in this format, so that's great."*

The Board is pleased that it was possible in this case to offer modifications to the OTE process in a manner that was acceptable to the STSA. The Board continues to look at innovative ways to adapt its processes to facilitate the participation of Aboriginal groups and notes that the small scale of the Chilliwack Realignment, as well as the STSA's representation of all participating Aboriginal groups, and the cooperative approach of all parties contributed to the success of this initiative. The Board thanks Mr. Darwin Douglas, Chief Mark Point, Mr. Ernie Victor, Mr. Shane James, and Elder Albert McHalsie, for providing this important context and information.

5.2.3 Government Participation

The Board notes that Guiding Principle No. 6 of the Governments of Canada's "Updated Guidelines for Federal Officials to Fulfil the Duty to Consult" (March 2011) states that the Government of Canada will use and rely on existing consultation mechanisms, processes and expertise, such as environmental assessment and regulatory approval processes. The Guidelines further state that agencies, boards, commissions and tribunals, including the Board, have a role to play in assisting the Crown in discharging, in whole or in part, the duty to consult.

To the extent that other government organizations had information to provide to the Board that potentially relates to Aboriginal concerns, they had the opportunity to participate in the Board's process and file relevant information on the Board's record. The City participated in the Board's proceeding as an intervenor and filed information on the Board's hearing record that relates to some of the concerns raised by Aboriginal groups in this hearing, such as protection of the Sardis-Vedder Aquifer, that are discussed further in Chapter 7: Environment and Socio-Economic Matters.

5.3 Issues and Concerns Raised by the STSA

5.3.1 Issues and Concerns Raised During Oral Traditional Evidence

During the oral portion of the hearing, the STSA shared their local, traditional, and cultural knowledge, including:

- the importance of oral tradition;
- the important role the STSA has as stewards who look after the land and pass it on to the next generation;
- the strength of the STSA's Interim Benefit Agreement;
- STSA traditional knowledge regarding fish and fish habitat, particularly sturgeon;
- the potential impact of projects such as the TMEP on the STSA's traditional activities and spiritual connection to the land;
- concerns regarding potential cumulative effects;
- the STSA's laws and customs;
- the significance of Lightening Rock to the STSA's history and culture; and
- the importance of working together and having a balanced approach to regulatory decisions.

The STSA shared their history with the land in their Traditional Territory, and their views on how they have protected it:

> ***Elder Albert McHalsie***
>
> *"….The strength of our culture, our ways, it's coming back. Now that we've had the handcuffs taken off for a few years and we've been able to practice and we're able to do this again, that strength is coming back, that shxweli. That strength is coming back. And we talk about these things. And that's coming back, but also our connection to our land is coming back because many of us that are using it and we're tied to that land -- and I liked, you know, when Sonny said people say we don't own this land. But I was always taught that, you know, we do, and we've protected it….We weren't necessarily the most warlike people here but we did have warriors and the different communities had their defence mechanisms and we protected our territory."*

The STSA also discussed the role of cultural teachings in carrying out the STSA's responsibilities as stewards of the land, as described by Chief Mark Point:

> ***Chief Mark Point***
>
> *"I'm the current leader of our community. And the biggest challenge that I think our people face, as an elder today, is how are we going to pass on this land to our next generation and the next generation the way that we received it? And that was the*

challenge that our elders and their elders had to face when they were put in places as stewards, stewards of this land. It's to look after this land the way we received it and pass it on to the next generation so that they can enjoy the bountiful fruits of the land that are given to us by our Creator."

5.3.2 Trans Mountain's Consultation with Aboriginal Peoples

The STSA stated that communities represented by them have been proactively trying to engage with Trans Mountain since December 2013, when Trans Mountain filed its TMEP Application with the Board.

The STSA noted that they expressed concerns regarding communication with Trans Mountain during the OH-001-2014 Hearing and this ongoing issue has continued, including throughout the Chilliwack Realignment approval process. The STSA also expressed dissatisfaction with the timing, detail and methods Trans Mountain used to communicate with the STSA.

With regard to the Chilliwack Realignment, the STSA stated that, rather than sending a notification of the Chilliwack Realignment directly to Tzeachten First Nation Chief and Council or Ts'elxweyeqw Tribe, or other STSA member communities, Trans Mountain sent the notification to 100 individual Tzeachten First Nation members. The STSA submitted that this is not sufficient for Aboriginal consultation and engagement as the process does not recognize First Nations as rights and title holders. However, during the oral hearing, the STSA indicated that they are willing to work with Trans Mountain to clarify communication protocols and how the STSA would like to be consulted moving forward.

5.3.3 Incorporation of Traditional Ecological Knowledge

The STSA challenged Trans Mountain's definition and integration of TEK into the TMEP, including the Chilliwack Realignment and stated there is a continued absence of Stó:lō TEK included in the technical review of the Chilliwack Realignment and its potential impacts. In the STSA's view, employing member First Nation archaeological field assistants did not necessarily equate to employing traditional knowledge holders, especially given the large Traditional Territory of Stó:lō and the localized experiences of each community within it. Regarding participation in biophysical field studies, the STSA stated that, rather than choosing not to participate, their preference was to have workshops with Trans Mountain where they could bring in Traditional Knowledge Holders.

5.3.4 Cumulative Effects on Traditional Land and Resource Use and Social and Cultural Well-Being

The STSA expressed general concerns about cumulative effects in the area on their cultural practices, spirituality, and rights, as a result of the increased development and potential increase

of environmental degradation within their Traditional Territory. The STSA provided information on Stó:lō 's history on the land and the cumulative effects of pipeline projects such as the TMEP on the Village of Shxw'ōwhámél:

> ***Mr. Shane James***
>
> *"My late great-uncle, former Shxw'ōwhámél Chief Ralph George once said -- 'This project already went through and this is a repeat of the last one with one big difference. In this day and age, we have the knowledge and power to stand up and say no and to stand up for our rights and title.' I've been asked what impact would the new pipe or old pipe have on the Village of Shxw'ōwhámél? Could we continue on with life, with all our fish, our wild deer, berries, but most importantly, wild and traditional medicine? My answer is no. Shxw'ōwhámél First Nation would cease to exist. We'd eventually fall apart and lose our spiritual connection to the land."*

The STSA submitted that Stó:lō connections and uses of the land represent aspects of their Aboriginal rights and title. STSA stated that the Stó:lō culture is undergoing a revival but that what the Stó:lō community currently does in the areas to which they have access has been limited by encroachment, alienation of lands, and land use decisions in which they had no participation.

The STSA indicated that some Sxwōxwiyá:m sites have already been destroyed and disturbed as a result of previous development. The STSA stated that these sites need to be kept in a certain pristine manner to maintain what it means and how it is used and how it informs the culture and the history of the Stó:lō.

5.3.5 Protection of the Sardis-Vedder Aquifer

The STSA raised concerns related to the protection of the Sardis-Vedder Aquifer. The STSA also expressed concerns regarding the potential effect of horizontal aquifer contamination on salmon species important to the STSA.

> ***Mr. Ernie Victor***
>
> *"It's the same thing with salmon. You know, we've had a little bit of change in power and some new policy and stuff like that. And you know, I was told that this creek here with salmon in it is worth protecting through DFO policy as long as that fish is fishable. If that fish is proven to be harvested in the ocean or by recreational fishermen or by Native fishermen, then we can protect it and its habitat. But if you can't prove that that salmon is within an integrated fishery management plan, then it's not protectable, right? So systems aren't very good, and we've got a lot of problems with it. And the governments change and they make new systems, new rules. You know, I don't have too much faith in that…. there's like over 27 different genetically types of Sockeye. Same thing with Chinook, that travel, migrate through the Fraser River different times of the year, you know. Federal policy doesn't recognize it."*

A summary of the STSA's concerns, Trans Mountain's response and the views of the Board with respect to the Sardis-Vedder Aquifer are provided in Chapter 7: Environment and Socio-Economic Matters.

5.3.6 Heritage Resources

The STSA filed its Cultural Heritage Overview Assessment (CHOA). The Study Area for the CHOA was a 1.7-km section of the Chilliwack Realignment plus a construction area buffer zone.

The CHOA identified several previously recorded cultural heritage sites/areas that were recorded within a 1 km context zone of the CHOA Study Area, including one *Sxwôxwiyám*, three *Halq'eméylem* Place Names, one previously recorded archaeological site, four Documented Travel Routes, and one traditional land and resource use area, five of which (one *Sxwôxwiyám*, one *Halq'eméylem* Place Name, and three Documented Travel Routes) are recorded within the Study Area.

No archaeological features or materials were identified in the CHOA Study Area as a result of the fieldwork to date; however, the archaeological impact assessment for the CHOA Study Area was labeled as incomplete. The CHOA also noted that further work was conducted in the CHOA Study Area in 2017 by Stantec Consulting, however, reporting with the assessment results has not been submitted to the Stó:lō Research and Resource Management Centre (SRRMC).

