Township of Langley

Est. 1873

REPORT TO MAYOR AND COUNCIL

PRESENTED:	JANUARY 26, 2015 - REGULAR AFTERNOON MEETING	**REPORT:**	15-10
FROM:	ENGINEERING DIVISION	**FILE:**	0400-40-11
SUBJECT:	TRANS MOUNTAIN PIPELINE EXPANSION PROJECT UPDATE		

RECOMMENDATION:

That Council receive the Trans Mountain Pipeline Expansion Project report for information.

EXECUTIVE SUMMARY:

At its Regular Afternoon meeting of December 8, 2014, Council received a delegation from the Pipe-Up Network, who provided Council with information relating to the Trans Mountain Pipeline Expansion (TMPL) Project; and requested that Council change the Township's position with respect to the application to the National Energy Board (NEB) intervenor status from 'neutral' to 'opposed'. At the same meeting, Council passed a motion directing staff to provide a report on whether the Township's intervenor questions are being adequately answered by the proponents, Kinder Morgan Canada (KMC).

As part of the Information Round 1 phase of the NEB process, the Township of Langley, working in collaboration with other municipalities and based on advice provided by legal counsel, submitted questions on 19 different areas of concern. These generally related to environmental matters, pipeline design, emergency response, impact on existing and future municipal infrastructure, and construction. The responses received from KMC did not adequately address the areas of concern. The lack of adequate response triggered the Township to submit a motion to the NEB requesting that KMC be compelled to provide the Township with complete and full responses to the questions.

The NEB supported the Township's motion only in 1 area, that relating to provision of emergency response plans. A response relating to emergency preparedness was received from KMC in October 2014, but it does not provide additional information and once again lacks in detail. Township of Langley is amongst many other government and non-government agencies with intervenor status who have received similar insufficient and inadequate responses to their questions. Staff estimates that the NEB has denied approximately 95% of all motions, including all motions submitted by the Province of British Columbia and Environment Canada.

In summary, the answers received from KMC during Round 1 Information phase of NEB's intervenor process have not been satisfactory and the Township's questions and concerns have not been fully addressed to date.

PURPOSE:

This report is in response to Council's request to provide Council with information relating to the Trans Mountain Pipeline Expansion (TMPL) Project and the adequacy of responses received to date from Kinder Morgan Canada (KMC) to address Township's concerns.

BACKGROUND/HISTORY:

Kinder Morgan Canada is proposing to twin the existing Trans Mountain Oil Pipeline, which runs north of the Trans-Canada Highway in the Township of Langley, conveying oils and related products from Edmonton, Alberta to Burnaby, BC. The project is commonly known as the Trans Mountain Pipeline Expansion Project (TMPL).

A section of the proposed pipeline routing within the Township has been changed from the previous submission, from Salmon River floodplain to the Redwoods Golf Course or adjacent properties to the east. Attachment A to this report provides a depiction of the revised routing. The new pipeline is planned to run parallel along the existing pipeline from the border of the City of Abbotsford to 217A Street, where it turns north until 88 Avenue, and then traverse either the Redwoods Golf Course or adjacent eastern properties to the rail corridor, before heading west paralleling the rail line through the industrial area into the City of Surrey.

The Township of Langley has no regulatory powers over the proposal, but can provide input through an application to the national Energy Board (NEB) to become an intervenor. The NEB has the overall regulatory powers for pipeline, energy development and trade in Canada.

At its Regular Afternoon meeting on February 3, 2014, Council authorized staff to proceed with an application to participate as intervenor to the NEB, in collaboration with other municipalities, if required.

DISCUSSION/ANALYSIS:

Information Round 1

For the Information Round 1 (IR#1), the Township submitted questions on 19 different topics of concern relating to such issues as environmental matters, pipeline design, emergency response, existing and future Township infrastructure, and the construction phase. The Township also submitted all public comments and questions received from the public.

The answers received from KMC on June 4, 2014 were inadequate and lacking in detail. The Township, as well as many other intervenors, submitted motions (Attachment B) to the NEB requesting better and more detailed answers to the questions that had been posed. However, the NEB only granted 1 of Township's motions relating to emergency response scenarios. That further response was received on October 17, 2014 (Attachment C) but did not provide any further information or detail.

Staff estimates that the NEB has denied approximately 95% of all motions requesting better and more detailed answers to various intervenors' questions. Specifically, the NEB denied every single motion of the Province of British Columbia as well as Environment Canada.

The Township did obtain a number of written commitments from the IR#1 process, such as:

- TMPL will consult with the Township on pipeline depth relative to existing and future municipal infrastructure;
- TMPL is willing to meet with the Township to share information on mainline block valve locations as the detailed engineering design is progressed;
- TMPL commits to consulting with the Township on its mitigation measures that will be incorporated into the detailed design and engineering to protect groundwater aquifers;
- TMPL will commit to designing and constructing the pipeline, with risk based design employed to manage risks following the principle of As Low as Reasonably Possible;
- TMPL commits to provide municipalities as-built information on location of the new TMPL, but not continuous markers;
- TMPL has commenced the detailed engineering and design of the Project, and is committed to engage with the Township as the detailed design progresses. The detailed

design will require identification of existing Township infrastructure, as well as future infrastructure growth plans to the extent that they are known. For municipal infrastructure, design considerations will be formalized in crossing agreements. In the event of an unforeseen strike or damage to municipal infrastructure, the specifications and contract for the construction work will typically require that any physical damage to existing property caused by construction will be restored to preconstruction condition;

- TMPL commits to working with the Township if approval of temporary [construction] facilities required;
- TMPL will consult with the Township in the development of the traffic and access management plans, and traffic control plans, to mitigate potential negative effects;
- TMPL has committed to managing and controlling invasive plants both during construction and operations of the Project; and
- TMPL commits to consulting with the Township as we progress through detailed engineering design and construction planning.

These commitments are not considered substantive in nature. In summary, the answers received from KMC during Round 1 Information phase of NEB's intervenor process have not been satisfactory and the Township's questions and concerns have not been fully addressed to date.

Information Round 2 and Intervenor Evidence

Staff, in collaboration with legal counsel, prepared questions for the Information Round 2 (IR#2), which were due on Friday January 16, 2015. The questions continued to be focused on the areas of concern as expressed as part of IR#1. Staff is also reaching out to the public and other stakeholders again to collect input regarding the Project, using the established publicinput@tol.ca email account. Similar to the Information Round #1 phase, TMPL will be required to respond and provide information to these and all other questions received from the intervenors

After the IR#2, the next step as an intervenor is to prepare for the filing of the Intervenor Evidence which is currently due May 1, 2015. The intent of the evidence filing before the NEB is to support any order the Township seeks from the NEB as a condition of pipeline approval as well as to strengthen Township's position in negotiations with TMPL. This evidence must be submitted in written format only. The NEB did not allow cross-examination on the evidence.

It is our understanding that the NEB will issue a draft list of terms and conditions on July 29, 2015 that the TMPL will have to adhere to, should the Project be approved.

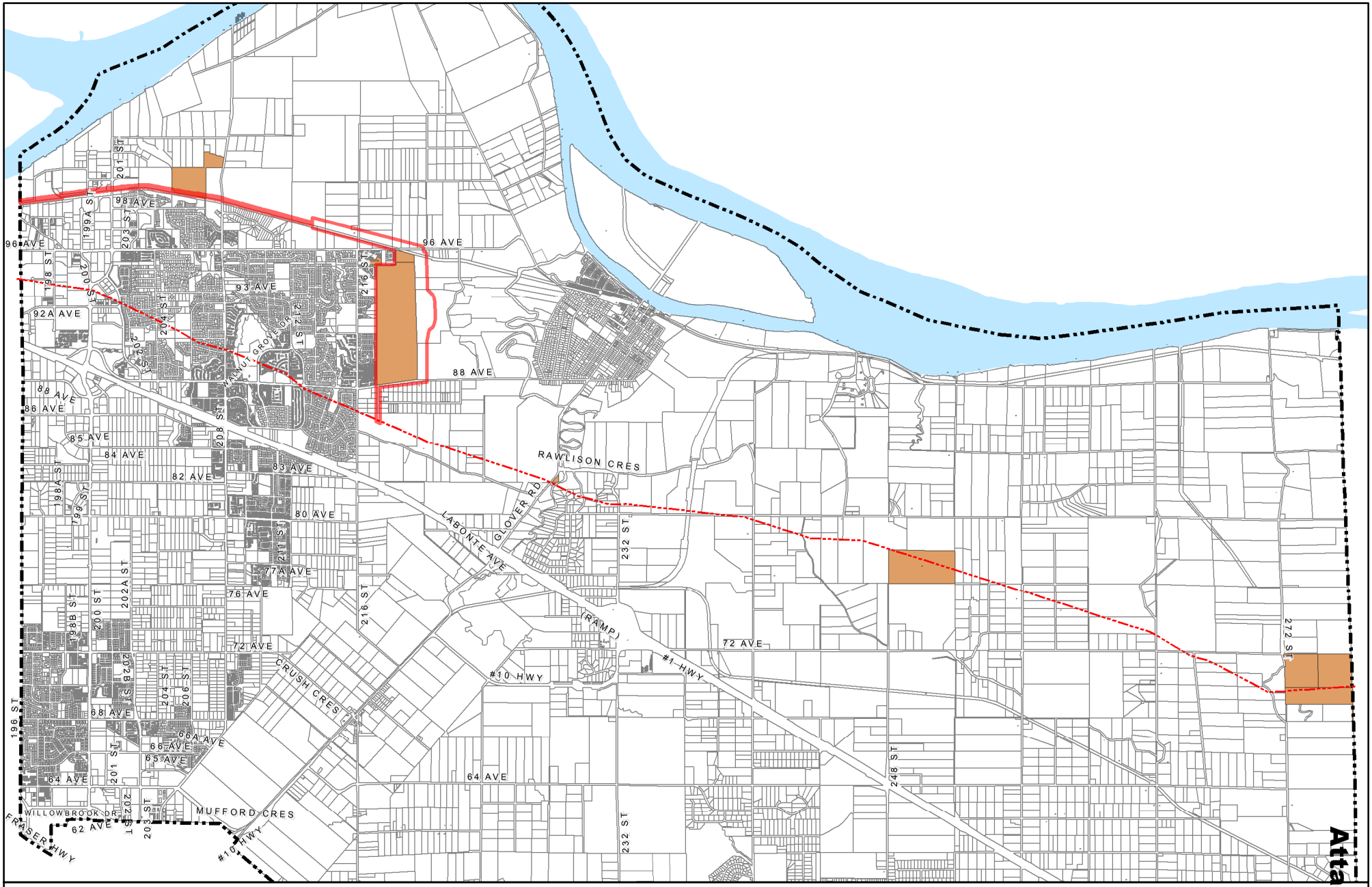
Financial Implications:

No financial implications at this time but the proposed project, should it obtain approval and proceed to construction, will have ongoing and long terms cost implications, that staff is currently attempting to address with KMC.

Respectfully submitted,

Roeland Zwaag
DIRECTOR, PUBLIC WORKS
for
ENGINEERING OF DIVISION

ATTACHMENT A TMPL – UPDATED ROUTING CORRIDOR
ATTACHMENT B TOWNSHIP NOTICE OF MOTION
ATTACHMENT C TMPL ADDITIONAL RESPONSE ON EMERGENCY RESPONSE
ATTACHMENT D TOWNSHIP INFORMATION ROUND #2 SUBMISSION



Township of Langley

Est. 1873

Kinder Morgan Proposed Pipeline and Township Affected Properties

Printed Date: 10/12/2014

Disclaimer: The data provided had been compiled from various sources and is not warranted as to its accuracy or sufficiency by the Township of Langley. The user of this information is responsible for confirming its accuracy and sufficiency.

Path: N:\Maps\Custom Maps\Engineering\2014\Eng_20140001_KinderMorganPipeline\TransMtnPipelineApplicationInfo\TransMtnPipelineInfrastructure_TOLAffectedProperties_8x11.mxd

- Existing Trans Mountain Pipeline
- Parcels
- Municipal Boundary
- Proposed Trans Mountain Pipeline Corridor
- TOL Affected Properties

0 0.5 1 2 3 Km

G.2 Attachment A

LIDSTONE & COMPANY
BARRISTERS AND SOLICITORS

July 9, 2014

BY ELECTRONIC FILING

National Energy Board
517 10th Avenue Southwest
Calgary, AB T2R 0A8

Attention: Sheri Young, Secretary of the Board

Dear Ms. Young:

Re: Hearing Order OH-001-2014
Trans Mountain Pipeline ULC ("Trans Mountain")
Application for the Trans Mountain Expansion Project
NEB File Number: File OF-Fac-Oil-T260-2013-03 02
Revised Motion to Compel Full and Adequate Responses to Information Requests

We represent the Township of Langley ("Langley"). Counsel for Trans Mountain requested formatting changes to Langley's Motion to Compel Full and Adequate Responses (A61503). Langley has complied with the request and attaches its Revised Motion to Compel in the attached table containing relevant portions of responses as directed by the NEB's Procedural Direction No. 3.

Counsel for Langley have been in communication with counsel for Trans Mountain regarding the revised motion. Counsel for Langley have confirmed that it is seeking responses to the same Information Requests as contained in the original motion and that there are no additional Information Requests in the revised motion. As such, Counsel for Trans Mountain has confirmed that it will still be able to provide a response to the revised motion by the deadline of 1:00 MT on Friday, July 11, 2014.

Counsel for Langley and Trans Mountain respectfully request that the NEB accept Langley's submission of its revised motion.

Sincerely,

LIDSTONE & COMPANY

Maegen Giltrow
giltrow@lidstone.info

MG/cb

Encl. Revised organizational chart

Hearing Order OH-001-2014
Trans Mountain Pipeline ULC (Trans Mountain)
Application for the Trans Mountain Expansion Project

REVISED Organizational chart for comments on inadequacy of IR responses (Round 1 Township of Langley IRs to Trans Mountain)

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
1.01(a)	Explain why the horizontal directional drilling ("HDD") technique is not considered feasible at the Nathan Creek and Salmon River crossings.	"The rationale and selection process for a specific crossing technique is specified in Volume 4A, Section 2.11 of the Application."	The response does not answer the request posed. The referenced Application Section states that HDD is preferred for large watercourses that have high fisheries sensitivities. HDD could be used for watercourses that do not meet these criteria. Trans Mountain has not explained why it will not be used specifically for the Salmon River and Nathan Creek, both of which have high fisheries sensitivities.
1.02(b)	If Trans Mountain will not commit to using heavy pipe at those crossings [Salmon River and Nathan Creek], please explain why not.	"During the Detailed Engineering and Design Phase of the Project, Trans Mountain will determine the segments of the pipeline where heavy wall and extra heavy wall pipe will be used. Generally heavier wall pipe is used at stream and river crossings."	This response is inadequate. Trans Mountain has said that it will make a determination in the future, after Project approval. But Township of Langley's concerns about safety and about protecting fisheries at these two watercourse crossings must be addressed now. Trans Mountain should explain why it will not commit to using extra heavy pipe to protect the crossings. Deprived of this information, Township of Langley will be prevented from participating fully as intervenors.
1.03(a)	1.03(a): Please provide Trans Mountain's specific	1.03(a): "The final programs will be developed in a	The responses do not answer the questions

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
1.03(b) 1.03(c) 1.03(d)	plan for responding to a spill or breach in a section of the pipeline within the Township of Langley, including sections that are under water, including in flood conditions. 1.03(b): Please indicate what the anticipated response time will be in the event of a spill, leak or breach. 1.03(c): Please indicate the volume of bitumen that would escape within the first 10 minutes of a spill, leak or breach of the pipeline or within the anticipated response time. 1.03(d): How would Trans Mountain's response time differ under circumstances where a pipeline is not easily accessible because it is under water?	manner consistent with the NEB's draft conditions 42, 52, 53 and 54." 1.03(b) "The maximum response time for field operations personnel to arrive on site is not defined. Field personnel are stationed strategically along the pipeline in order to be able to respond promptly to issues that arise anywhere along the pipeline route." 1.03(c): "Modeled worst-case scenario spill volumes along the entire length of Line 2 are provided in Volume 7, Appendix B of the Application, and the results of overland and stream flow modeling of these spill volumes are provided for the full length of Line 2 in Volume 7, Appendix C of the Application. It should be noted that the spill volumes reported in these references represent credible worst-case spills, and the volumes include estimates prior to detection/isolation, as well as drain-down volumes following isolation." 1.03(d): "This does not effect the response time described in the response to Township of Langley IR No. 1.03b."	posed. The request in 1.03(a) asked for a specific plan, but none was provided. Final programs should be developed and provided to the Intervenors now so that the Intervenors can adequately assess the Application and the TMEP's potential effects. In 1.03(b) Township of Langley requested an anticipated response time, and Trans Mountain's response should contain a number value or a number range. Response 1.03(c) is similarly non-responsive. Trans Mountain has not provided an anticipated volume of crude oil within the first 10 minutes of a spill, leak or breach. Response 1.03(d) states that the response time would not differ should the pipeline be under water at the time of a spill, but Trans Mountain has not provided a response time in the first instance. Therefore, Response 1.03(d) does not answer the question.
1.04(b)	If Trans Mountain will not commit to this request [to install an OSCAR station in Township of Langley], why not?	"The Application, Volume 7, Section 4.8 outlines the process to enhance Kinder Morgan Canada's (KMC) existing emergency management programs as they relate to the Trans Mountain Pipeline system to address the needs of the Project. The final programs will be developed in a manner consistent with the NEB's draft conditions 42, 52,	This response is inadequate. Trans Mountain responds that it will make this determination in the future, but the Township of Langley needs to know now how Trans Mountain plans to address its concerns regarding emergency response capacity and timing within its boundaries. Deprived of this information, Township of Langley will be prevented

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
		53 and 54."	from participating fully as intervenors.
1.05(d)	Does Trans Mountain plan to locate any mainline block valves within the Township of Langley?	"The locations of mainline block valves (MLBVs) will be finalized during the Detailed Engineering and Design Phase of the Project using the criteria in Volume 5A, Section 4.4.2 and Volume 4A, Section 3.2.15.1 of the Application. This could result in one or more MLBVs being located within the Township of Langley."	This response is inadequate. Trans Mountain responds that it will make this determination in the future, but the Township of Langley needs information now regarding the capacity for a prompt emergency shutdown and pipeline segment isolation within the environmentally sensitive and populated areas of the Township. Deprived of this information, Township of Langley will be prevented from participating fully as intervenors.
1.06(a) 1.06(b)	1.06(a): Please detail Trans Mountain's plan for responding to an earthquake that compromises the pipeline. 1.06(b): What is Trans Mountain's plan for a situation in which there are multiple failures, breaches, ruptures or spills at different segments of the pipeline, all of which must be responded to at the same time?	1.06(a): "Kinder Morgan Canada (KMC) plans for credible worst case scenarios, examples of which can be found in the Application, Volume 7, Sections 7 and 8. Section 2.9.3, Volume 4A of the Application briefly describes the principles to be used in the seismic design of the new pipelines and facilities (including pump stations and terminals) proposed as part of the Project. Please see Volume 7, Section 4 for a description of KMC's Emergency Management Program. The emergency response plans are comprehensive in their application regarding hazards and potential emergency situations on the Trans Mountain Pipeline System and this includes checklists for earthquake response." 1.06(b): "Please refer to the response to the Township of Langley IR No. 1.06a."	Application Volume 4A, section 2.9.3 discusses pipeline design, not emergency response. And none of the Application sections referenced in Application Volume 7 refers specifically to emergency plans in response to an earthquake. Application Volume 7, section 4 acknowledges that seismic risks are one of the principal threats to the TMEP, but it does not contain an emergency response plan or checklist specific to earthquakes. Volume 7, section 7 discusses the environmental and socio-economic impacts of a spill. Volume 7, section 8 only discusses a hypothetical worst case scenario during tanker loading at Westridge Marine Terminal.
1.07(f)	Will Trans Mountain commit to compensating	"Trans Mountain Pipeline ULC (Trans Mountain)	Township of Langley's Information Request was in

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
	Township of Langley fully for any costs incurred in responding to a pipeline emergency such that Township taxpayers will not be adversely affected by the pipeline project?	confirms it is liable to pay the costs of damages resulting from its construction and operation activities. For additional information, please see the response to NEB IR No. 1.08e"	respect of "any costs incurred in responding to a pipeline emergency", however, Trans Mountain's response is limited to "damages" resulting from construction and operation activities. The answer is non-responsive to the question concerning costs to the Township of Langley.
1.08(c)	Please indicate how much contamination that the pipeline is expected to create over its lifetime	"Trans Mountain believes improvements in pipeline design and construction will result in a low probability for pipeline leaks or ruptures and resulting contamination." . . . . "…historical incident data is not a sound foundation for estimating failure frequency in modern pipelines [because of advances in technology]."	This answer is nonresponsive. Trans Mountain should be required to use the data and information available to it now in order to answer Township of Langley's question. It is not relevant that the answer may change in the future as more is known and discovered about modern pipeline technology.
1.08(d)	Will Trans Mountain commit to providing potable water and irrigation water within the Township of Langley should an aquifer be compromised by the pipeline?	"Trans Mountain would expect to reach voluntary agreements with the District or Municipality outlining the company's responsibilities for the provision of water, the manner in which water would be provided and any further remediation work required."	Trans Mountain has failed to indicate whether or not it commits to providing potable water in the event that a Township aquifer is compromised.
1.14(e)	Please assess the impact on residents and local businesses to increased TMEP- related traffic on Township of Langley roads.	"Potential residual effects for residents and local businesses related to traffic are anticipated to be as follows: • Increase in traffic on highways and access roads during construction (refer to Section 7.2.5 of Volume 5B). • Change in land use patterns during	The answer is non-responsive. Township of Langley requested specific information related to Township of Langley roads, however the information provided is general.

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
		construction and site-specific maintenance (refer to Section 7.2.4 of Volume 5B). ・ Sensory disturbances for Aboriginal and non-Aboriginal local residents and land users during construction and site-specific maintenance (refer to Section 7.2.4 of Volume 5B). ・ Traffic safety effects (refer to Section 7.2.8 of Volume 5B). ・ Reduced business or commercial income due to disruption of business (refer to Section 7.2.7 of Volume 5B). All of the above effects were concluded to be short-term in duration, isolated in frequency, and reversible. Further, potential residual effects related to traffic safety and reduced business or commercial income were concluded to be of low probability."	
1.15(b) 1.15(c)	1.15(b): Has Trans Mountain evaluated or predicted the TMEP's effects on industrial property values? 1.15(c): Will Trans Mountain commit to compensating Township of Langley for any reduction in property tax values on its residential and industrial lands caused by the proposed project?	1.15(b): "For discussion on property values, please see the response to Amy C IR No. 1.3g." 1.15(c): "Trans Mountain does not anticipate an impact to property values, and therefore no consequential impact upon municipal residential taxes."	1.15(b) is non-responsive. The Response to Amy C IR No. 1.3 g does not discuss impacts on industrial property values. Trans Mountain fails to indicate in 1.15(c) whether or not it commits to compensate Township of Langley in the event that Trans Mountain is incorrect in its assessment, and there is a negative impact on property tax values.
1.18(a)	Has Trans Mountain identified potential adverse impacts on agricultural land within the Township	"All agricultural areas impacted by the proposed Project including those within the Township of	Township of Langley requested that Trans Mountain provide information specific to the

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
	of Langley specifically? If so, please explain what those impacts are anticipated to be.	Langley were identified and farm use verified using a combination of high resolution aerial maps and on the ground observation. Agricultural use affected by the proposed Project in the Metro Vancouver Region, including the Township of Langley, has been identified in four categories: natural pasture and grazing areas (not affected); field crops (tame pasture, turf); specialty crops (container nursery); and livestock facilities (poultry, dairy, equestrian and other livestock)." "The various types of disturbance the pipeline may create have been analyzed for each land use and this information is provided in the Application. . ." "Soils on agricultural land impacted by the proposed Project including the Township of Langley were also surveyed and mitigation measures developed. . ."	Township of Langley, which it has failed to do.
1.18(d)	Will Trans Mountain commit to compensating Township of Langley farmers for reduced productivity of agricultural land? How will that compensation be calculated?	"For discussion on compensation, please see response to CGLAP IR No. 1.7b." The response to CGLAP No. 1.7b states: "Trans Mountain is required to do as little damage as possible, and make full compensation to all persons interested for all damages suffered as a result of the operations of the company. Damages caused as a result of residual effects are included within this responsibility."	Trans Mountain has failed to indicate whether it is providing a specific commitment to compensate Township of Langley farmers for reduced agricultural productivity, which is what Township of Langley has requested in 1.18(d).

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
		"Should residual damages continue to occur following mitigation, compensation for those residual damages would be calculated based upon the actual measurable damages incurred. In general, the compensation framework would involve assessing actual damage to, for example, crop production, inconvenience, increased operating costs, and any other applicable damage. For reduced crop production, productivity off and on the right-of-way would be measured and damages would be calculated based upon the measured difference in production, holding all other mitigating factors constant. Where residual damages persisted, additional mitigation measures would be developed and employed and any remaining residual damages would be determined and compensated as indicated above." "Because crops and soil conditions vary, and construction and restoration methods may change depending upon site specific conditions, each situation would be evaluated, and addressed individually."	
1.20	Email 2014-04-27 8:43 pm: Does anyone know how bitumen can be completely remediated, and the environment restored back to a state before a spill? Is that even possible?	"In the event that dilbit were to be spilled, the procedures for cleaning up the spill would be similar to cleaning up a conventional crude spill. Trans Mountain completed research to study the fate and behavior of diluted bitumen in large simulation spill tanks and was able to demonstrate the effectiveness of conventional equipment in recovering the spilled material. Trans Mountain is committed to continued participation in	The response does not answer the resident's question whether the environment can be completely restored back to its original state after a spill occurs.