Recommendations for the CHOA Study Area for the Chilliwack Realignment included:

- finalizing the surface survey for the Study Area to (a) examine for surface materials and areas of subsurface potential, and (b) identify areas requiring deep testing;
- conducting shovel testing and augering where necessary; and
- that Trans Mountain ULC and Stantec collaborate with SRRMC and the Ts'elxwéyeqw Tribe to develop specific management measures for the *Sxwôxwiyám* and the *Halq'eméylem* Place Name recorded within the Study Area.

5.4 Trans Mountain's Reply to Issues and Concerns Raised by Aboriginal Groups

5.4.1 Trans Mountain's Consultation with Aboriginal Peoples

Trans Mountain stated that, following the conclusion of the hearing process for the TMEP, the STSA Chair advised Trans Mountain that all consultation on the TMEP was to be directed to the STSA Chair and the People of the River Referral Office (PRRO), and that individual First

Nations were not to be copied on the correspondence and referrals. Trans Mountain submitted that it followed the direction of the STSA and directed all consultation efforts through the STSA and PRRO. In a few instances where the individual bands of the STSA were contacted, Trans Mountain submitted that the STSA Chair repeatedly directed Trans Mountain to engage solely with STSA and PRRO both for land and resource issues, as well as economic issues such as employment and procurement opportunities.

Trans Mountain asserted that there was no discussion of the Chilliwack Realignment during engagement activities as the STSA maintained the position that they will not engage or respond to any issues until a comprehensive engagement and capacity funding agreement is in place. Trans Mounted stated that it will continue to engage with the STSA on engagement and capacity discussions.

At the oral hearing, Trans Mountain explained that the STSA membership was changing and it was looking for guidance on who to engage with respect to permitting related to the Chilliwack Realignment. Trans Mountain committed to working with the STSA to clarify how each member of the STSA would like to be consulted moving forward, and to implement its consultation initiatives accordingly.

5.4.2 Incorporation of Traditional Ecological Knowledge

Trans Mountain stated that it provided an opportunity for the SRRMC to participate in the Archaeological Impact Assessment (AIA) completed for the Chilliwack Realignment and that the SRRMC selected two of their representatives to participate in the AIA fieldwork. While the STSA stated that they do not consider information shared by SRRMC field participants to qualify as traditional knowledge, Trans Mountain asserted that the opportunity to inform the AIA was provided to SRRMC, and shared information will be incorporated into the AIA. Trans Mountain reiterated that the SRRMC sent out the people that they felt were the appropriate people to participate in the program and that Trans Mountain did not make requests. Trans Mountain further submitted that it did not vet the qualifications of the people that SRRMC sent to work in the program.

Trans Mountain asserted that its approach for collecting TEK tried to ensure a free, informed and ongoing process that met Canadian ethical research standards. Trans Mountain stated that TEK and TLU is information gathered in multiple facets such as an independent report or through participation in biophysical field programs. Trans Mountain stated that there were up to 45 individual Aboriginal groups that undertook their own TLU studies and that over 200 Aboriginal participants were engaged on the various biophysical programs for the entire project, as well as participation in the archaeological surveys. While the STSA did not participate in the biophysical field studies, it did complete an Integrated Cultural Assessment for the TMEP.

Trans Mountain committed to continue working collaboratively with the STSA to incorporate TEK into its assessment. Trans Mountain also confirmed that it is currently in discussions with the STSA to plan workshops to discuss gathering TEK and determine how best to incorporate this information into the Chilliwack Realignment.

5.4.3 Cumulative Effects on Traditional Land and Resource Use and Social and Cultural Well-Being

The assessment of traditional land and resource use in the TMEP Application and related filings concluded that the predicted TMEP-related residual and cumulative effects would not be significant (Section 7.2.2 of Volume 5B [A3S1S7], Section 8.2 of Volume 5B [A3S1T0], ESA Update [A4F4Z3], and responses to NEB IR No. 2.041 [A3Z4T9] and NEB IR No. 3.025 [A4H1V2]). Trans Mountain stated that it reviewed the information gathered on the proposed Chilliwack Realignment in the context of the original Environment and Socio-Economic Assessment (ESA) and related filings and determined that the significance conclusions of the ESA in regards to traditional land and resource use remained unchanged. Trans Mountain concluded that the predicted project-related effects and cumulative effects of the Chilliwack Realignment on traditional land and resource use are not significant.

5.4.4 Heritage Resources

Trans Mountain stated that it reviewed the STSA's CHOA and the information provided in the CHOA confirmed a high archaeological potential rating for the Chilliwack Realignment footprint. Trans Mountain submitted that the CHOA for the Chilliwack Realignment informs the AIA, which was conducted with the participation of two SRRMC representatives as noted in Section 5.4.2 of this Chapter. Trans Mountain committed to fulfilling the three recommendations in STSA's CHOA report for the proposed Chilliwack Realignment.

Trans Mountain submitted that a Heritage Resources Discovery Contingency Plan was developed as part of Certificate Condition 72 Pipeline Environmental Protection Plan which outlined "chance find" procedures to be followed if archeological, historical or paleontological materials are discovered during construction activities so that unforeseen impacts to these resources can be avoided and/or minimized.

Trans Mountain stated that several Aboriginal groups in BC maintain heritage policies and permitting systems that are independent of those required by the *Heritage Conservation Act*. Trans Mountain further stated that, while these heritage policies and permits are not a statutory requirement, it strives to work productively and cooperatively with Aboriginal groups and, as such, consider Aboriginal groups' heritage policies and permitting systems wherever possible. Trans Mountain's also stated that its heritage resources team applied for permits and research applications with several Aboriginal groups including Stó:lō Nation and received Stó:lō Heritage Investigation Permit (SHIP 2015-100). Trans Mountain noted that this permit details how archaeological work in Stó:lō territory will be undertaken including, but not limited to, participation in fieldwork, disposition of recovered materials, and review of draft deliverables.

5.5 Views of the Board

As set out more fully below, the Board is of the view that there has been adequate consultation and accommodation for the purpose of the Board's decision on the Chilliwack Realignment. The Board is also of the view that any potential impacts on interests, including rights, of affected Aboriginal peoples are not likely to be significant and can be effectively addressed.

5.5.1 Trans Mountain's Consultation with Aboriginal Groups

The Board is of the view that Trans Mountain's design of project-specific consultation activities was adequate given the scope and scale of the Chilliwack Realignment. The Board is of the view that potentially affected Aboriginal peoples were appropriately identified and provided information about the design, operations, environmental, social and economic effects of the Chilliwack Realignment. In addition, the Board finds that Trans Mountain provided Aboriginal groups that expressed an interest in the Chilliwack Realignment with reasonable opportunities to participate, share traditional knowledge, and to identify site-specific and general concerns about the Chilliwack Realignment.

With respect to the STSA, the Board is of the view that Trans Mountain engaged with the SRRMC and the PRRO based on its understanding of the STSA's expectations and any misunderstandings do not diminish or negate Trans Mountain's efforts to consult. The Board is, therefore, of the view that the STSA has been offered sufficient and varied opportunities by Trans Mountain to engage in the Chilliwack Realignment.

The Board further notes Trans Mountain's commitment to work with Aboriginal groups to address project-related concerns and the requirement, imposed by Condition 96 of the Certificate, to file with the Board reports on its ongoing consultation with potentially affected Aboriginal groups during construction, and through the first five years of operations. The Board expects Trans Mountain's responsiveness to the STSA's concerns to be reflected in these filings.

The Board also encourages Aboriginal groups with an interest in the Chilliwack Realignment to continue to engage with Trans Mountain.

5.5.2 Incorporation of Traditional Ecological Knowledge

The Board notes that Trans Mountain and the STSA did not share the same understanding regarding how TEK was incorporated in the TMEP and the Chilliwack Realignment. In particular, the STSA was of the view that participants in the TMEP and the Chilliwack Realignment were not Traditional Knowledge Holders and, therefore, the applications do not include TEK. The Board is of the view that there is a need for additional discussions to occur between Trans Mountain and the STSA on this subject. The Board acknowledges both

Trans Mountain's and the STSA's commitment to working towards clarifying and improving communication protocols.

5.5.3 Cumulative Effects on Traditional Land and Resource Use and Social and Cultural Well-Being

The Board is of the view that there are no predicted material differences between the Chilliwack Realignment and the originally assessed TMEP with regard to the effects on traditional land and resource use. The Board notes that the Chilliwack Realignment is a 1.8 km reroute, 100 per cent of which is located within the existing TMPL easement within privately owned residential and agricultural land. For this reason, the Board finds that that the Chilliwack Realignment's contribution to cumulative effects on traditional land and resource use and social and cultural well-being is not significant.

5.5.4 Heritage Resources

The Board recognizes the value of heritage resources preservation to Aboriginal groups. The Board acknowledges the concerns raised by the STSA regarding the potential effects of the TMEP on physical and cultural heritage resources and the information and knowledge they shared regarding historical, cultural and archaeological sites that are of significance and value to them. This knowledge helps to ensure that potential environmental effects of the Chilliwack Realignment on heritage resources are identified, and that the final Chilliwack Realignment design and associated mitigation measures adequately protect identified and unidentified heritage resources that may be impacted by the Chilliwack Realignment. The Board encourages the STSA to continue to share information with Trans Mountain, and to consider their potential participation in monitoring activities during construction.

The Board acknowledges Trans Mountain's commitment to fulfilling the three recommendations in STSA's CHOA report for the proposed Chilliwack Realignment including collaborating with SRRMC and the Ts'elxwéyeqw Tribe to develop specific management measures for the Sxwôxwiyám and the Halq'eméylem Place Name recorded within the Study Area. The Board notes that Certificate Condition 96 requires Trans Mountain to file ongoing reports on the engagement activities it undertakes with potentially affected Aboriginal groups. The Board expects Trans Mountain to include the outcomes of its commitment regarding the Sxwôxwiyám and Halq'eméylem Place Name sites name in its filings to the Board pursuant to this condition.

The Board notes that the management of archaeological and heritage resources is the responsibility of provincial government under the British Columbia Heritage Conservation Act. The Board reminds Trans Mountain that Condition 100 of the Certificate, requiring confirmation that all archaeological and heritage resource permits and clearances have been obtained from the relevant provincial ministries prior to commencing construction, would apply to the Chilliwack Realignment.

The Board is of the view that there are no predicted material differences between the Chilliwack Realignment and the originally assessed TMEP with respect to heritage resources given: the measures and commitments made by Trans Mountain to avoid all sites where possible and to implement its Heritage Resources Discovery Contingency Plan in the event resources are encountered during construction; the evidence and traditional knowledge identifying potential sites of concern provided by Aboriginal groups; and the regulatory oversight of provincial authorities that issue final clearances for lands.

5.5.5 Section 35(1), Constitution Act, 1982

The Board interprets its responsibilities in a manner consistent with the Constitution Act, 1982, including section 35, which recognizes and affirms the existing Aboriginal and treaty rights of Aboriginal peoples.

In Clyde River (Hamlet) v. Petroleum Geo-Services Inc., 2017 SCC 40, and Chippewas of the Thames First Nation v. Enbridge Pipelines Inc., 2017 SCC 41, the Supreme Court of Canada acknowledged that the Board has the procedural powers to implement consultation and the remedial powers to impose and enforce accommodation measures as well as the requisite technical expertise. The Supreme Court also acknowledged the Crown's ability to rely on the Board's regulatory assessment process to fulfill its duty to consult.

In addition to the mandated one-on-one consultation that occurs between an applicant and potentially impacted Aboriginal groups, it should be understood that the Board's hearing process itself, including these reasons, is part of the overall consultative process. The Board is of the view that its process was appropriate in these circumstances.

The Board has considered the information submitted regarding the nature of potentially affected Aboriginal groups' interests in the Chilliwack Realignment area, including information on constitutionally protected Aboriginal and treaty rights. The Board has also considered the anticipated effects of the Chilliwack Realignment on those interests and the concerns expressed by Aboriginal groups, as discussed in this chapter and this Report. In light of the nature of the interests and the anticipated effects, the Board has evaluated the consultation undertaken with respect to the Chilliwack Realignment, including the mandated consultation performed by Trans Mountain and the consultation undertaken through the Board's project assessment process. The Board has also considered the mitigation measures proposed to address the various concerns and potential effects. Having assessed all of the evidence, the Board is of the view that there has been adequate consultation and accommodation for the purpose of the Board's decision on the Chilliwack Realignment.

The Board is also of the view that any potential adverse project impacts on the interests, including rights, of affected Aboriginal groups are not likely to be significant and can be effectively addressed. As a result of the above, considering all of the findings in this Decision, the Board is of the view that the requirements of section 35 of the Constitution Act, 1982 have been met, such that an approval of the Chilliwack Realignment is in keeping with the honour of the Crown.

Chapter 6

Land Matters

The Board's Filing Manual sets out the Board's expectations for lands information to support an application that involves constructing or modifying facilities under the NEB Act. Applicants are expected to provide a description and rationale for the proposed route of a pipeline, the location of associated facilities, and the permanent and temporary lands required for a project. If new lands will need to be acquired for the proposed variance application, applicants are also expected to provide a description of the land rights to be acquired and the land acquisition process, including the status of land acquisition activities. This information permits the Board to assess the appropriateness of the proposed route, land requirements and the applicant's land acquisition program.

6.1 Route Selection

An overview of alternative routes is included in Chapter 2: Application and Hearing Process. Trans Mountain's approved TMEP corridor in Chilliwack, BC followed a BC Hydro transmission corridor rather than the existing TMPL easement. Trans Mountain's proposed Chilliwack Realignment starts at KP 1095.5 and ends at KP post 1097.3. The length of new corridor being applied for outside of the approved pipeline corridor is 1.8 km, 100 per cent of which is proposed to be installed within the existing TMPL easement. The Chilliwack Realignment is 500 m shorter in length compared to the approved pipeline corridor. The land in this area is privately owned with predominantly residential use, one Agricultural Land Reserve, and one public school.

Views of Trans Mountain

Trans Mountain stated that it developed routing principles to guide its routing decisions and to ensure consistency of decision-making. In descending order of preference, these routing principles were:

- where practicable, co-locate the TMEP on or adjacent to the existing TMPL easement to reduce land use fragmentation;
- where co-location with the existing TMPL was not practicable, minimize the creation of new linear corridors by installing the TMEP segments adjacent to existing easements or rights-of-way of other linear facilities, including other pipelines, power lines, highways, roads, railways, fibre optic cables and other utilities;

- if co-location of the TMEP with an existing linear facility was not feasible, install the TMEP segments in a new easement selected to balance safety, engineering, construction, environmental, cultural and socio-economic factors; and
- in the event a new easement was necessary, minimize the length of the new easement before returning to the existing TMPL easement or other rights of way.

Trans Mountain explained that selecting a final route was an iterative process, one involving a combination of technical and environmental studies, engagement with interested parties and on the ground fieldwork, and required consideration of multiple factors, including safety, constructability, operability, environmental, cultural and socioeconomic elements. Trans Mountain noted that routing principles, criteria and guidelines must be balanced in the circumstances and that strict adherence to one principle or guideline would have effectively ensured the TMEP could never be built.

Trans Mountain stated that it studied several pipeline alignment scenarios and extensively investigated the P1 route, however, the P1 route was not acceptable to BC Hydro from a technical and operational perspective. Trans Mountain submitted that the studies considered the potential interaction between Trans Mountain's and BC Hydro's infrastructure as they related to public safety, safe operation and each system's integrity. Trans Mountain stated that it also explored trenchless options to mitigate impacts to BC Hydro's infrastructure. Trans Mountain stated that cost was not the reason it selected the proposed Chilliwack Realignment.

Trans Mountain stated that choosing the P1A route would affect approximately 46 properties which had not previously been affected by the existing TMPL easement, with 43 homes being less than 20 m from the TMEP and 25 homes and six sheds less than 8 metres from the TMEP. Under the P1A route, Trans Mountain indicated that a number of residents would have the existing TMPL located immediately to the south of their property and the TMEP immediately to the north of their property. Trans Mountain noted that the P1A route did not adhere to its routing principles and was 500 m longer than the P2 route.

Trans Mountain explained that it commissioned an assessment of the feasibility of routing along the TransCanada Highway and provided this report to the City on 27 July 2017. Trans Mountain noted that there were significant challenges in routing along the TCH including lack of contiguous routing and construction risks. Trans Mountain stated that it was unable to identify a TCH route that was clearly feasible from an engineering perspective and acceptable to the BC Ministry of Transportation and Infrastructure.

With this knowledge, Trans Mountain stated that it decided to adhere to its first routing principle, which was to route within the existing TMPL easement, where practicable. Trans Mountain explained that this decision eliminated the need for two separate pipeline corridors through the Sardis neighborhood in Chilliwack, impacted fewer residents, and avoided the proximity concerns associated with BC Hydro infrastructure. Trans Mountain stated that it was of the view that the City preferred a single route along the existing pipeline corridor through the City.

Trans Mountain stated that while construction would take place close to existing residential housing, the Chilliwack Realignment is constructible, does not pose technical or operational

issues for BC Hydro, and takes into account stakeholder feedback. In addition, Trans Mountain stated that the Chilliwack Realignment is a more direct route across the Sardis-Vedder Aquifer, which reduces the length of pipeline over the Sardis-Vedder Aquifer by a corresponding 500 m.

Views of Participants

City of Chilliwack

In its August 2017 letter to the Board, the City stated that the P1 route was feasible, though it acknowledged during final argument that the P1 route many legitimately not be viable as it is close to electrical currents. The City acknowledged the challenges faced by Trans Mountain in rerouting the pipeline. However, the City requested that the Board reject the proposed P2 route.