IR #	IR Wording	Trans Mountain's response to IR	Intervenor's explanation for claiming IR response to be inadequate
		government and industry research programs to further inform emergency management programs for heavy oil spills."	
1.20	Email 2014-04-28 10:26 pm: My primary concern for the Township of Langley (and my community of Walnut Grove) is the absence of a strong research base on effective methods to re-habilitate or decommission older pipelines in built-up communities.	"The age of the pipeline is not in and of itself a reason for concern, with proper maintenance and monitoring, a pipeline can be safely operated indefinitely."	Several Township residents expressed concern about Trans Mountain's plans for decommissioning older pipelines. Instead of outlining a specific plan, Trans Mountain simply states that the age of the pipeline is not in and of itself a reason for concern. Trans Mountain must be more specific about its plans for decommissioning older pipelines and the increased chance of a spill or a breach as a pipeline ages.

Trans Mountain Pipeline ULC
Trans Mountain Expansion Project
NEB Hearing Order OH-001-2014
Follow-Up Responses to Information Request from
Township of Langley

F-IR 1.3 Emergency Response Time

Reference:

(i) A3S1R5, Application Volume 5B, ESA – Socio-Economic Assessment, PDF page 136
(ii) A3S1A4, Application Volume 4A, Project Design and Execution - Engineering, PDF page 11

Preamble:

In reference (i), Trans Mountain responds to concerns about safety in the event of a spill by stating that the consequences of a spill would be minimized by quickly shutting down and isolating the damaged section of the pipeline or facility.

The application does not state how fast the response time would be in the event of a spill.

Reference (ii) indicates that the proposed pipeline route runs directly parallel to the Salmon River between RK 1148 and RK 1150.5. Thus, the new pipeline is currently proposed to be located within the Salmon River floodplain, which is difficult to access during winter or wet conditions. During certain rain events, it would not be possible for Township of Langley to stop pumping water from its dyke station. If there is a spill when the land is flooded, bitumen risks spreading along the Salmon River and eventually into Township of Langley's dyke station to be pumped into the Fraser River.

Request:

b. Will Trans Mountain's response time be within 10 minutes if a spill, leak or breach of the pipeline is detected? If not, please indicate what the anticipated response time will be in the event of a spill, leak or breach.

Response:

b. A report of a release related to the Trans Mountain terminals or pipelines received by the control centre would result in the immediate shut down of pumps, closure of valves, and dispatch of field operations personnel to investigate the report. The maximum response time for field operations personnel to arrive on site is not defined. Field personnel are stationed strategically along the pipeline in order to be able to respond promptly to issues that arise anywhere along the pipeline route.

Intervenor's Explanation for Claiming IR Response to be Inadequate:

The responses do not answer the questions posed. The request in 1.03(a) asked for a specific plan, but none was provided. Final programs should be developed and provided to the Intervenors now so that the Intervenors can adequately assess the Application and the TMEP's

potential effects. In 1.03(b) Township of Langley requested an anticipated response time, and Trans Mountain's response should contain a number value or a number range. Response 1.03(c) is similarly non-responsive. Trans Mountain has not provided an anticipated volume of crude oil within the first 10 minutes of a spill, leak or breach. Response 1.03(d) states that the response time would not differ should the pipeline be under water at the time of a spill, but Trans Mountain has not provided a response time in the first instance. Therefore, Response 1.03(d) does not answer the question.

NEB Decision on Intervenor Motion:

Grant – Motion sought information that met the Board's test for compelling a further and better response. The Board is compelling Trans Mountain to provide a full and adequate response to the original question asked.

Trans Mountain's Follow-Up IR Response:

Upon detection of a spill, leak or breach of the pipeline KMC's response will be immediate.

Response actions initiated by the control center, include shut down of pumps, closure of valves, dispatch of field operations personnel and in some cases notification of first responders. The maximum time for field operations personnel to arrive on site is not defined and may exceed 10 minutes. However, trained personnel and response equipment are located in strategic locations along the pipeline to allow their prompt deployment.

LIDSTONE & COMPANY
Barristers and Solicitors

January 16, 2015

Mr. D. Scott Stoness
Vice President, Finance & Regulatory Affairs
Kinder Morgan Canada Inc.
Suite 2700, 300 – 5th Avenue SW
Calgary, AB T2P 5J2
Facsimile: 403-514-6622
Regulatory@transmountain.com

Mr. Shawn H. T. Denstedt, Q.C.
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Barristers & Solicitors
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Facsimile: 403-260-7024
Regulatory@transmountain.com

Dear Mr. Stoness and Mr. Denstedt:

Re: Hearing Order OH-001-2014
Trans Mountain Pipeline ULC (Trans Mountain)
Application for the Trans Mountain Expansion Project (Project)
Information Request No.1 to Trans Mountain

Pursuant to the above referenced National Energy Board Hearing Order, please find the attached Information Request No. 2 to Trans Mountain, which we submit on behalf of the Township of Langley.

If you have any questions, please do not hesitate to contact me.

Sincerely,

LIDSTONE & COMPANY

Maegen Giltrow
giltrow@lidstone.info
(604)899-2269

MG/cm
c.c. National Energy Board (filed electronically)

Encl.

Trans Mountain Pipeline ULC
Trans Mountain Expansion Project ("TMEP")

Township of Langley Information Request No. 2

Table of Contents

Trans Mountain Pipeline ULC
Trans Mountain Expansion Project ("TMEP")

Information Request No. 2

Emergency Management and Response

2.01 Emergency Response Time

Reference:

i. C352-1-1 - Township of Langley's Information Request No. 1 to Trans Mountain - A3W7K1, IR q. 1.03(b), PDF p. 5.
ii. B91-1 - Trans Mountain Response to Langley IR No. 1 - A3X6U7.
iii. C352-3-1 - Township of Langley Motion to Compel Full and Adequate Responses to Round 1 IRs - A3Y8E1.
iv. A81-3 – Appendix 1 to NEB Ruling No. 33 - Motions to compel full and adequate responses to the first round of intervenor information requests - A4C4H7.
v. B280-3 - Trans Mountain Follow-Up Response to NEB Ruling 33 – A4D3G2, PDF pp. 292-293.

Preamble:

In Reference (i), the Township requested an anticipated response time in the event of a spill, leak, or breach within the Township's boundaries.

Trans Mountain provided an inadequate response to the Township's IR question No. 1.03(b) in Reference (ii). The Township filed a motion to compel an adequate response, requesting a number value or a number range (Reference iii). The NEB granted the Township's motion (Reference iv).

Trans Mountain issued its follow-up response in Reference v, which states:

> "Upon detection of a spill, leak or breach of the pipeline KMC's response will be immediate. Response actions initiated by the control center, include shut down of pumps, closure of valves, dispatch of field operations personnel and in some cases notification of first responders. The maximum time for field operations personnel to arrive on site is not defined and may exceed 10 minutes. However, trained personnel and response equipment are located in strategic locations along the pipeline to allow their prompt deployment."

Trans Mountain's follow-up response is no more specific regarding the anticipated response time than it was in Reference ii.

Request:

a) Using a specific number or a number range, please indicate what the anticipated response time will be in the event of a spill, leak or breach within the Township's boundaries. If the number will vary based on the type of event, please indicate the response time for each event type.

2.02 Location of Mainline Block Valves (MLBVs)

Reference:

i. B91-1 - Trans Mountain Response to Langley IR No. 1 - A3X6U7, PDF p. 8.

Preamble:

Reference (i) says "Trans Mountain is willing to meet with representatives of the Township of Langley to share information on mainline block valve locations as the detailed engineering design is progressed."

Request:

a) Please share the information with the Township that has been obtained during the detailed design and engineering phase to date about the location of MLBVs within the Township's boundaries.
b) If Trans Mountain claims there is no information to date, please identify when it will share this information.

2.03 Emergency Response: Multiple Incidents

Reference:

i. B279-5 - Attachment 2.3 Trans Mountain Pipeline ERP (Publish Date July 2014) - A4D3F2, PDF p. 66; and B279-6 - Attachment 2.4 Terminals and Tank Farms ERP (Publish Date July 2014) - A4D3F3, PDF p. 46.

Preamble:

Reference (i) outlines "multiple hazards" but it does not identify the emergency response plan in the event of multiple and simultaneous spills, leaks, breaches or other security incidents.

Request:

a) What is the emergency response plan in the event of multiple emergencies occurring simultaneously or in close temporal proximity along the pipeline?

2.04 Emergency Response: Local Government Notification

Reference:

i. B279-5 - Attachment 2.3 Trans Mountain Pipeline ERP (Publish Date July 2014) - A4D3F2, PDF p. 33.

Preamble:

Reference (i) states that the Trans Mountain "liaison team" will conduct notifications of local governments "as soon as possible" in the event of an internally confirmed emergency.

The Township of Langley is concerned that "as soon as possible" is unacceptably vague.

Request:

a) Will Trans Mountain notify local governments of any confirmed emergency incident, or only one requiring municipal resources?
b) When will notification occur?

2.05 Clean-up of Sunken Dilbit

Reference:

i. B279-5 - Attachment 2.3 Trans Mountain Pipeline ERP (Publish Date July 2014) - A4D3F2, PDF p. 55.
ii. B225-2 Attachment Table A3Z2C1, PDF p. 9-10.

Preamble:

Reference (i) outlines Trans Mountain's emergency response plans and recovery tactics for sunken and submerged oil.

At Reference (ii), Trans Mountain said: "In the event that dilbit were to be spilled, the procedures for cleaning up the spill would be similar to cleaning up a conventional crude spill. Trans Mountain completed research to study the fate and behavior of diluted bitumen in large simulation spill tanks and was able to demonstrate the effectiveness of conventional equipment in recovering the spilled material. Trans Mountain is committed to continued participation in government and industry research programs to further inform emergency management programs for heavy oil spills."

The Township is concerned that the factors that cause dilbit to sink in freshwater rivers is poorly understood, and conventional equipment used for cleaning up conventional crude oil spills is insufficient to clean up sunken dilbit.

Request:

a) Please provide the research that Trans Mountain completed to reach the conclusion that using conventional equipment in recovering sunken dilbit is acceptable.
b) What equipment will Trans Mountain use to clean up sunken dilbit in the Fraser River?
c) What percentage of the sunken dilbit will be unrecoverable with this equipment under various spill scenarios?
d) How long will the clean-up take under a worse case spill scenario?

2.06 Commitment to Increase Liability Insurance

Reference:

i. B32-2 Trans Mountain response to Board IR No. 1, A3W9H8 IR 1.8b, PDF p. 28.
ii. B18-14 - V7_APPG_CLEANUP_COST_POTEN_OIL_SPILL - A3S4W8, p. 24.
iii. Goodman, Ian and Brigid Rowan, "Economic Costs and Benefits of the Trans Mountain Expansion (TMX) Project for BC and Metro Vancouver" Simon Fraser University, November 10, 2014, PDF p. 63-64. [Attachment #1].
iv. *Pipeline Safety Act (Bill C-46)* http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=6825928&Language=E&Mode=1&File=48#8

Preamble:

In Reference (i), Trans Mountain states that it has a total of $750 million in liability insurance coverage:

> 1. $150 million General Liability insurance component, which covers all of the Kinder Morgan assets located in Canada, except for the Canadian section of the Kinder Morgan Cochin Pipeline, and the Puget Sound Pipeline; and
>
> 2. $600 million of coverage for all of the entities in the Kinder Morgan (North America) group of companies.

Reference (ii) estimates that total clean-up costs for various spill scenarios could range from $102.9 to $315.9 million.

Reference (iii) asserts that Trans Mountain's estimates at Reference (ii) are too low and clean-up costs for a worst case scenario would more likely be in the range of $2 to $5 billion US.

The federal *Pipeline Safety Act*, which has passed first reading, will require pipeline companies to have the financial resources to pay for the limit of liability of at least $1 billion [see s. 48.13 and 48.12(5)] (Reference iv).

The Township is concerned that Trans Mountain does not carry sufficient liability coverage to pay for the potential clean-up costs of a spill.

Request:

a) Will Trans Mountain commit now to increasing its liability coverage to $1 billion to meet proposed federal legislative requirements?
b) Will Trans Mountain commit to increasing its liability coverage to $2 billion?
    i. What is the difference in premium costs to Trans Mountain between $1 billion, $2 billion and $5 billion in liability coverage?