Early in the current process, the City stated that the routes along the BC Hydro Corridor (P1 and P1A) and the TCH route are superior to the proposed Chilliwack Realignment. The City stated that these routes, if selected, would have significantly alleviated concerns around the Sardis-Vedder Aquifer by moving the pipeline several km north. The City recommended the NEB require Trans Mountain to re-assess an alternative routing along the TCH taking into account the relative impacts of the two routes on the Sardis-Vedder Aquifer.

The City stated that Trans Mountain dismissed the P1A route mainly on the basis that this route would result in approximately 25 homes and 6 sheds less than 8 m from the TMEP. The City expressed concern that Trans Mountain did not adequately compare the impacts of the Chilliwack Realignment and the P1A route on the Sardis-Vedder Aquifer and the City's water wells.

The City also stated that, while it had expressed its general preference for a single route along the existing pipeline corridor, it was never specific to the Chilliwack Realignment. The City further noted that this preference was stated in August of 2015 for a different section of the TMEP along south Sumas Road in the City, which was not part of the Chilliwack Realignment.

WaterWealth

WaterWealth shared the City's concerns regarding the Chilliwack Realignment's proximity to the Sardis-Vedder Aquifer and its preference for the TCH route. WaterWealth challenged Trans Mountain's routing criteria and selection process for the proposed Chilliwack Realignment and was of the view that Trans Mountain's information and conclusions regarding the Chilliwack Realignment were lacking. WaterWealth further stated that, where Trans Mountain could have chosen to vigorously explore a route along the TCH, it instead put its energies into the approved corridor option. WaterWealth indicated that, after failing to reach agreement for the approved TMEP corridor, Trans Mountain then chose the Chilliwack Realignment, portions of which are all but inaccessible, and where proximity to City's water wells and the number of utility and road crossings are increased.

WaterWealth submitted that Trans Mountain failed to state how close the Chilliwack Realignment would place residences or sheds to the TMEP, or how close the existing TMPL easement is to residences or sheds. In WaterWealth's view, the maps included with the

Chilliwack Realignment Application give the appearance that the proposed reroute would offer little or no advantage with regard to proximity to residences or sheds.

S'olh Temexw Stewardship Alliance

The STSA's views and concerns are available in Chapter 5: Aboriginal Matters and Chapter 7: Environmental and Socio-Economic Matters.

Views of the Board

The Board acknowledges that the City and WaterWealth did not agree with Trans Mountain's application of its routing criteria or its route selection, and that Trans Mountain may not have produced route selection outcomes that were desired or acceptable for some participants. However, in the OH-001-2014 Hearing, the Board found that Trans Mountain's route selection process, route selection criteria, and level of detail for its alternative means assessment were appropriate. The Board remains of this view and finds that Trans Mountain appropriately considered and applied the many competing factors in its alternate route selection process. The Board also notes that no directly affected residents along the Chilliwack Realignment raised objections.

Given that determination of the best routing is part of the detailed route approval process, and was not therefore part of this variance application, the Board declines to order the City's requested examination of other alternative routes (e.g. TCH) in this matter.

The Board is of the view that the proposed route for the Chilliwack Realignment avoids the proximity concerns associated with BC Hydro infrastructure, is 500 m shorter in length compared to the approved corridor which has risk-reduction benefits, and by choosing to use the existing TMPL right-of-way, the Chilliwack Realignment minimizes the potential area of environmental disturbance and involves residents who are already familiar with living in proximity to the existing TMPL which has safety benefits.

The Board is satisfied that Trans Mountain has proposed suitable mitigation, as discussed in Chapter 7: Environment and Socio-Economic Matters, and Chapter 3: Facilities and Emergency Response Matters, and as outlined in the OH-001-2014 Hearing, to address the Chilliwack Realignment's potential land-related effects during design, construction, and operation. The Board finds that the route, as proposed, is acceptable.

6.2 Land Requirements

Views of Trans Mountain

Trans Mountain stated that the existing 18.3 m TMPL easement would be used for the Chilliwack Realignment, with a variable temporary workspace, as necessary, through locations with minimal construction workspace constraints, such as fields. Trans Mountain confirmed that, at nine locations, available work space will be less than 18.3 m to allow for an adequate buffer between workspace and permanent structures along the pipeline right-of-way. Trans

Mountain indicated that in the short segments where permanent structures are up to the edge of the easement, there will be a minimum of one m offset for construction. Trans Mountain provided drawings showing these nine locations along with cross sections, and confirmed ortho-photography used is more accurate than ±1 m.

Views of Participants

Participants did not raise concerns regarding land requirements for the Chilliwack Realignment.

Views of the Board

Trans Mountain submitted that the requested right-of-way and temporary workspace land requirements, as described in the Chilliwack Realignment Application, are necessary to allow for the construction and operation of the Chilliwack Realignment in a safe and efficient manner. The Board finds that Trans Mountain's anticipated requirements for permanent and temporary land rights are acceptable.

6.3 Land Acquisition Process

Views of Trans Mountain

Trans Mountain stated that the Chilliwack Realignment will affect 75 properties, all of which have the existing TMPL on their property. Trans Mountain submitted that the Chilliwack Realignment will result in one additional road crossing and 20 additional utility crossings compared to the approved TMEP corridor.

Trans Mountain stated that it commenced land acquisition activities in January 2017. Trans Mountain confirmed that, of the 75 properties along the proposed Chilliwack Realignment corridor, it has entered into agreements with 66 landowners, and that negotiations are ongoing with the outstanding 9 landowners. Trans Mountain noted that concerns of landowners who have not entered into an agreement were predominantly related to compensation, however, the City, owning three parcels of land, was concerned about the potential environmental and socio-economic impacts of the Chilliwack Realignment (see Chapter 7: Environment and Socio-Economic Matters).

Trans Mountain confirmed that the land acquisition process for the Chilliwack Realignment complied with the applicable sections of the NEB Act, including section 87. Trans Mountain submitted that section 87 notices have been served on all private landowners whose lands are required for the purpose of the Chilliwack Realignment.

Trans Mountain stated that the level of landowner agreement, evidenced by the number of voluntary agreements reached, contradicted the assertion made by WaterWealth that there is little to no support for the Chilliwack Realignment.

Views of Participants

WaterWealth asserted that there is little to no support for the Chilliwack Realignment and that it is aware of only a single landowner who favours the Chilliwack Realignment.

Views of the Board

The Board notes that Trans Mountain has reached an agreement with 66 of the 75 landowners along the Chilliwack Realignment and has committed to continue engaging with the remaining nine landowners in order to reach an agreement. The Board also notes that section 87 notices have been served on all private landowners whose lands are required for the purpose of the pipeline. The Board gives some weight to the number of voluntary agreements signed, while accepting this may or may not be representative of wider community sentiment about the Chilliwack Realignment. The Board finds the land rights documentation and acquisition process proposed by Trans Mountain to be acceptable.

The Board recognizes that there were a few outstanding issues from landowners, including compensation. The Board notes that land acquisition agreements must comply with section 86 of the NEB Act, which includes options for landowners to receive compensation by one lump sum payment, or by annual/periodic payments over a period of time. Section 86 also provides for the review, every five years, of the amount of compensation payable in the case of annual/periodic compensation.

The Board reminds all parties that the amount of compensation paid for an easement is negotiated between the company and the landowner. When a landowner and a pipeline company cannot agree on compensation for lands that the company has acquired or damaged, either party may apply to the Minister of Natural Resources to receive the services of a negotiator, or to have the dispute settled by arbitration.

Chapter 7

Environment and Socio-Economic Matters

Under the NEB Act, the Board considers environmental protection as a component of the public interest. When making its decision, the Board is responsible for assessing the environmental and socio-economic effects of a project throughout the life of that project. This chapter presents the Board's views on the environmental and socio-economic effects of the Chilliwack Realignment. Matters related to Aboriginal peoples are discussed in Chapter 5: Aboriginal Matters.

7.1 The Board's Environmental Assessment Methodology

As described in the Board's May 2016 Report for TMEP, the Board conducted an environmental assessment of TMEP under the *Canadian Environmental Assessment Act*, *2012* (CEAA 2012). The Board also assessed the environmental and socio-economic effects of TMEP as part of its public interest mandate under the NEB Act, and fulfilled certain responsibilities the Board has with regard to other legislation, such as the *Species at Risk Act*.

As the Board noted in its letter of 5 December 2017, the Chilliwack Realignment is not itself a designated project under CEAA 2012. Nevertheless, the Board has assessed the environmental and socio-economic effects of the Chilliwack Realignment as part of its public interest mandate under the NEB Act in order to:

- determine if there are any new or unique interactions for the Chilliwack Realignment that may imply material changes to the Board's previous environmental and socio-economic assessment of TMEP;
- consider the need for any further mitigation or follow-up;
- determine if there are any additional Board responsibilities related to other legislation; and
- inform the decision on whether or not to approve the Chilliwack Realignment.

7.2 Environmental and Socio-Economic Setting

The Chilliwack Realignment is within the existing TMPL easement in the City. Trans Mountain said the proposed realignment crosses privately-owned agricultural land and residential areas. The Chilliwack Realignment is approximately 1.8 km in length, which is 500 m shorter than the approved TMEP corridor.

Both the approved TMEP corridor (and thus the P1 route and P1A alternative) and the existing TMPL pipeline (and thus the proposed P2 route) overlie the Sardis-Vedder Aquifer (also known as the Vedder River Fan Aquifer). The City said that the Sardis-Vedder Aquifer provides approximately 98 per cent of its drinking water, and that the City owns and operates eight groundwater wells which are supplied by the aquifer. This aquifer also provides base-flow to a number of down-gradient creeks.

7.3 The Sardis-Vedder Aquifer and City water wells

7.3.1 Background

As noted by Trans Mountain, TMEP crosses approximately 68 aquifers from Edmonton through Burnaby. The NEB's May 2016 Report on TMEP described the concerns raised by participants in the OH-001-2014 Hearing with regard to such aquifers, such as potential contamination from leaks or spills, and Trans Mountain's commitments for mitigation and monitoring to protect groundwater. In addition, the Board imposed a number of conditions that would provide further protections for aquifers and community reliance upon them. These include numerous conditions related to engineering, safety, integrity management, and emergency preparedness and response, as well as:

- Condition 72: Pipeline Environmental Protection Plan;
- Condition 93: Water well inventory;
- Condition 94: Consultation Reports – Protection of Municipal Water Sources; and
- Condition 130: Groundwater Monitoring Program.

The commitments and conditions related to aquifers and community drinking water supplies noted in the Board's May 2016 Report on TMEP are legal requirements of the Certificate, and provide an important backdrop to the Board's assessment of the specific concerns and mitigations related to the Sardis-Vedder Aquifer and the City's water wells, as described below.

7.3.2 Specific concerns

With regard to mitigation related to potential spills of contaminants during the construction phase of the TMEP, Trans Mountain submitted a Groundwater Management Plan pursuant to Certificate Condition 72, which has been approved by the Board. With specific regard to the Chilliwack Realignment, Trans Mountain committed to use biodegradable hydraulic fluid on the heavy equipment used during pipeline installation in the area.

The STSA expressed concerns that there is a high potential for contamination, including wells currently used for private homes, irrigation, and other uses, as a result of development (digging, removal of gravel, plants and soils) of the pipeline, or any sort of leak, spill, or eruption within the Sardis-Vedder Aquifer's protected and high sensitive areas. The STSA said that much of the

water to serve the City is received at wells located near the Vedder River. The STSA also expressed concern about horizontal contamination as water flows from the aquifer into smaller creeks and the Vedder River, which has the potential to adversely affect a number of salmon species on which Stó:lō rely.

The City's primary concern is that a large sudden spill or, in particular, a slow undetected leak from the new pipeline during the operational phase of the TMEP could contaminate the aquifer and render one or more of its water wells unusable for years if not decades. The City stated that the risk of this occurring is higher with the proposed Chilliwack Realignment because it is closer to the wells than the approved TMEP corridor. Intervenors Ms. Symington and WaterWealth expressed similar concerns, as did some commenters such as Mr. Coulter and Ms. Shilladay.

The potential for leaks and spills during operations, mitigations to reduce their likelihood, and leak and spill detection and response, are discussed in Chapter 3: Facilities and Emergency Response Matters. Addressed below is the likelihood that leaked or spilled oil from the pipeline would reach and contaminate the City's drinking water wells. Four factors in particular were discussed during the hearing that could affect that likelihood:

- general characteristics of the aquifer;
- depth to the water table;
- capture zones of the City water wells; and
- movement of oil constituents underground.

7.3.3 General characteristics of the aquifer

Trans Mountain and the City agree that the Sardis-Vedder Aquifer:

- is an important resource that provides water of excellent quality;
- has a general downgradient flow from south to north;
- is an unconfined aquifer (i.e. there is no low permeability layer above it), and that unconfined aquifers are generally more vulnerable to surface contamination than confined aquifers;
- is classified as highly or extremely vulnerable;
- underlies both the approved TMEP corridor and the Chilliwack Realignment to the north of the City's water wells, but that the Chilliwack Realignment is closer to the City's wells than the approved TMEP corridor; and
- that placing an oil pipeline over a potable groundwater source involves a certain level of risk.

7.3.4 Depth to the water table

Trans Mountain said it chose an open trench method of installation, which would place the pipeline in the unsaturated zone above the water table. Trans Mountain said this would generally require a trench just over 2 m deep, except at crossings of buried utilities and roads which may require trench depth of up to 3 m. Trans Mountain said that the depth to the water table in the vicinity of the nearest City water wells is estimated at between 8 m and 9 m below ground level. Trans Mountain said that any spilled or leaked oil from the pipeline would therefore have to penetrate the unsaturated layer before reaching the aquifer, and absorption in the unsaturated materials could result in a decreased mass of mobile hydrocarbons.

One Commenter, Ms. Shilladay, quoted the City's website as stating that the water table lies only five to ten m below the ground's surface, so chemicals or waste materials must travel only a short distance through the soil to impact groundwater quality, and that rainfall quickly seeps through the pores of the coarse soil, carrying contaminants from the surface to the aquifer below. The Draft 2017 Golder Report, submitted by the City, acknowledged that when contaminants are released above the water table within the unsaturated zone, there is some potential for them to be attenuated before reaching the water table. The City agreed that the water table at the nearby City water wells is approximately 9 m below ground level.

7.3.5 Capture zones of the City water wells

The capture zone of a water well is the three-dimensional portion of an aquifer from where groundwater is drawn to a well when the well is pumped. This zone can be viewed from the top, providing a two-dimensional plan view showing the horizontal extent of the capture zone. It can also be viewed from the side, providing a two-dimensional side (or cross-sectional) view showing the vertical extent of the capture zone. Trans Mountain and the City agree that with increased pumping at a water well, the capture zone can expand both horizontally and vertically. Mr. Foley, principal hydrogeologist with Waterline Resources Inc. (Waterline) on behalf of Trans Mountain submitted that average pumping rates, rather than peak demand, are of primary relevance to capture zone size.

Horizontal extent of the City's well capture zones

Over the years, the City has commissioned numerous studies concerning the aquifer and the City's wells, which have included a number of modelling exercises to estimate the horizontal extent of the capture zones of the City's water wells. Trans Mountain and the City acknowledged that modelling capture zones entails inherent uncertainties, that capture zones can be dependent on local geological details that are not known, and that capture zones can change in response to seasonal effects. The City confirmed that field verification of predicted capture zones has not been undertaken.

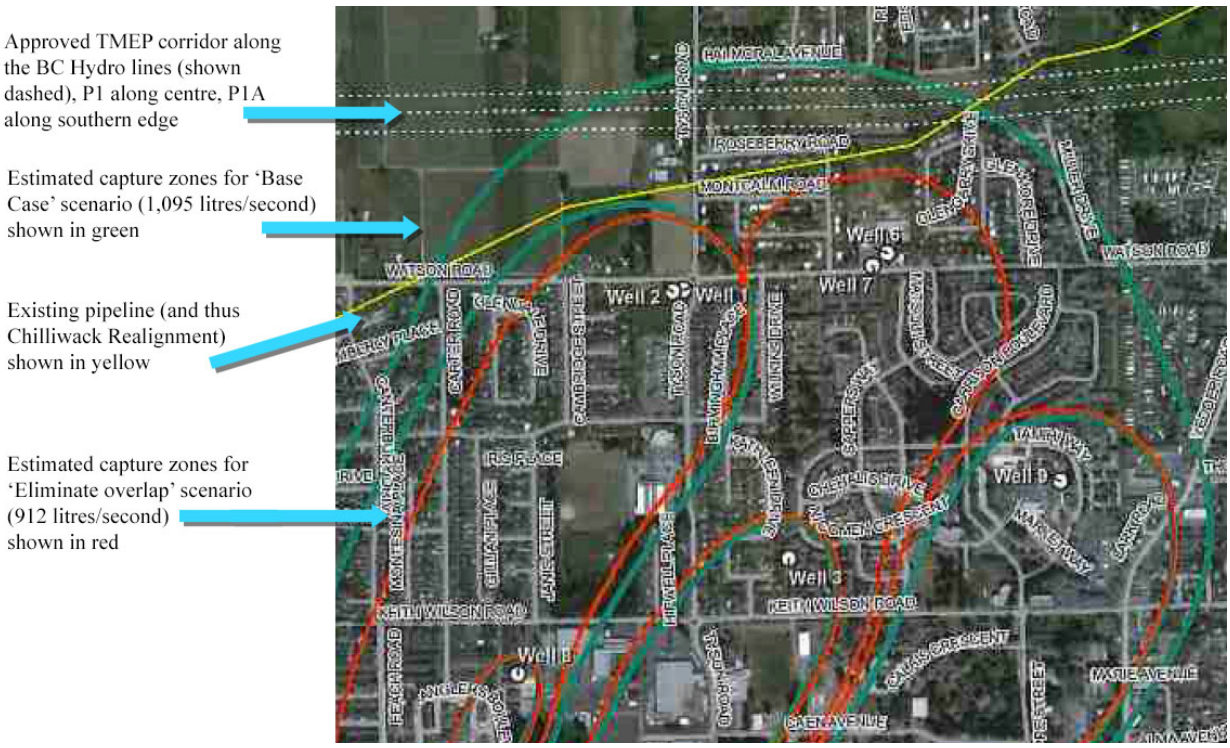
Modelling by AMEC dated December 2007 and January 2011 provided horizontal plan maps of capture zones for the City water wells. Trans Mountain provided a drawing showing the existing pipeline (and thus proposed realignment) to be just to the north of these estimated capture zones.