2.07 Volume of Crude Oil Spilled

Reference:

i. B280-3 Trans Mountain Follow Up Responses to NEB Ruling 33 A4D3G2, PDF p. 293.
ii. B279-5 - Attachment 2.3 Trans Mountain Pipeline ERP (Publish Date July 2014) - A4D3F2, PDF p. 14, 21, 22, 29.

Preamble:

After being compelled by the NEB to respond to the Township of Langley's question about Trans Mountain's anticipated response time in the event of a spill, leak or breach, Trans Mountain says:

> "Upon detection of a spill, leak or breach of the pipeline KMC's response will be immediate.
>
> Response actions initiated by the control center, include shut down of pumps, closure of valves, dispatch of field operations personnel and in some cases notification of first responders. The maximum time for field operations personnel to arrive on site is not defined and may exceed 10 minutes. However, trained personnel and response equipment are located in strategic locations along the pipeline to allow their prompt deployment" [Reference (i)].

Reference (ii) indicates that KMC's immediate response initially consists of internally confirming a spill, leak or breach irrespective of whether the notification of the spill comes from an experienced emergency first responder:

> "If the detection method comes from alarms to the CCO or a member of the public the potential incident must then be visually verified by KMC personnel. If a leak, fire or other emergency event is confirmed the on-site operator will inform the CCO of the incident and CCO will initiate the internal notification procedure" (emphasis added).

The Township is concerned about the volume of oil spilled in the time it takes for Trans Mountain to arrive on site and confirm a spill, which will likely take longer than 10 minutes.

Request:

a) What is the volume of bitumen that would escape in a worst case scenario in a 30 minute time span?
b) Please also Identify the volume of oil spilled in 1 hour and 2 hours.

Hydrogeological Assessment

2.08 Hydrogeological Assessment

Reference:

i. C352-1-1 - Township of Langley's Information Request No. 1 to Trans Mountain - A3W7K1, IR q. 1.03(b), PDF p. 9.

Preamble:

As noted in Reference (i), the Township relies heavily on groundwater for agricultural, commercial, industrial and residential uses. Approximately 80% of the Township of Langley's water supply comes from municipal and private wells.

Request:

a) Will Trans Mountain commit to conducting a hydrogeological assessment of the portion of the TMEP going through the Township of Langley and provide the results and mitigation measures from the assessment? If so, when?

Pipeline Location

2.09 Provision of GIS Files

Reference:

i. B91-1 - Trans Mountain Response to Langley IR No. 1 - A3X6U7, PDF p. 21.

Preamble:

Reference (i) says "Trans Mountain commits to provide municipalities as-built shape files on location of TMEP Line 2".

Request:

b) Will Trans Mountain fulfill its commitment to the Township of Langley in Reference (i) before the TMEP is operational and to provide sufficient time for the Township to conduct emergency management planning and training and municipal operations planning? In your response, identify when Trans Mountain will fulfill its commitment.
c) Will Trans Mountain provide these files directly to municipal staff?

Pipeline Depth

2.10 Consultation with the Township

Reference:

i. B91-1 - Trans Mountain Response to Langley IR No. 1 - A3X6U7, PDF p. 25.

Preamble:

Reference (i) says "Trans Mountain will consult with Township of Langley on pipeline depth proximate to existing and future municipal infrastructure."

Request:

a) Will Trans Mountain commit to obtaining the Township's approval on pipeline depth proximate to existing and future municipal infrastructure?

Construction Phase

2.11 Excavated Material Deposited on Private Property

Reference:

i. B5-9 Application Volume 5A, ESA – Biophysical A3S1L3, PDF p. 63.

Preamble:

Reference (i) says excess trench soil will be feathered-out over adjacent portions of the construction right-of-way where topsoil or root zone material salvage has occurred.

Request:

a) Will Trans Mountain commit to:
    i. not depositing any soil or excavated material within 3 metres of a property line;
    ii. if soil or excavated material is deposited within 6 metres of a property line, Trans Mountain commits to grading the deposited material in such a manner that the slope of the deposit closest to the property line is not steeper than 1 metre vertical to 5 metres horizontal;

iii. not depositing any material in the immediate vicinity of any utilities or services which may be damaged by any settlement resulting from such deposit; and
iv. not depositing any material over wells or private sewage disposal systems.

b) How will Trans Mountain ensure that any deposited or removed materials will not interfere with the hydrological function and established above or below ground drainage pattern or capacity of adjoining or adjacent lands?
c) How will Trans Mountain ensure that deposited or removed materials will not cause the groundwater table to rise on the land or on adjacent or adjoining land?

2.12 Pollution or Impediment of Watercourses

Reference:

i. B248-16 – Trans Mountain Pipeline ULC Tech Update 1 Cons Update 2 Part 1 Routing Pt15 - A3Z8F9, PDF p. 9-11.

Preamble:

The Township of Langley has identified its concern that pipeline construction works may pollute or obstruct the flow of watercourses, resulting in damage to public property and public infrastructure [Reference (i)].

Request:

a) Please commit to not causing or permitting any material or substance that is dangerous, deleterious or toxic including: chemicals, chlorinated water, cleaning compounds, detergents, fertilizers, herbicides, pesticides, paints, soaps, solvents and waste oil or any material whose direct or indirect release into a watercourse would violate the *Fisheries Act* or the *Environmental Management Act*.
b) Please commit to not impeding or obstructing a watercourse with any material or substance.
c) Will Trans Mountain commit to taking any remedial action as specified by the Township, including suspending construction activities, if the Township discovers damage to public watercourses or infrastructure or endangerment to human life and safety as a result of Trans Mountain's activities? If not, explain why.
d) Will Trans Mountain commit to paying the Township for all costs and expenses incurred by on behalf of the Township for undertaking remedial action to protect its watercourses from Trans Mountain construction activities should Trans Mountain fail to take action?

2.13 Sediment Discharge into Drainage System

Reference:

i. B11-4 - V6B_1of2_PIPELINE_EPP - A3S2S3, PDF p. 52, 57, 180.

Preamble:

Reference (i) sets out Trans Mountain's sediment control measures and sediment contingency plan, for example:

> "Install additional erosion and sediment control measures prior to or during wet conditions and extreme weather events, to ensure the protection of sensitive environments. The Lead Activity Inspector, the Lead Environmental Inspector and the Environmental Inspector(s) in consultation with the Construction Manager, will determine if and when to suspend work if an extreme weather event occurs onsite that may pose risks to the environment or environmental protection measures." (p. 52)

> "Install and maintain appropriate erosion and sediment control measures to prevent sediments from disturbed areas from being transported into watercourses/wetland/lakes (see Drawings [Erosion Control – Rollback in Riparian Areas] and [Mounding in Riparian Areas] provided in Appendix R)." (p. 57)

The Township of Langley is concerned that pipeline construction works may discharge sediments (including rock, gravel, sand, silt, clay, earth, construction or excavation wastes) into its drainage system, which includes rivers, streams, creeks, waterways, watercourse, ditches, channels, storm sewers and drains located in the Township.

Request:

a) Please commit to not discharging sediment or sediment-laden water directly or indirectly into the Township's drainage system.
b) Please commit to not discharging water with a turbidity greater than 100 NTU (nephelometric turbidity unit), or as indicated by current Fisheries and Oceans Canada standards, into the Township's drainage system within 24 hours of a significant rainfall event (which means any precipitation event that meets or exceeds 25 mm in a 24 hour period).

c) Please provide the location(s) of existing drainage infrastructure in the Township and Trans Mountain's proposed measures to protect it during construction.
d) Please provide the location(s) of existing and proposed watercourses, ditches, swales or any other body of water within 50 metres of the TMEP construction site boundaries, along with Trans Mountain's proposed protection measures.
e) Will Trans Mountain commit to entering into a legally binding agreement with the Township to retain an independent qualified professional at Trans Mountain's cost (an engineer, biologist, geoscientist, CPESC, applied scientist or technologist, registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act who is an expert in erosion and sediment control) to monitor and inspect Trans Mountain's sediment and erosion control measures once per week and report failures and maintenance requirements to Trans Mountain and the Township?

2.14 Damage to Riparian and Environmentally Sensitive Areas

Reference:

i. B11-4 – V6B 1of2 Pipeline EPP A3S2S3, PDF p. 89, 100, 105, 124, 238.

Preamble:

The Township of Langley contains over 1,600 kilometres of watercourses. Approximately 700 kilometres are streams providing direct or indirect habitat for local fish species, including seven salmonid and two endangered fish species. The remaining 900 kilometres are roadside and field ditches primarily serving to drain land and convey water. As many of these ditches were created to drain wetland areas or reroute historical flow patterns, some of them also provide fish habitat. The Township contains fourteen watersheds or drainage catchment areas. As such, it has designated a number of watercourse areas that require streamside protection. The Township is concerned that TMEP construction will damage these riparian and environmentally sensitive areas.

Reference (i) outlines Trans Mountain's proposed mitigation measures and a reclamation strategy for riparian areas and streambanks.

Request:

a) At p. 89 of the Pipeline EPP, Trans Mountain says it will adhere to clearing guidelines for the protection of streams and wetlands where riparian management zones (widths) are identified. Which entity is identifying riparian management zones?
    i. Will Trans Mountain recognize and adhere to the Township's identification of riparian management zones?

b) Will Trans Mountain commit to submitting a tree protection plan consisting of tree retention, protection and replacement details acceptable to the Township for the disruption to trees caused by pipeline construction in riparian areas?
c) Will Trans Mountain commit to submitting a landscape plan prepared by a qualified landscape professional indicating the location of the vegetation or trees to be planted, the type and size of materials to be used, planting methodology and timing, and a three year monitoring schedule to ensure survival of planted materials?
d) Will Trans Mountain commit to providing an assessment, prepared by a qualified independent professional, of the predicted changes to site drainage and propose measures to manage drainage impacts?
e) Will Trans Mountain commit to submitting a stormwater management plan depicting the proposed measures to mitigate drainage impacts including sediment control from the development site?
f) Will Trans Mountain commit to providing the Township with evidence that the minimum requirements of the Provincial Riparian Areas Regulation, B.C. Reg 376/2004 as amended have been complied with; and where applicable, evidence that Section 35 (HADD) of the Federal *Fisheries Act* is being complied with during construction?

2.15 Highway Use Permit

Reference:

i. B91-1 - Trans_Mountain_Response_to_Langley_IR_No._1 - A3X6U7, PDF p. 31-32.

Preamble:

In Reference (i), the Township of Langley asked if Trans Mountain would commit to obtaining a highway use permit from the Township during the construction phase, to which Trans Mountain said it would “work with the Township of Langley to understand the applicability of its bylaws”.

Request:

a) What is Trans Mountain’s understanding of the applicability of the Township of Langley’s Highway and Traffic Bylaw to the TMEP?
b) Will Trans Mountain commit to applying for a Highway Use permit (s. 510, *Highway and Traffic Bylaw 2010* No. 4758) and complying with the terms of that permit during construction of the TMEP through the Township of Langley?
c) If Trans Mountain will not commit to applying for a permit, will it commit to:

i. Not parking a commercial vehicle in excess of 5700 kg on a highway between the hours of 9 pm and 6 am of the following day?
ii. Not parking a commercial vehicle in excess of 5600 kg on a highway within a residential zone or on either side of a highway where residential zoned property exists on one side of the highway, or adjacent to a park or school?
iii. Not drive or operate a commercial vehicle exceeding 10,000 kg on any highway in the Township except those designated as Truck Routes in Schedule C of the *Highway and Traffic Bylaw*?
iv. Not undertake any works, construction, dig up, break up or remove any part of a highway or excavate in or under a highway?
v. Not cause damage to, trim, cut down, or remove trees or timber, sod, shrubs, plants, bushes and hedges from a highway?
vi. Not cause damage to, deface, or remove fences, signs, posts, benches or other street furniture, utilities, survey monuments and services or other things erected by the Township on or under a highway?
vii. Not place, construct or maintain a loading platform, skids, rails, mechanical devices, buildings, signs, street furniture, ramps, or any other structure or thing on a highway?
viii. Not erect or maintain any sign, advertisement or guide-post on or over any highway or alter, repaint, tear down or remove any sign, advertisement or guide-post erected or maintained on any highway;
ix. Not ride, drive, lead, move or propel any vehicle or any animal in excess of 270 kg over or across a boulevard including any curb, sidewalk or ditch unless such has been constructed or improved to form a suitable crossing?
x. Not construct a boulevard crossing, including a curb, ditch or sidewalk crossing?
xi. Not in any way obstruct or create an obstruction to the flow of traffic on a highway?
xii. Not plant a tree or shrub on any highway, or landscape the boulevard?
xiii. Not construct or maintain a driveway or roadway on any highway?

2.16 Design Standards and Requirements for Pipeline Infrastructure

Reference:

i. B91-1 - Trans_Mountain_Response_to_Langley_IR_No._1 - A3X6U7, PDF p. 31-32.

Preamble:

In Reference (i), Trans Mountain said it would "work with the Township of Langley to understand the applicability of its bylaws".