The City submitted a draft report by Golder Associates Ltd. (Draft 2017 Golder Report) that described recent modelling of capture zones for a number of scenarios representing different levels of water production at the City's wells. The City acknowledged the Draft 2017 Golder Report was draft and unsigned, and due to a conflict, none of the authors were able to appear at the oral hearing on behalf of the City. The capture zone maps in this Draft 2017 Golder Report depict the outer perimeter of the capture zones.

Based on the Draft 2017 Golder Report, the City said the Chilliwack Realignment falls within the capture zone of the City's drinking water wells, and as a result, contamination from the pipeline will flow to the wells. The scenarios in the Draft 2017 Golder Report included the following:

- Base Case: this scenario assumes all City wells are pumped at their maximum licensed rate, resulting in a total pumping rate of 1,095 litres per second. The modelled capture zones for wells #6 and #7 underlie both the Chilliwack Realignment (for approximately 1.4 km) and the approved corridor routing (for approximately 0.8 km), while the capture zones for wells #1 and #2 do not underlie, but are very close, to the Chilliwack Realignment.
- Base Case with well #9 shut off: the Base Case with well #9 shutdown results in a total pumping rate of 845 litres/second. The modelled capture zone for wells #6 and #7 was found to contract substantially, underlying the Chilliwack Realignment (for approximately 1 km) but no longer underlying the approved corridor.
- Eliminate overlap: this scenario was developed to estimate how much the pumping rates at the northern-most wells (i.e. wells #1, #2, #6, and #7) needed to remain below the maximum licensed rates such that no overlap was observed between the capture zones and the Chilliwack Realignment, or within a 50 m buffer of it. A total pumping rate of 912 litres per second was found to be possible. The Draft 2017 Golder Report stated that reduced pumping rates for the northern-most wells would therefore be a groundwater protection measure.

Figure 7-1: Excerpt from Draft 2017 Golder Report showing horizontal extent of estimated capture zones (notations added)



Maximum sustained yield and safe yield

Participants in the hearing discussed whether the total pumping rates in the scenarios considered in the Draft 2017 Golder Report would be sustainable. Limitations on pumping rates were explained to include a physical upper limit related to the amount of recharge to an aquifer, and a 'safe yield' above which undesirable results are produced. A 2003 Report by Emerson submitted by the City estimated the maximum sustained yield of the Sardis-Vedder Aquifer to be approximately 750 to 1000 litres per second without consideration of environmental impacts, and that stream depletion is the single most important criteria in determining safe yield. Mr. Foley on behalf of Trans Mountain submitted that safe yield would be considered less than sustainable yield.

For the Base Case (i.e. all wells operating at their licensed capacities), the Draft 2017 Golder Report predicted significant reductions in baseflow[2] (decreases of at least 44 per cent) at three streams draining the aquifer to the north. Mr. Foley on behalf of Trans Mountain submitted that reductions in baseflow of as much as 40 and 50 per cent are a very strong argument of an undesirable impact on the environment and that safe aquifer yield has been exceeded. The Draft

[2] Baseflow is the portion of streamflow which results from groundwater discharge to the channel.

2017 Golder Report stated that since these streams drain the aquifer to the north, further increases in pumping from the City wells should consider maintaining current groundwater withdrawals at the northern-most wells (wells, #1, #2, #6, #7), and only increasing withdrawals in the wells located in the south.

The City said it is a rapidly growing community, and expects a 58 per cent population increase by 2040. The City said its current average daily water supply requirement is around 400 litres per second, and that its projected water demand in 2040 is approximately 1000 litres per second.

Vertical extent of City well capture zones

Three conceptual illustrations were submitted showing different possibilities for the vertical extent of a capture zone:

- Waterline, on behalf of Trans Mountain, illustrated how a capture zone that does not extend up to the water table would allow shallow groundwater flow to evade capture by a well. In such a case, although a potential contaminant source might overlie a capture zone, and thus appear to be 'within' it on a horizontal plan view, the flow of shallow groundwater could be away from the well rather than towards it.
- A different conceptual illustration provided by Waterline illustrated how a capture zone might extend vertically up to the water table but not down to the bottom of the aquifer, in which case deep groundwater flow in the aquifer could evade capture.
- A third illustration presented by GW Solutions Inc., on behalf of the City, illustrated a capture zone that extends vertically from the bottom of an aquifer to the top.

Trans Mountain said there was no direct evidence to determine which illustration best described the situation in the vicinity of the Chilliwack Realignment, but pointed to four indirect reasons supporting the first illustration as most likely (i.e. that capture zones do not currently reach vertically up to the water table in the vicinity of the Chilliwack Realignment):

- capture extends deeper in an aquifer for deeper well completions, and the intakes of the water supply wells located closest to the Chilliwack Realignment exceed 35 m depth below ground surface;
- geological layering in the alluvial fan deposits results in groundwater within the aquifer flowing efficiently in a horizontal direction, while limiting the influence of downward flow across the layers;
- despite the large number of existing industrial and urban sources of groundwater contamination above the aquifer, the water quality sourced from municipal production wells has not been impacted; and
- even if a capture zone extends vertically up to the water table at the heart of the capture zone on a horizontal plane, it may not extend up to the water table at the edge of the zone.

Waterline warned, however, that substantially increased pumping rates could expand vertical capture such that existing shallow contamination sources begin to be drawn to the wells, raising another aspect of 'safe yield'.

The City, in contrast, stated that the first illustration described above does not reflect the characteristics of either the Sardis-Vedder Aquifer or the City wells. Dr. Wendling, a hydrogeologist with GW Solutions Inc., said that the aquifer is relatively homogeneous rather than having many layers, and that he believes the capture zone does extend up to the water table.

7.3.6 Potential movement of oil constituents underground

The Draft 2017 Golder Report presented preliminary predictions of the potential for oil to move towards the City water wells under the Base Case scenario (i.e. all wells pumping at maximum licensed rate). These simulations estimated, for example, that oil constituents could reach well #6 from a hypothetical release at the closest point on the Chilliwack Realignment (a distance of about 240 m) in 132 days, assuming the oil made its way below the water table and into the capture zone. It was also predicted that benzene levels could exceed drinking water standards at the City's wells within a year, taking first-order degradation into account, and assuming the source concentration were to remain constant.

The Draft 2017 Golder Report acknowledged that if spill response and remediation is done in a timely manner, it is less likely that concentrations at receptors will reach steady-state concentrations, or even reach the same peak values. Mr. Foley on behalf of Trans Mountain submitted that contaminants may not move at the same speed as water in an aquifer, and so may take a year and a half rather than 132 days to move a particular distance, and that the Golder modelling would not have resolved the full three-dimensional aspect of capture.

WaterWealth and commenter Mr. Coulter stated that the pipeline spill at Bemidji, Minnesota, shows that oil from a pipeline spill can last underground and pollute an aquifer for decades. Trans Mountain stated that research at the Bemidji pipeline spill site in Minnesota has exemplified how natural biodegradation can limit subsurface migration of dissolved hydrocarbon constituents. Mr. Foley on behalf of Trans Mountain further stated that it is rare for a hydrocarbon plume to exceed 100 m.

Views of the Board regarding potential consequences on the City water wells of a leak or spill

As noted above, the Sardis-Vedder Aquifer is one of approximately 68 aquifers crossed by the TMEP from Edmonton through Burnaby, and the Chilliwack Realignment would be subject to the commitments and conditions from the OH-001-2014 Hearing and the Certificate. These include numerous commitments and conditions intended to reduce the risk of leaks and spills, as well as more specific conditions related to water wells and groundwater monitoring.

The Board recognizes that groundwater contamination can be very difficult to clean up, and although natural biodegradation has been found to limit the spread of groundwater contamination in some cases, there are no doubt site-specific variations.