Request:

a) Will Trans Mountain commit to meeting or exceeding the design criteria and construction requirements and specifications as outlined in Schedule B and C of the Township's *Subdivision Development and Servicing Bylaw* 2011 No. 4861?

2.17 Noise Disruption and Hours of Work

Reference:

i. B5-2 - V4B_4.2.1.2_TO_6.1_PROJ_DES_AND_EXEC-CONSTR - A3S1K6, Section 4.4.3 and Section 5.2.8, PDF p. 13, 24.

Preamble:

Reference (i) states: "Hours of work will be determined after review of local bylaws, consideration of community input, consultation with contractors, assessment of critical path activities, and other factors. Typical construction schedules will be 10 to 12 hours per day, 5 to 6 days per week, in the day-time hours. Night-time activities will generally be limited to those that produce very low noise (*e.g.*, NDT, dewatering). In special circumstances (*i.e.*, critical tie-ins or critical crane lifts, where work cannot be stopped until complete), somewhat more significant night-time or weekend activity may be required."

Section 5.2.8 outlines a Noise Control Plan, which includes adhering to municipal regulations and guidelines for noise management.

Request:

a) Will Trans Mountain commit to not carry on works in connection with the construction of the TMEP, including excavation or operating any kind of machine or engine to the disturbance of the quiet, peace, rest or enjoyment of the public in residential areas of the Township between the hours of:
    i. 8:00 p.m. and 7:00 a.m, Monday to Friday;
    ii. 5 p.m. and 9 a.m., Saturdays; and
    iii. No construction activity whatsoever on Sundays and statutory holidays.
b) Will Trans Mountain commit to not make or cause continuous noise, the sound level of which exceeds 55 dBAs (decibel reading on the "A" level of a sound level meter) between the hours of 7:00 a.m. and 8:00 p.m., or which exceeds 45 dBAs

between the hours of 8:00 p.m. and 7:00 a.m. in residential areas of the Township?

c) Will Trans Mountain include these noise level requirements in its contracts with its contractors and subcontractors?
d) Please explain how Trans Mountain will monitor and enforce compliance with these or any agreed upon noise level restrictions.

2.18 Damage to Parks and Boulevards

Reference:

i. A3S1S4 Volume 5B, ESA - Socio-Economic, Table 5.4-3, PDF p. 11
ii. A3S1S7 Volume 5B, Socio-Economic Effects Assessment, Table 7.2.4-2, PDF p.
iii. 65; A3S2S4 Volume 6B, Pipeline Environmental Protection Plan, Appendix E v. A3S2S3 Volume 6B, Pipeline Environmental Protection Plan, PDF p. 64

Preamble:

Reference (i) identifies 3 municipal parks in the Township of Langley through which the pipeline passes.

Reference (ii) describes the mitigation measures for effects on parks. The table outlining site-specific mitigation measures for terrain features is blank, and states that these measures "will be included prior to construction".

Reference (iii) indicates that Trans Mountain will ensure that "any required approvals, licenses and permits that are necessary are in place prior to commencing applicable construction activities".

Request:

a) Will Trans Mountain commit to obtaining the Township of Langley government Council's approval prior to making changes to the Township's parks or regarding construction damage, vehicle use and parking in the Township's parks? If not, why?
b) Will Trans Mountain commit to obtaining the Township's approval to Trans Mountain's site-specific mitigation measures at least 6 months prior to the construction start date? If not, why?

2.19 Pavement Restoration of Municipal Roads

Reference:

i. B1-9 - V3A_1.5.6_TO_2.0_PUBL_CONSULT - part 4 - A3S0R5 Table 1.7.7, PDF p. 74

Preamble:

In Reference (i), Trans Mountain stated: "Kinder Morgan is responsible for repaving any sections of road that need to be excavated during pipeline construction, and will cover all of these costs. Should the project proceed, we will plan our construction process in such a way that allows us to minimize the amount of time that any given road is closed or disrupted."

The Township is concerned about the standard to which Trans Mountain will restore the pavement to municipal roads or roads running parallel to municipal roads.

Request:

a) Will Trans Mountain commit to adhering to the Township's specifications when reinstating pavement cuts?
b) Will Trans Mountain commit to maintaining pavement cuts for a minimum of one year after the work is completed?
c) Will Trans Mountain commit to paying a non-refundable pavement reinstatement fee to the Township as set out in the Township's fee schedule?

2.20 Commitment to Use Concrete Casings or Heavy Wall Pipe

Reference:

i. B91-1 - Trans_Mountain_Response_to_Langley_IR_No._1 - A3X6U7, PDF p. 3.

Preamble:

In Reference (i), Trans Mountain said: "During the Detailed Engineering and Design Phase of the Project, Trans Mountain will determine the segments of the pipeline where heavy wall and extra heavy wall pipe will be used. Generally heavier wall pipe is used at stream and river crossings."

Request:

a) Please provide a commitment to use concrete casings or heavy wall/extra heavy wall pipe at every municipal road allowance and at all water bodies in the Township of Langley. If Trans Mountain will not commit to this, please explain why.

b) Please state how much it costs to add concrete casing or heavy wall to a segment of pipeline.
c) Will Trans Mountain share with the Township which locations it has determined where heavy wall and extra heavy wall pipe will be used? If so, by what date?

2.21 Recovery of Costs of Policing during Construction

Reference:

i. B295-1 - Response to City of Burnaby Letter dated December 5, 2014 - 1 - A4F8Q3, PDF p. 4.

Preamble:

In Reference (i), Trans Mountain states that "Trans Mountain is not in control of third parties who decided to break the law. The police were required to maintain public order and safety. Policing costs are a service provided to taxpaying citizens and corporations in Burnaby, including Trans Mountain, to protect their lawful rights,"

The Township is concerned that it will incur additional policing costs during pipeline surveying and construction work, that it would not incur but for the expansion project.

Request:

a) Will Trans Mountain commit to compensating the Township of Langley for any or all of the additional policing costs incurred between the start of construction and the completion of the TMEP construction? If not, explain why.

Detailed Design and Engineering Phase

2.22 Detailed Design Specifications Developed to Date

Reference:

i. B91-1 - Trans_Mountain_Response_to_Langley_IR_No._1 - A3X6U7.

Preamble:

Reference (i) generically refers to many detailed specifications being completed in the "Detailed Engineering and Design Phase of the Project".

Request:

a) Please outline and explain the detailed design specifications that have been developed to date in the Township of Langley with respect to:
   i. Township of Langley flood plains;
   ii. Yorkson Creek;
   iii. Depth of the pipeline at railways in the Township of Langley; and
   iv. Valves within the Township of Langley.

Public Consultation

2.23 Questions from Township of Langley Residents

Reference:

i. Questions from Langley residents [Attachment #2].

Preamble:

Reference (i) outlines questions and comments received from the Township regarding the TMEP for Trans Mountain's response.

Request:

a) Please respond to the questions in Reference (i).

Economic Costs and Benefits of the Trans Mountain Expansion Project (TMX) for BC and Metro Vancouver

Ian Goodman and Brigid Rowan, The Goodman Group, Ltd.,
in Collaboration with
The Centre for Public Policy Research, Simon Fraser University

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November 10, 2014

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SFU SCHOOL OF PUBLIC POLICY

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About Simon Fraser University, Centre for Public Policy Research (CPPR)

The Centre for Public Policy Research (CPPR) is the research arm of the Simon Fraser University School of Public Policy. The CPPR promotes interdisciplinary research, education, and dialogue on a broad range of public policy issues in Canada.

Doug McArthur is Professor and Director of Graduate School of Public Policy at Simon Fraser University. Prior to joining SFU's Public Policy Program in 2003, McArthur was Senior Fellow in Public Policy at the University of British Columbia. His public service career has included senior roles with the British Columbia, Saskatchewan and Yukon Governments. Doug has served as Deputy Minister to the Premier and Cabinet Secretary in BC, Deputy Minister of Aboriginal Affairs in BC, Chief Land Claims Negotiator in the Yukon, as well as two posts in Saskatchewan as Deputy Minister of Agriculture and Deputy Minister of Northern Saskatchewan. He was Minister of Education in Saskatchewan from 1978 to 1982 and Chair of the Canadian Council of Ministers of Education.

About The Goodman Group, Ltd. (TGG)

The Goodman Group, Ltd. is a consulting firm specializing in energy and regulatory economics. Since 1989, TGG has consulted and conducted economic research across a broad range of issues. Their North American-wide client base includes energy sector companies, regulators, government, customer groups, and environmental and indigenous groups. One of TGG's key areas of expertise is economic development analysis (including employment impacts) of energy projects. In recent years, TGG has published several influential and widely publicized studies on the economic costs and benefits of various crude oil pipelines in North America. California-based Ian Goodman, the President and founder of The Goodman Group Ltd., and Ottawa-based Brigid Rowan have over 55 years of experience in the areas of energy and regulatory economics.

Preface

The mandate of the Centre for Public Policy Research, the research centre of the School of Public Policy of Simon Fraser University in Vancouver, is to support and encourage research based analysis and public dialogue on important public policy issues. Collaboration with experts from outside Simon Fraser University and widespread dissemination of results, in keeping with the University's stated mission of collaborative research, knowledge mobilization and community engagement on policy, play an important role in the Centre's work.

Perhaps no contemporary public policy issue is of greater importance to SFU's local and regional communities, as well as the people of the province generally, than that of pipelines proposed to carry resource products across the breadth and length of the province. This report and the associated public debate, which it stimulates, will make an important contribution to further understanding the actual benefits and costs of Kinder Morgan's Trans Mountain Expansion Project now being assessed by citizens, communities and government agencies, including the National Energy Board (NEB).

Assessments of energy and pipeline projects are methodologically complicated. Further accessing and analyzing data is often a challenge requiring highly specialized experts in the field. Given this, and consistent with the University's commitment to collaboration, the School of Public Policy is very fortunate to be able to undertake this study as a collaboration with two experts from the Goodman Group, Ltd. (TGG) of Berkeley California. TGG is a leader in carrying out facts-based economic analyses of energy projects (including major pipeline projects) and is well known for providing expert testimony to energy regulatory bodies throughout North America. I thank them for the time and dedication they have given to this study, which I have observed first hand. Their incredible commitment to objectivity, their care and attention to methodology and factual data, and their dedication as reflected in long hours beyond the call - all have impressed me and given me great confidence in our findings as detailed in the SFU-TGG Report.

The report carefully and objectively reviews the facts and evidence provided by the company publicly and to the NEB. The findings and conclusions are quite different from those of the company. These results are an important input to a thorough and informed decision on the Kinder Morgan pipeline. The report is thus being widely distributed as a contribution to that complex task.

It is my hope that this report will contribute to an informed, community-engaged process of debate and dialogue on this important policy issue.

Doug McArthur, Professor, School of Public Policy, Simon Fraser University, Vancouver, British Columbia

1 Executive Summary

The SFU-TGG Report ("the Report") on the economic costs and benefits of the Trans Mountain Expansion Project (TMX) for BC and Metro Vancouver estimates the economic benefits of the proposed project and then compares these benefits to a range of potential costs of bad to worst-case scenarios. The purpose of this Report is to provide an independent assessment for decision-makers and the citizens of BC and Metro Vancouver. Particularly, the Report provides guidance as to whether TMX is in the public and economic interest of BC and Metro Vancouver. The key findings of the SFU-TGG Report are the following:

1. **Benefits: The employment, property tax and fiscal benefits of TMX are very small in the context of the overall provincial economy and significantly overstated by KM/TMP (Kinder Morgan/Trans Mountain Pipeline).[1] (See Figures 1 to 4 and Section 3.)**

   KM/TMP has exaggerated the short-term jobs associated with building the pipeline by a factor of three. Kinder Morgan maintains that building TMX will create 36,000 person-years of employment in BC (including a wide range of spin-offs). But the Report has determined that TMX will only create 12,000 person-years or less over the three-year period for construction and related activity - equivalent to 4000 jobs/year (or less). This is less than 0.2% of the total provincial employment. Similarly, for Metro Vancouver, the Report has determined that building TMX will only create 6,000 person-years or less over this period - equivalent to 2000 jobs/year (or less). This is substantially less than 0.2% of the total regional employment.

   In terms of long-term jobs, Kinder Morgan estimates that operating TMX will create only 50 direct full-time jobs in BC, but also claims that a wide range of spin-offs could push the total up to almost 2000 jobs. Once again, these claims are exaggerated: even with a wide range of spin-offs TMX will only create 800 long-term jobs. This is approximately 0.03% of total BC employment.

   TMX would provide only small property tax benefits for BC communities along its

[1] Trans Mountain Pipeline (TMP), a wholly-owned subsidiary of Kinder Morgan, operates the existing Trans Mountain Pipeline and is the entity that is seeking to expand the existing pipeline by building TMX. In the media, TMX is typically referred to as a pipeline being developed by Kinder Morgan. To avoid confusion, we refer to the Company as KM/TMP in this Report.

route. And these benefits (averaging less than 1% of current total municipal revenues) will be even smaller in the context of projected growth for these communities.

A review of the fiscal benefits also demonstrates the tiny returns to BC from TMX. KM/TMP's flawed analysis, which overstates employment benefits, also overstates tax benefits from building and operating TMX.

2. **Costs: Under a range of bad to worst-case scenarios, the costs of a major rupture can vary from US$1 billion to as high as US$5 billion. With its high damage cost scenario estimate of C$100-300 million, KM/TMP has vastly understated the costs of a bad to worst-case scenario. (See Figure 5 and Section 4.)**

   The potential costs for a major rupture in a High Consequence Area (HCA),[2] but not an urban setting (similar to Marshall, MI, site of the Enbridge spill to the Kalamazoo River) could start at $1 billion (bad scenario). Contrary to KM/TMP's findings, damage and cleanup costs for major accidents are highly correlated with population density. Therefore, if a major accident occurred in a more densely populated area (i.e. Metro Vancouver), damaging and disrupting key infrastructure, and possibly resulting in a spill to water, these costs could escalate to multi-billion dollar damages (potentially as high as $2-5 billion) (worst-case scenario). Given the hazardous characteristics (notably flammability) of dilbit (with sizable amounts of diluent such as condensate), an accident involving this pipeline could also involve loss of human life.

3. **Liability:** Further exacerbating our concerns about the fact that KM/TMP has significantly overstated the benefits while vastly understating the costs, are concerns about liability in the event of a catastrophic spill. There are uncertainties regarding KM/TMP's capacity and willingness to pay for all of the cleanup and damages; and what portion of these costs could be borne by governments, municipalities and taxpayers. **(See Section 4.5.)**

4. **Cost-Benefit Analysis:** The benefits of the pipeline are very small, whereas the worst-case costs of a catastrophic spill are very large. Even with a narrow economic definition of costs and benefits, which excludes many broader

[2] HCAs include highly populated areas, other populated areas, drinking water resources, environmentally sensitive areas, and commercially navigable waterways.

environmental and human health impacts (notably GHGs), the potential costs of TMX under a bad to worst-case scenario are very high. **Based on our evaluation of the economic costs and benefits in Sections 3 and 4, the SFU-TGG Report concludes that under a range of bad to worst-case scenarios, the costs will exceed, or greatly exceed, the benefits for BC and Metro Vancouver. (See Section 5.)**

5. **Uneven Allocation of the Costs and Benefits: The costs and benefits are very unevenly allocated across stakeholders and regions. (See Section 5.3.)**

   Based on the Company's own estimates regarding the increased revenues to tar sand producers from TMX, BC will receive less than 2% of these revenues; tar sands producers retain 68%, and 31% goes to Alberta and other provinces in royalties and corporate income taxes (paid directly to the provinces, or paid to the federal government and then flowed back to the provinces). The lion's share of the benefits flows to KM/TMP, the Alberta tar sands producers and Alberta, whereas the citizens of BC, and Metro Vancouver in particular, will bear the lion's share of the risks and receive very small benefits.

In light of the above findings regarding the evaluation of the costs and benefits of TMX, we conclude that the pipeline project is not in the economic or public interest of the citizens of BC and, in particular, the citizens of Metro Vancouver. Moreover, TMX completely fails to satisfy BC's fifth condition for the consideration of construction and operation of heavy-oil pipelines within its borders.[3] **The SFU-TGG Report therefore strongly recommends that the citizens and decision-makers of BC and Metro Vancouver reject this pipeline, which is neither in the economic nor public interest of BC and Metro Vancouver.**

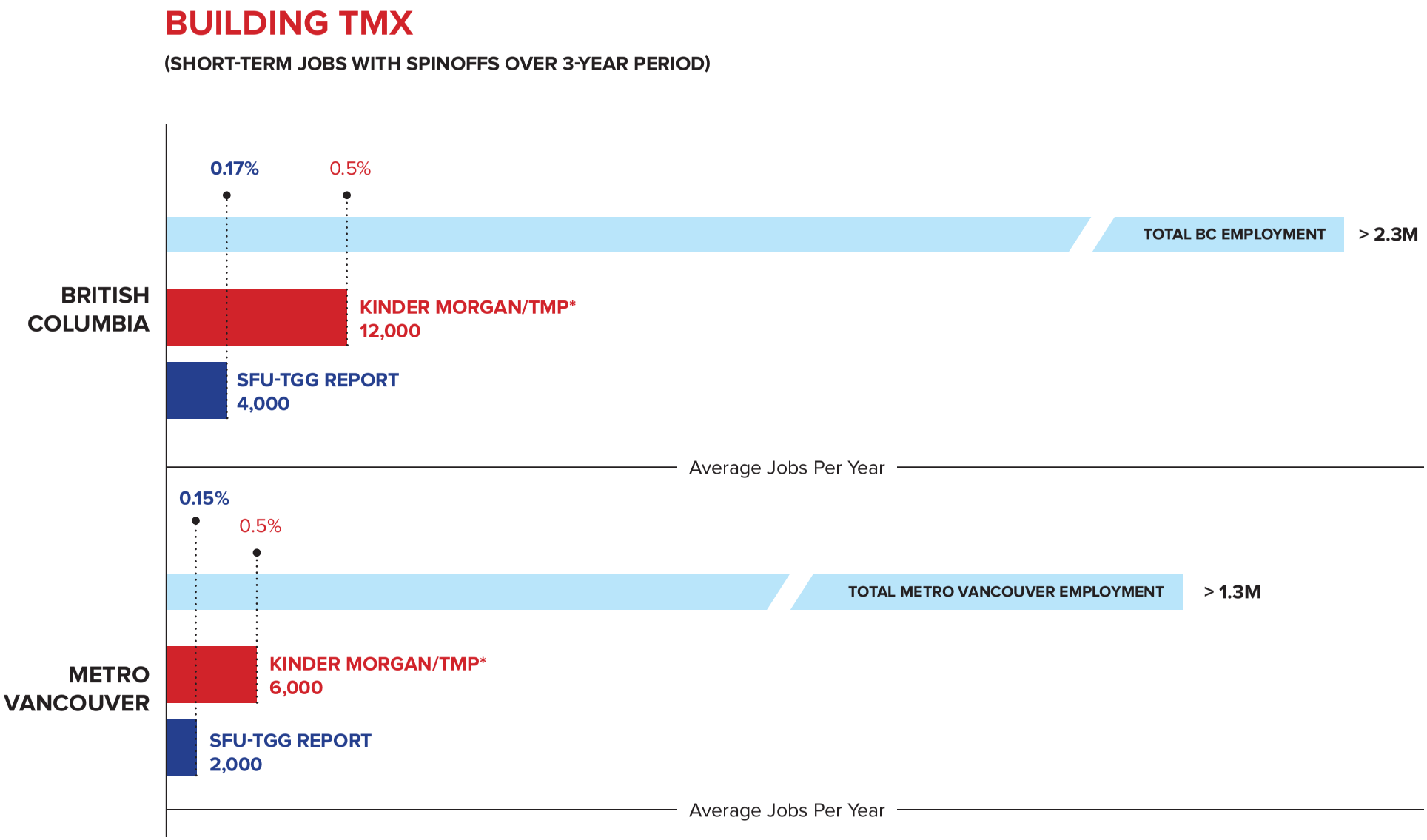
[3] See footnote 8.

1.1 Figures

For the convenience of the reader, the complete group of infographs (Figures 1-5) is provided on the following pages. Figures 1 and 2 illustrate the SFU-TGG estimates of TMX employment benefits in the context of BC and Metro Vancouver economies, and compare these estimates to the KM/TMP estimates. Figure 3 depicts the municipal property tax benefits for communities along the TMX route in the context of BC and Metro Vancouver municipal property taxes and municipal revenues. Figure 4 shows the fiscal benefits for BC of building and operating TMX. It also provides a vivid illustration of the very small and uneven allocation to BC (2%) of the increased revenues to tar sands producers from TMX. The SFU-TGG estimates are compared with KM/TMP's numbers. Finally, Figure 5 compares the SFU-TGG estimates of the costs of a bad to worst-case scenario for TMX with those provided by KM/TMP.

FIGURE 1

Employment Benefits for BC and Metro Vancouver from Trans Mountain Expansion Project (TMX)



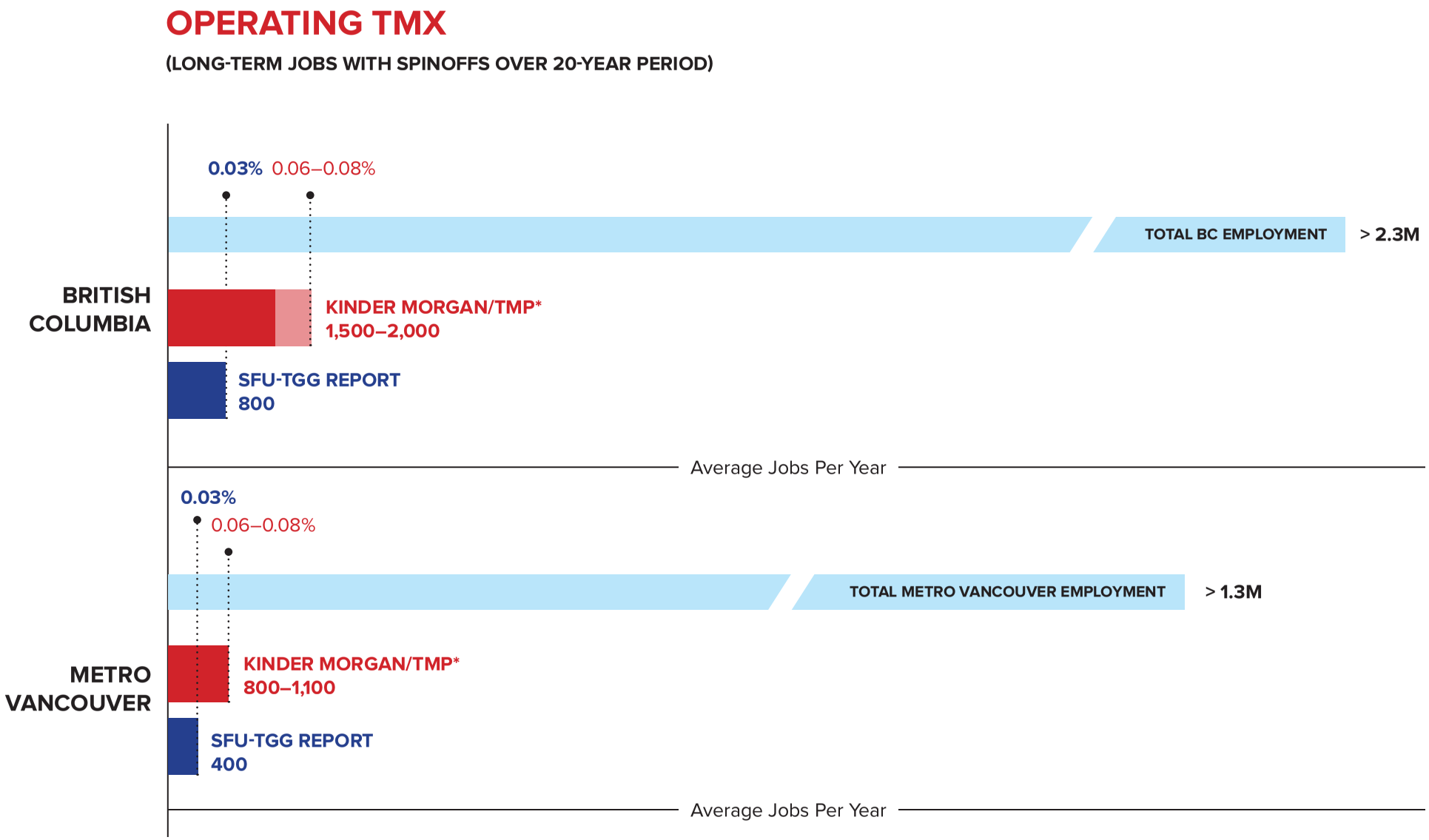
G.2

* Kinder Morgan/Trans Mountain Pipeline

Economic Costs and Benefits of the
Trans Mountain Expansion Project (TMX)
for BC and Metro Vancouver

FIGURE 2

Employment Benefits for BC and Metro Vancouver from Trans Mountain Expansion Project (TMX)