Oil from a pipeline leak or spill will reach the City water wells if it enters one of their capture zones. Although there are inherent uncertainties in modelling the extent of capture zones, the 2007 and 2011 AMEC horizontal mapping suggests the TMPL (and thus the Chilliwack Realignment) may be slightly to the north of the capture zones for the City's northern-most wells (#1, #2, #6 and #7). But as suggested by the more recent Draft 2017 Golder Report, if the City increases the pumping rates of its wells, it is possible for the capture zones of wells #6 and #7 to underlie the proposed realignment, and for the capture zones of wells #1 and #2 to be very close to it.

Given the City's strong objections to having the new oil pipeline above the City well capture zones, it is not clear to the Board if the City would in fact pump its wells in a manner that would expand the capture zones to underlie the existing TMPL and thus the Chilliwack Realignment. As suggested by the Draft 2017 Golder Report, pumping the northern-most wells at less than their maximum licensed rate would still allow a total pumping rate of 912 litres per second, over twice the current average pumping rate, while maintaining a 50 m horizontal buffer from TMPL. The Board also notes that a higher total rate of pumping could exceed the maximum sustained yield recommended in the Emerson 2003 Report, and the Draft 2017 Golder Report noted that limiting pumping at the northern-most wells could alleviate the significant reductions in baseflow to streams it predicted at higher pumping rates.

Nevertheless, the Board understands the City's desire to retain the option to pump each well up to its maximum licensed rate, given the City's projected water demands to 2040 and the benefits of flexibility and redundancy. The evidence suggests that under certain pumping arrangements, the City well capture zones could underlie the proposed realignment by up to approximately one km more than they would underlie the approved TMEP corridor.

The Board notes, however, that even if a capture zone underlies the proposed Chilliwack Realignment horizontally, the evidence suggests that such a zone may not extend vertically up to the water table underneath it. The Board found Mr. Foley's multiple lines of reasoning supporting this view to be reasonable. Further, the Board notes that even if Dr. Wendling is correct that a capture zone extends up to the water table at some locations, the proposed Chilliwack Realignment would be near the edge of the zone where, as submitted by Mr. Foley, capture zones are less likely to reach up to the water table. The Board concludes that it is unlikely, but not certain, that an underlying capture zone would reach up to the water table under the proposed Chilliwack Realignment. The Board also notes that such capture zones can expand vertically with increased pumping.

In summary, the Board finds that, in the case of a leak or spill from the pipeline in either the approved TMEP corridor or the Chilliwack Realignment, the consequences for the City water wells are not certain given inherent limitations in modelling capture zones and given unknown future pumping rates. Nevertheless, the Board finds that the Chilliwack

Realignment, being closer to the City wells than the approved TMEP corridor, creates a higher probability that leaked/spilled oil could reach those wells. However, for that to happen, the Board is of the opinion that all of the following would have to occur:

- as discussed in section 7.3.5 above, either existing modelling would have to be underestimating the horizontal extent of the capture zones, or the City would have to increase its pumping rates at its wells in a manner that places a capture zone under the Chilliwack Realignment, despite such increase also: 1) placing the capture zone under the existing TMPL; 2) increasing the potential of drawing in surface contamination from elsewhere; and 3) potentially resulting in significant baseflow reductions to surface streams;
- as discussed in section 7.3.5 above, the underlying capture zone would have to extend vertically up to the water table in the vicinity of the Chilliwack Realignment, despite: 1) the depth of the City wells and 2) the Chilliwack Realignment being on the edge of the capture zone.
- as discussed in sections 7.3.5 and 7.3.6 above, a pipeline leak or spill would have to occur in the relatively short distance where the Chilliwack Realignment is above the capture zone and where that zone extends up to the water table, despite the integrity management program and other preventative mitigation described in Chapter 3: Facilities and Emergency Response Matters.
- as discussed in sections 7.3.4 and 7.3.6 above, the leak or spill would have to continue, or not be detected or remediated, for long enough to provide a large-enough source of oil to reach the water table, despite 1) the leak detection and 2) spill remediation measures described in Chapter 3: Facilities and Emergency Response Matters and 3) the depth of the unsaturated zone between the pipeline and water table; and
- as discussed in section 7.3.6 above, degradation of the oil constituents as they move underground would have to leave sufficient contaminants in the groundwater by the time it reaches the wells.

The Board considers the probability of the above sequence of events all happening to be minimal. Nevertheless, the Board finds that the probability is not zero. This slightly increased risk of adverse consequences for the City water wells in the case of a leak or spill from the Chilliwack Realignment is therefore included in the weighing of benefits and burdens in Chapter 1: Decision.

The City requested that if the Board does consider approving the Chilliwack Realignment, that it require Trans Mountain to carry out a detailed analysis of the City well capture zones and the impact of locating the TMEP and the TMPL within or very near such capture zones. Given the multiple analyses already conducted to-date, including the recent Draft 2017 Golder Report, the Board does not consider that additional capture zone analysis by Trans Mountain is necessary.

Groundwater contamination from a pipeline leak or spill could also have other potential adverse effects, such as contamination of down-gradient fish-bearing creeks, as noted by the

STSA. Such environmental effects could occur with either the approved corridor routing or with the Chilliwack Realignment. However, as noted in Chapter 3: Facilities and Emergency Response Matters, there is a lower probability of a full-bore rupture with the Chilliwack Realignment (due, primarily, to it being shorter), and so the chances of such environmental effects occurring would be less. This difference is also taken into account in the Board's weighing of benefits and burdens in Chapter 1: Decision.

7.3.7 Groundwater monitoring wells

The Draft 2017 Golder Report recommended consideration be given to the installation of monitoring wells between the pipeline alignment and the northern-most production wells to provide early warning of a potential release. The City added that collecting such monitoring data before construction is also important, in order to understand baseline conditions. The evidence of both Trans Mountain and the City suggested that there are currently no monitoring wells between the existing pipeline route and the City's northern-most production wells (#1, #2, #6, #7).

When asked by intervenor Ms. Symington about monitoring wells for the Sardis-Vedder Aquifer, Trans Mountain referred to Certificate Condition 130, which requires Trans Mountain to file, three months prior to commencing operations, a groundwater monitoring program that pertains to all terminals and pump stations, and for any vulnerable aquifers along the pipeline route.

Trans Mountain said it will consider installation of monitoring wells in strategic locations along the pipeline route, such as highly vulnerable aquifers, where and if it is deemed beneficial to monitoring and protecting groundwater. Further, Trans Mountain said that the aquifer in the vicinity of the City municipal wells is unique because it is unconfined, it is incredibly transmissive, and because the Chilliwack Realignment is sufficiently close to municipal wells that the well capture zones are in proximity to the proposed pipeline.

Trans Mountain said that no decisions have been made yet with regard to monitoring wells specifically for the Sardis-Vedder Aquifer. Nevertheless, Trans Mountain said that, in general, it does not consider groundwater monitoring wells an effective method of monitoring for potential contaminant releases from a long linear source like a pipeline because it is unknown where a release might occur. Mr. Foley added that even when the location of receptors of concern are known (e.g. the City water wells), the movement of contaminants towards them can be very narrow and so may not be detected by a monitoring well.

Views of the Board

As discussed in the Board's May 2016 Report on TMEP, Condition 130 of the Certificate requires Trans Mountain to file a Groundwater Monitoring Program with the NEB for approval, at least 3 months prior to commencing operations. That Groundwater Monitoring Program must pertain to all terminals and pump stations, and any vulnerable aquifers along the pipeline route. And as noted above, TMEP crosses a total of approximately 68 aquifers from Edmonton through Burnaby.

The Board considers the question of whether monitoring wells should be installed for particular aquifers to be best addressed as part of Certificate Condition 130. This will allow the monitoring of aquifers to be considered in a coherent manner for the TMEP as a whole. The Board would not therefore apply an additional condition for monitoring wells, specific to the Chilliwack Realignment.

In addition to Certificate Condition 130, Trans Mountain has already developed a Groundwater Management Plan focused on the construction phase pursuant to Certificate Condition 72, and Certificate Condition 94 requires consultation reports related to the protection of municipal water sources. Together with the other mitigation noted in this Report, such as to avoid leaks and spills, the Board considers these commitments and requirements, collectively, cover what Trans Mountain should be required to do with regard to groundwater management. The Board does not therefore consider a further groundwater management plan, as requested by the City, to be necessary.

7.3.8 Alternative drinking water supplies

Trans Mountain acknowledged that, in the unlikely event that a hydrocarbon leak or spill impacted the City water wells, the consequences would be classified as catastrophic, given they could include a major impact for a large population, potential long-term health effects (e.g., cancer) associated with the consumption of contaminated water, and the requirement for a significant modification to the operation and management of the water supply system. The City stated that it has an emergency water supply source, but bringing these water sources online would require substantial upgrades to its water supply system, the water would not be of the same quality as at present, and thousands of people will lose trust in their drinking water.