G.2

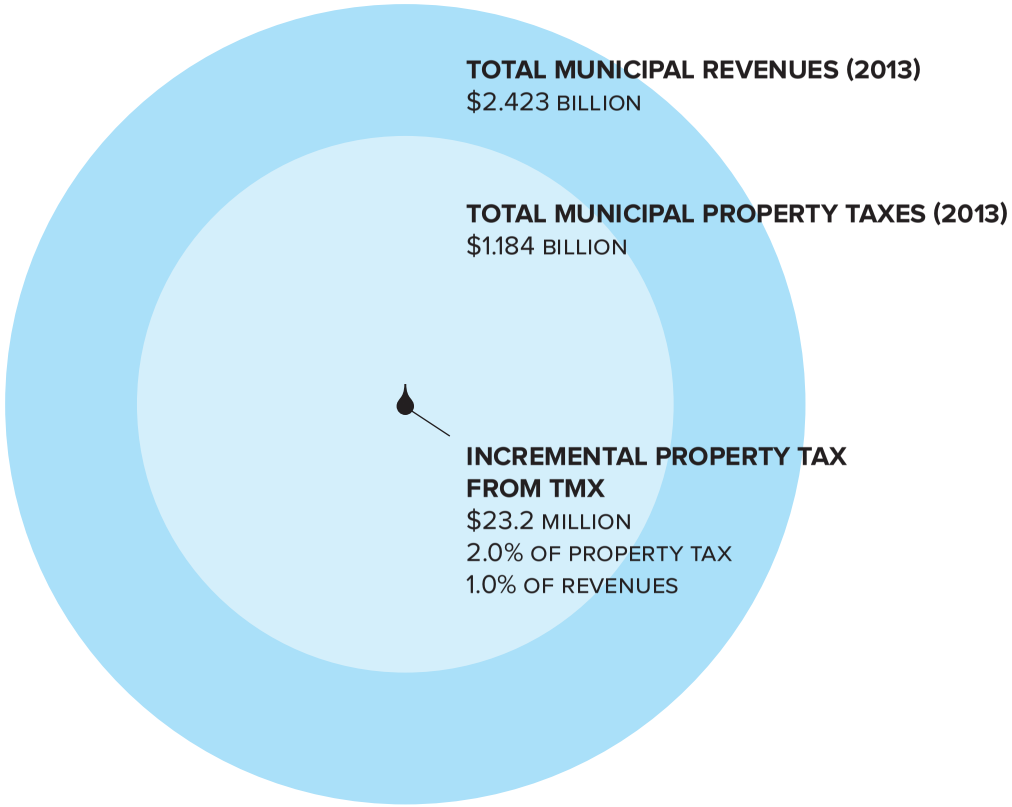
* Kinder Morgan/Trans Mountain Pipeline

Economic Costs and Benefits of the
Trans Mountain Expansion Project (TMX)
for BC and Metro Vancouver

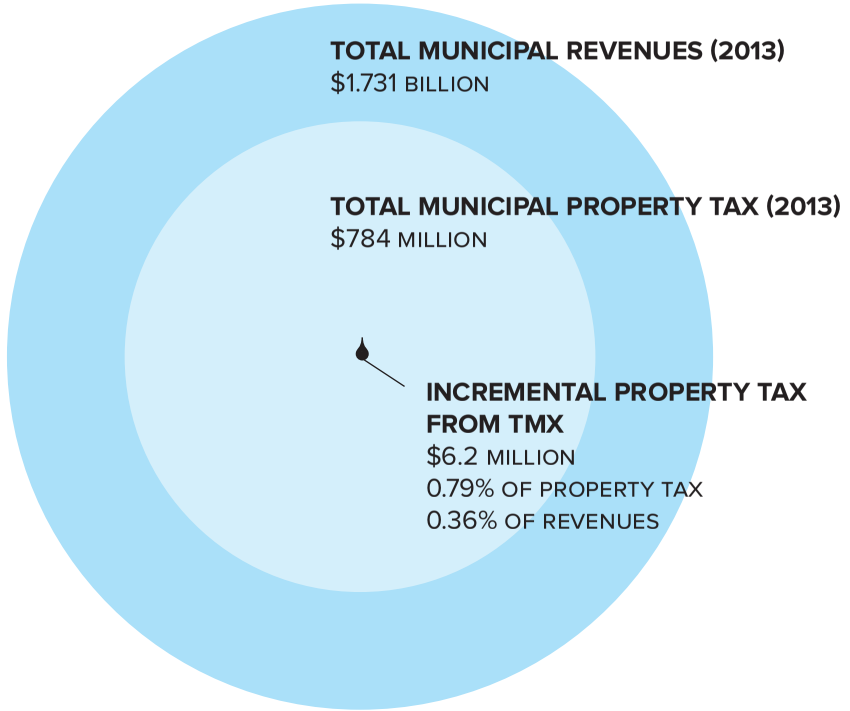
FIGURE 3

Incremental Annual Property Tax Benefits for BC and Metro Vancouver from Trans Mountain Expansion Project (TMX)

BRITISH COLUMBIA*



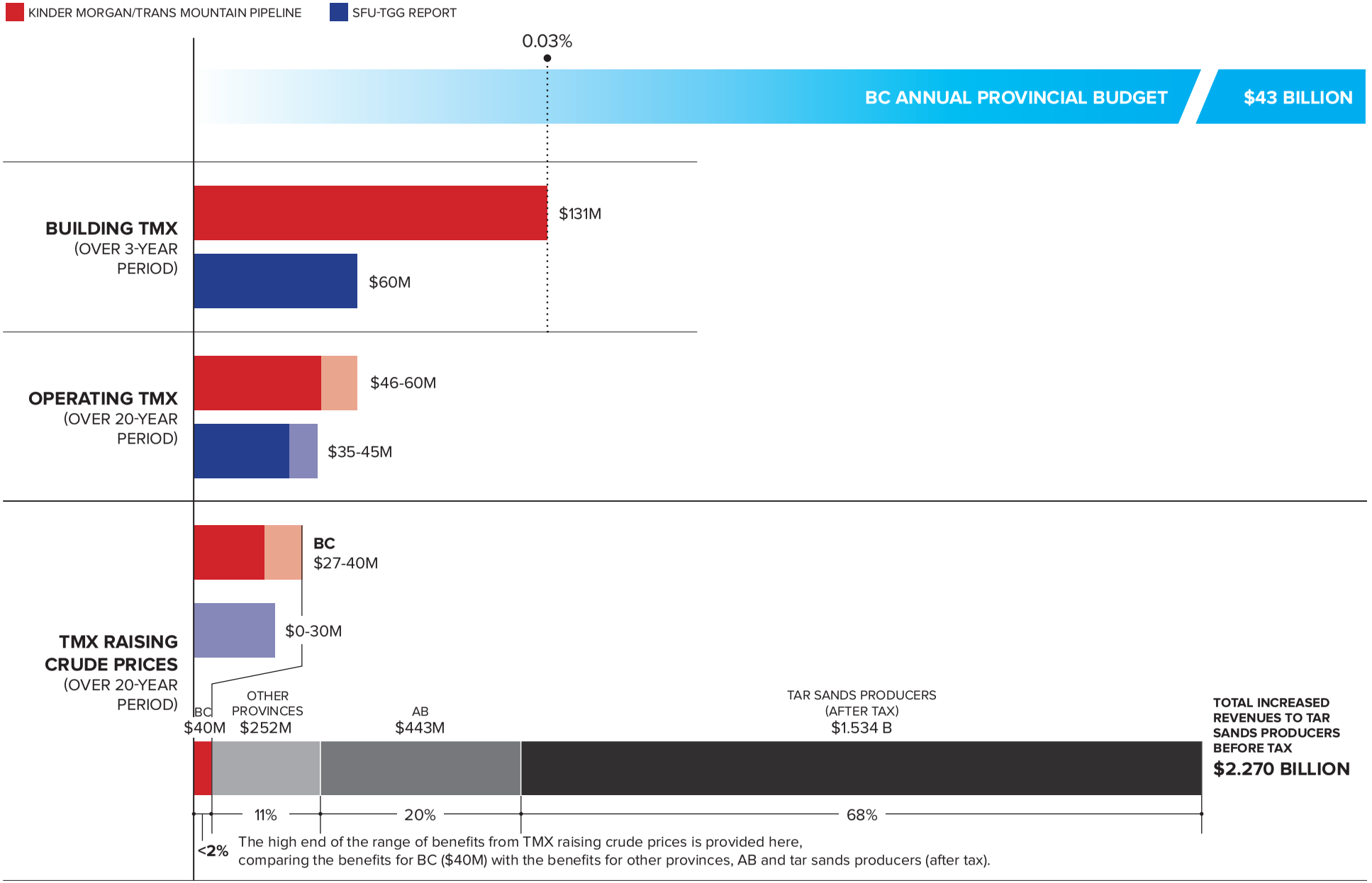
METRO VANCOUVER**



* For all BC communities along TMX route.
** For 4 Metro Vancouver communities along TMX route.

FIGURE 4

Annual Fiscal Benefits for BC from Trans Mountain Pipeline Projects (TMX)



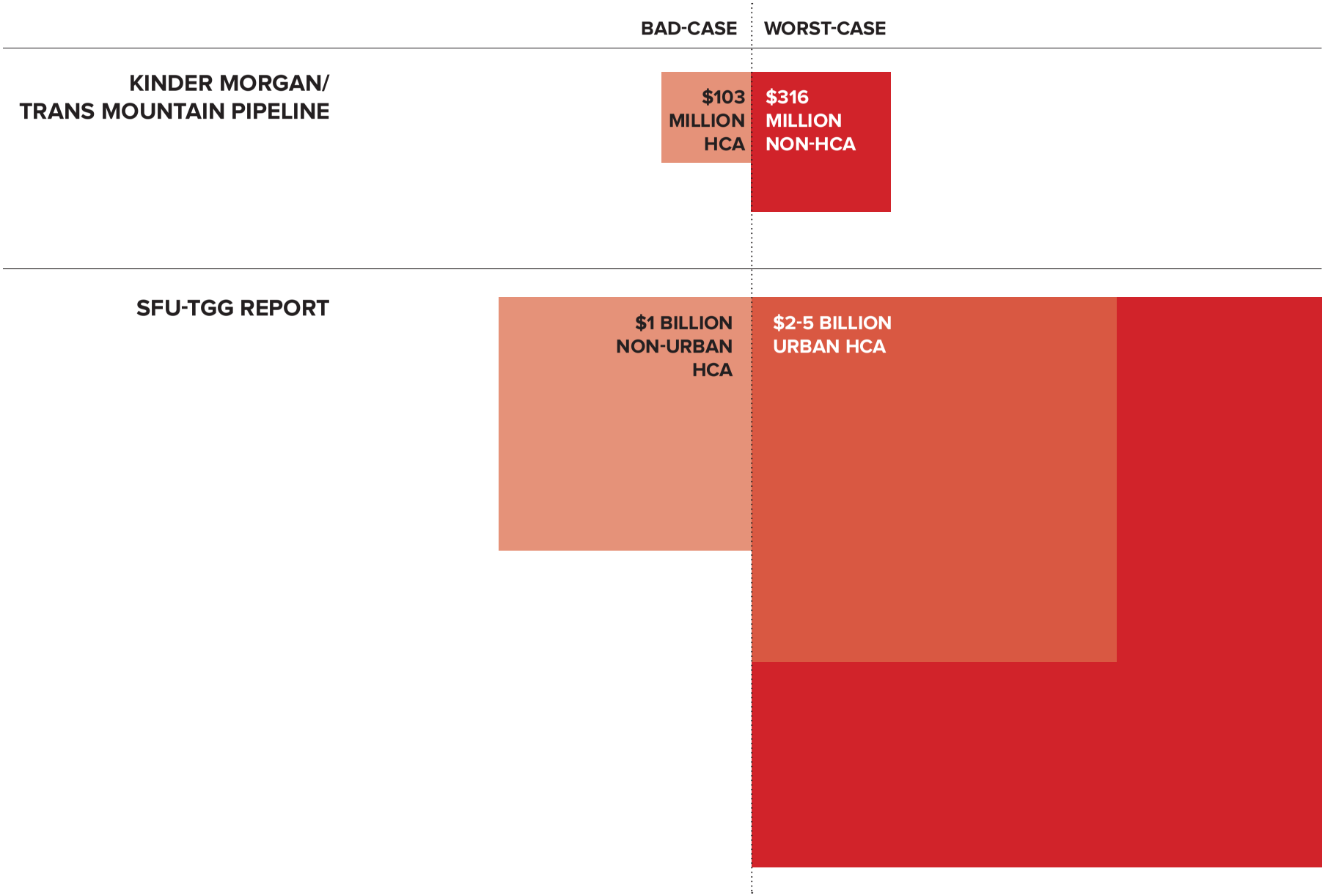
G.2

Note: All amounts in C$2012.

Economic Costs and Benefits of the
Trans Mountain Expansion Project (TMX)
for BC and Metro Vancouver

FIGURE 5

Costs of Bad to Worst-Case Scenario for Trans Mountain Expansion Project (TMX) in BC



Note: All amounts in current US$.