As noted in the NEB's May 2016 Report on TMEP, Trans Mountain said that, if a pipeline release impacts the community's use of an aquifer, it would source and pay for an alternate water supply to meet the needs of the community until groundwater remediation was complete, and groundwater quality met provincial and federal criteria for its intended use. With regard to the Chilliwack Realignment, Trans Mountain said that it would work with the City to identify alternative water sources, which could include surplus capacity from other wells in the system, while suitable replacement alternatives are established and implemented. Trans Mountain said that it has sufficient financial capacity to fund restoration efforts and compensate those affected.

Views of the Board

The Board is satisfied with Trans Mountain's commitments regarding the sourcing of alternative drinking water if the City's water supplies are impacted by a pipeline leak or spill. The City requested that if the Board does consider approving the Chilliwack Realignment, that it require Trans Mountain to provide details and cost analysis of locating, treating and delivering alternate sources of drinking water in the event of a spill or water degradation in the Sardis-Vedder Aquifer. The Board agrees with Trans Mountain that such details and cost analysis would be highly dependent on the nature of a particular release and the impact it might have to the aquifer and municipal source wells, and so anything provided now would be hypothetical and of limited usefulness.

The Board's views on Trans Mountain's measures to address emergency prevention and response are discussed in Chapter 3: Facilities and Emergency Response Matters. The Board is of the view that Trans Mountain's commitments are also protective of human health. The Board reminds Trans Mountain that it must file Certificate Condition 94 requiring consultation reports related to the protection of municipal water sources.

7.4 Other Environmental Effects

With regard to other potential environmental effects of the Chilliwack Realignment, Trans Mountain stated that no interaction is predicted between the Chilliwack Realignment and terrain instability, acid generating/metal leaching rock, watercourses or wetlands, fish and fish habitat, and species at risk. Although there would be interactions with soils and soil productivity, air emissions and greenhouse gas emissions, vegetation, and wildlife and wildlife habitat, Trans Mountain said there would be no new or unique interactions for the Chilliwack Realignment, and that no new mitigation is recommended beyond that identified during the OH-001-2014 Hearing.

Views of the Board

With regard to other environmental effects, Trans Mountain's ESA for the Chilliwack Realignment concluded there is no change to the significance conclusions, including for accidents and malfunctions and for cumulative effects, compared to its original ESA and related filings submitted in the OH-001-2014 Hearing. Based on the evidence before it, the Board accepts this conclusion, and finds there are no predicted material differences with respect to such effects for the Chilliwack Realignment in comparison to the original environmental assessment conclusions for the TMEP, and that there is no need for additional mitigation or follow up.

7.5 Other Socio-Economic Effects

Views of Trans Mountain

With regard to other potential socio-economic effects of the proposed Chilliwack Realignment, Trans Mountain stated that no interaction was predicted between the Chilliwack Realignment and infrastructure and services, navigation and navigation safety, and employment and economy. Although there is potential for interaction with heritage resources, human occupancy and resource use, acoustic environment, social and cultural well-being and community health, Trans Mountain said there would be no new or unique interactions for the Chilliwack Realignment, and that no new mitigation is recommended beyond that identified during the OH-001-2014 Hearing.

Trans Mountain's views and commitments with regard to construction safety and emergency response are described in Chapter 3: Facilities and Emergency Response Matters.

Trans Mountain stated that construction activities will be scheduled in consideration of applicable municipal noise bylaws where feasible and that noise abatement equipment and construction scheduling will be considered at noise-sensitive locations, such as neighboring residents, and during noise-sensitive periods. Trans Mountain further reiterated that, with regard to cumulative effects, the assessment of noise and vibration in the OH-001-2014 Hearing concluded that the predicted TMEP-related residual and cumulative effects will not be significant. Trans Mountain said that its assessment team reviewed the information gathered on the proposed realignment and determined that the significance conclusions in regard to noise and vibration remain unchanged from the TMEP assessment, and are not significant.

Views of Participants

Participants raised issues and concerns regarding the safety of residents during construction in a restricted workspace, and with regard to emergency response in the case of a leak or spill. These issues and concerns are discussed in Chapter 3: Facilities and Emergency Response Matters.

Views of the Board

The Board has reviewed the evidence and considered the interactions expected to occur between the Chilliwack Realignment activities and the surrounding socio-economic elements. The Board notes that, in Trans Mountain's view, there will be either no interaction or no new or unique interactions between the Chilliwack Realignment and the surrounding socio-economic elements. The Board agrees with this assessment based on the similarities of the Chilliwack Realignment in this regard with approved corridor.

The Board's views concerning construction safety and emergency response are provided in Chapter 3: Facilities and Emergency Response Matters. The Board notes that Trans Mountain has committed to notifying and consulting with current landowners, as discussed in Chapter 4: Public Consultation. The Board also notes that none of the directly affected landowners, who would have the Chilliwack Realignment on their property, applied to participate in this hearing, nor were any concerns regarding construction workspace and proximity to residences raised during the oral hearing.

The Board notes that, although participants did not raise concerns regarding noise, there are likely to be increased project related effects associated with noise levels due to the close proximity of residences to the construction workspace in comparison to the approved corridor. The Board is of the view that the associated effects of construction-related noise level increases are temporary (in the order of a few months) and would be relatively localized. Levels would return to the current baseline following completion of construction. However, given the close proximity of construction to residences, and to ensure that noise impacts associated with the construction of the Chilliwack Realignment will be addressed, the Board would impose a condition requiring Trans Mountain to file a noise management plan prior to starting construction activities. See Condition 2 in Appendix 1.

In light of these considerations, the Board is of the view that with the Board's imposed condition, and Trans Mountain's proposed mitigation measures and commitments, potential adverse socio-economic effects resulting from the Chilliwack Realignment can be effectively addressed.

Appendix 1 - Conditions

The purpose of conditions is to mitigate potential risks and effects associated with a project so that the project can be designed, constructed, operated and abandoned in a safe manner that protects the public and the environment.

All conditions and commitments from the original OH-001-2014 Hearing would apply, to the extent they are relevant, to the Chilliwack Realignment if and when the Board receives GiC approval in accordance with subsection 21(2) of the NEB Act for the Chilliwack Realignment.

The Board considered all comments it received from Parties, as discussed in the relevant Chapter, before finalizing and setting out the terms and conditions it will impose on the Chilliwack Realignment.

The Board notes that any commitments made by Trans Mountain in its Application or in its related submissions during the proceeding would also become regulatory requirements. If the GiC approves the Chilliwack Realignment, the attached Order will come into effect and vary the Certificate. The Order will be subject to the terms and conditions set out below.

Additionally, the Board has considered Trans Mountain's 18 January 2018 response to Undertaking No. 5 (A5Z3L5) summarizing the conditions related to the Chilliwack Realignment. In its filing, Trans Mountain stated that the updated filing for Certificate **Condition 104 (Updated engineering alignment sheets and drawings)** submitted to the Board on 29 August 2017 will need to be revised to reflect the Chilliwack Realignment circumstances for alignment sheets filed under A85700-16, A85700-17, and A85700-20. The Board notes that alignment sheets filed under A85700-16 and A85700-17 do not apply to the Chilliwack Realignment. Additionally, the Board notes that alignment sheets filed under A85700-18 and A85700-19 apply to the Chilliwack Realignment. Therefore, if the Board receives GiC approval in accordance with subsection 21(2) of the NEB Act for the Chilliwack Realignment, then in addition to filing an updated alignment sheet for filing A85700-20, the Board directs Trans Mountain to file updated alignment sheets for filings A85700-18 and A85700-19 within 30 days after receipt of the GiC approval.

The Board will monitor and enforce compliance with these terms and conditions throughout the lifecycle of the TMEP through audits, inspections, and other compliance and enforcement tools.

Documents filed by Trans Mountain in relation to condition compliance and related Board correspondence will be available to the public on the Board's website at www.neb-one.gc.ca.

The terms used in this appendix have been defined in the Glossary at the beginning of this Report.

Conditions for the Order

Overarching condition

1. Compliance with commitments

Trans Mountain must implement all of the commitments it made in the Chilliwack Realignment application or to which it otherwise committed on the record of the OH-001-2017 proceeding, unless the Board otherwise directs.

Prior to commencing construction condition

2. Noise Management Plan

Trans Mountain must file with the NEB for approval, **at least 3 months prior to commencing construction**, a site-specific Noise Management Plan for construction of the Chilliwack Realignment, for all directly affected landowners within 15 m of the proposed construction activities. The plan must include, at minimum:

a) proposed hours of daytime and nighttime work;

b) noise mitigation measures, including all technologically and economically feasible mitigation measures;

c) a noise monitoring program, including locations, methodology, and schedule;

d) a description of the public and Aboriginal communication and noise complaint response process; and

e) a contingency plan that contains proposed mitigation measures for addressing noise complaints, which may include the temporary relocation of specific residents at their request.