2 Methodology: Economic Cost-Benefit Analysis

This Report uses an economic cost-benefit analysis to evaluate the costs and benefits of the TMX project. Economic costs and benefits are defined as costs and benefits that directly affect economic activity and can be somewhat readily (albeit approximately) quantified using market economics. The Report uses economic costs and benefits for the following reasons: (i) these are the elements that can be most readily be estimated and compared; (ii) TGG has a well-developed expertise in the evaluation of economic development benefits (including employment) from various energy options; (iii) the evaluation of the environmental and social costs and benefits is subject to major controversy; (iv) the NEB does not consider increased GHG costs as part of its evaluation of TMX and therefore this information is not available in the NEB filing in the current case.[4]

Resources and time[5] did not allow us to conduct a comprehensive cost-benefit analysis, nor to determine the probability of a bad to worst-case scenario for a major pipeline rupture. In comparing economic costs and benefits of TMX, we further narrowed the scope to a comparison of an estimate of the economic benefits of TMX with a range of bad to worst-scenario costs. While we are able to provide estimates of the economic benefits of TMX, there is a high degree of uncertainty and a broad range of potential costs. Despite the impossibility of making a precise determination of the costs (or the risks)[6] associated with the proposed pipeline, this Report offers useful guidance by comparing an estimate of economic benefits against a range of bad to worst-case scenario costs.

The Report does not attempt to quantify the *probability* of a bad to worst-case spill. Attempts to quantify such probabilities are controversial at best. Moreover, in the current

[4] We note that the narrow economic definition of costs excludes many environmental impacts such as upstream GHGs, compromised ecosystem services, damage to plant and animal habitat, harm to plant and animal species, and broader human health impacts beyond injuries and death related to an accident. If a more comprehensive definition of costs were taken into account, the costs of the project would be even higher. However, even using this narrow economic definition of the costs, we will show that under bad to worst-case scenarios, the cost of a major pipeline rupture can escalate into the multi-billion dollar range.

[5] There is a high and increasing level of public interest and debate in BC and Metro Vancouver regarding the costs and benefits of this pipeline. Moreover, there are growing concerns about the fairness of the current NEB review process for TMX, as well as the adequacy of the information provided by KM/TMP to assess the project (see footnote 7). Consequently, there is now some urgency to release an independent assessment of the costs and benefits of this project, in order to facilitate informed public debate and provide guidance to citizens and decision-makers.

[6] It is also impossible to make a precise determination of the broader environmental and human health impacts (notably from increased GHGs) that do not fit into a narrow economic definition of costs.

NEB case, there appears to be significant controversy as to whether KM/TMP has been sufficiently transparent in providing intervenors and the Board with the information needed to fully understand the risks of the project.[7] Experience has taught us that bad to worst-case scenarios do occur and have been occurring with alarming frequency since 2010, starting with the US$1.1 billion plus rupture of Enbridge's Line 6B in Marshall, MI. While the Report has not quantified the probability of a bad to worst-case scenario, we have focused on quantifying the costs for a credible range of bad to worst-case scenarios, based on relevant and recent real-world cases.

We have also focused on bad to worst-case scenario costs because this is our core area of disagreement with KM/TMP in regard to spill costs. Our main concern is not the costs of smaller (or even average) spills. Instead, we are most concerned about the costs of bad to worst-case scenarios that are possible given that TMX runs through Metro Vancouver (proximate to people, water and economic activity), with the potential of a spill to sea (as will be discussed in Section 4).

Cost benefit analyses typically have limitations on the scope of the costs and benefits that are analyzed. This Report's analysis is narrower than we would prefer. However, a comparison of economic benefits estimates against a range of bad to worst-case scenario costs is sufficient to inform decision-making about the following:

1. Are there serious problems with TMX? And more specifically, under a range of bad to worst-case scenarios, do the costs of TMX exceed the benefits?

2. Can the KM/TMP evaluation of the costs and benefits (which concludes that the overall costs are moderate and acceptable compared to the benefits) be relied upon?

3. Is TMX in the public interest of the citizens of BC and Metro Vancouver? More specifically, is BC's fifth condition being fulfilled - i.e. that "British Columbia receives a fair share of the fiscal and economic benefits of a proposed heavy-oil

[7] See Province of BC - Notice of Motion on Trans Mountain Inadequacy of IR No. 1 Responses (A61531), para 22, p. 4. https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2449925/2451398/2485159/C289%2D3%2D2_%2D_Province_of_BC_Notice_of_Motion_%231_%2D_A3Y8R3.pdf?nodeid=2484869&vernum=-2
See also Marc Eliesen - Letter of Withdrawal (A64000). https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2449925/2451033/2543157/C118%2D6%2D1_%2D_Marc_Eliesen_Letter_of_Withdrawal_%2D_A4E1Q6.pdf?nodeid=2543843&vernum=-2

project that reflects the level, degree and nature of the risk borne by the government, the environment and taxpayers?"[8]

There is increasing evidence that the current NEB hearings may not ensure that KM/TMP provides all the necessary information on the costs and benefits of TMX. In fact, the Province of British Columbia stated that "Trans Mountain's failure to file the evidence requested by the Province in Information Request No. 1 denies the Board, the Province and other Intervenors access to the information required to fully understand the risk posed by the Project, how Trans Mountain proposes to mitigate such risk and Trans Mountain's ability to effectively respond to a spill related to the Project."[9]

In this context in particular, the independent assessment of costs and benefits provided in this Report can offer useful guidance to inform decision-making, and can help British Columbians evaluate if TMX is indeed in the public interest.

Section 3 provides estimates of the benefits from TMX, including the employment benefits of building and operating TMX, fiscal benefits, and property tax benefits. It also analyzes how these benefits are distributed. Section 4 determines a range of bad to worst-case scenario costs for a TMX rupture using relevant real-world examples of major oil and gas transport accidents. Finally, Section 5 summarizes comparisons of the costs and benefits and answers the three questions posed in this section.

[8] In 2012, BC set out five minimum requirements that must be met for the B.C. government to consider the construction and operation of heavy-oil pipelines within its borders, the fifth of which pertains to BC receiving its fair share of the benefits commensurate with the risks. See http://www2.news.gov.bc.ca/news_releases_2009-2013/2012ENV0060-001422.htm. In November 2014, Christy Clark has reiterated that these conditions "remain in place." http://www.vancouversun.com/news/Christy+Clark+looks+warm+relations+with+Alberta+after+frosty/10350317/story.html

[9] See footnote 7.

3 Economic Benefits of TMX for BC and Metro Vancouver

3.1 Introduction

KM/TMP (Kinder Morgan/Trans Mountain Pipeline) claims that TMX (Trans Mountain Expansion Project) will result in significant employment, municipal property tax, and fiscal benefits for BC and Metro Vancouver.[10] But these claimed benefits are small when evaluated in the relevant provincial and regional contexts. Moreover, the benefits estimated by KM/TMP are very high relative to likely actual benefits for BC and Metro Vancouver. In addition, BC will receive only a small share of benefits from TMX.

Section 3 provides estimates of the economic benefits of TMX for BC (and Metro Vancouver if applicable), including the employment benefits of building and operating TMX, property tax benefits, fiscal benefits, and benefits of increased revenues to crude producers. These respective benefits are contrasted with KM/TMP's estimates. Figures 1 to 4 summarize and compare the respective benefits estimates from KM/TMP and SFU-TGG.

Sections 3.2 through 3.4 analyze the employment benefits for BC and Metro Vancouver from TMX. Sections 3.2 and 3.3 estimate the short-term employment benefits for BC and Metro Vancouver, respectively. Section 3.4 estimates the long-term employment benefits for BC and Metro Vancouver, respectively. The SFU-TGG estimates are evaluated in context of the broader economies and contrasted with the KM/TMP estimates.

[10] The KM/TMP employment, property tax and fiscal estimates reviewed in this Report are provided in KM/TMP's December 16, 2013 TMX Project Application to the NEB (National Energy Board) and based on the TMX Project as then defined. See https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2392699/B5-26_-_V5B_ESA_01of16_SOCIOEC_-_A3S1R5.pdf?nodeid=2392986&vernum=-2 pp. 2-14-2-18 https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2393468/B5-38_-_V5B_ESA_13of16_SOCIOEC_-_A3S1S7.pdf?func=doc.Fetch&nodeid=2393468 pp. 7-167 – 7-189.
Conference Board Report (2013), https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2385938/B1-5_-_V2_4of4_PROJ_OVERVIEW_-_A3S0R1.pdf?nodeid=2392869&vernum=-2 App. B, (PDF pp.69-127).
The NEB Application assumes that most project expenditures and construction activity would take place over a two-year period in 2016-17, for a planned in-service date of late 2017. KM/TMP has subsequently proposed modifications to the pipeline corridor in Burnaby, and the schedule for the NEB process has been extended by nearly 7 months. http://www.neb-one.gc.ca/bts/nws/nr/2014/nr25-eng.html Project expenditures, construction activity, and job impacts may thus now occur somewhat later in time (and over a longer period), compared with what was assumed in the NEB Application.

Sections 3.5 through 3.7 estimate the non-employment benefits of TMX. Sections 3.5 analyzes the long-term municipal tax benefits for communities along the pipeline route in the context of BC and Metro Vancouver municipal tax revenues. Section 3.6 analyzes the fiscal benefits for BC from building and operating TMX, as well as the fiscal benefits for BC from TMX raising revenues for crude producers. Finally, Section 3.7 examines the important issue of BC's share of the fiscal benefits from building and operating TMX, as well as BC's share of the benefits to tar sands producers from increased revenues resulting from building TMX.

3.2 Building TMX: Short-term employment benefits for BC

KM/TMP claims that building TMX will result in significant employment benefits. But the benefits from building TMX are very short-term and concentrated into a 2-3 year period of construction and related activity.[11] Moreover, the benefits estimated by KM/TMP are very high relative to likely actual benefits for BC from building TMX. See Figure 1.

3.2.1 Jobs including Spin-offs: KM/TMP Estimate

Including a very wide range of spin-offs throughout the supply chain and economy, KM/TMP estimates that developing and constructing TMX would result in about 36,000 person-years of employment in BC (one person-year is defined as one full-time job for one person for one year).[12] Averaged over a 3-year period for construction and related activity,[13] the BC employment estimated by KM/TMP is about 12,000 jobs/year.

Total employment in BC now exceeds 2.3 million. With all the spin-offs estimated by KM/TMP, the jobs from building TMX would be about 0.5% of the provincial total. This would be a somewhat significant impact, albeit short-term. But as will be explained below, KM/TMP's employment estimates are very high relative to likely actual impacts for developing and constructing TMX.

[11] See footnote 13.
[12] Section 3.2.2 will provide an explanation of how these estimates were generated and the spin-offs included.
[13] KM/TMP assumes that the timing of employment impacts will coincide with annual expenditures on the project. KM/TMP estimates project expenditures would be spread over a 7-year period 2012-2018, but most will be concentrated into a 2-year construction period 2016-2017, with some follow-up work (such as final cleanup and reclamation) in 2018 after project in-service. In reality, there will be some time lags for employment impacts to ripple through the economy. Much of the total employment impacts being estimated are for these ripple effects, as opposed to the direct on-site construction labor whose timing is tied to the actual construction. So associated employment impacts will be spread over at least 2 years of actual construction, and it is realistic to assume that they would actually be spread over at least 3 years.

3.2.2 Jobs with Spin-offs vs. Direct Construction Workforce

The KM/TMP job estimates (discussed in Section 3.2.1) include a very wide range of spin-offs throughout the supply chain and economy. Put simply, in addition to the jobs on-site (construction workforce), these employment estimates include jobs off-site (design, engineering, permitting, support); upstream (in the supply chain); and downstream (as workers spend income from jobs upstream, off-site and on-site).

Jobs with spin-offs are widely dispersed in sectors throughout the economy, as well as geographically.[14] So it is not feasible to directly count the jobs for spin-offs, especially for a project that has not yet been built. Instead, jobs with spin-offs are estimated with an economic model, which is a highly simplified representation of how the economy actually operates.[15]

Separate from its job estimates with spin-offs, KM/TMP has also estimated the jobs on-site (direct construction workforce). KM/TMP estimates that building TMX in BC would require a direct construction workforce averaging about 1900/year workers over a two-year period, or about 3800 person-year of employment. Only about one-third of this workforce (averaging about 600 workers/year, or less than 1300 person-years of employment) would be in Metro Vancouver.

Thus, for all of BC, the direct construction workforce for TMX (about 3800 person-years) is less than 11% of total jobs with spin-offs estimated by KM/TMP for building TMX (about 36,000 person-years). As shown by this comparison, almost 90% of the jobs estimated by KM/TMP for building TMX would be off-site, up-stream, and downstream.

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[14] On-site jobs are tied to project locations; jobs elsewhere (off-site, upstream, and downstream) can be located in other provinces and countries. And even if jobs are located in-province, the labour supply for these jobs (especially for on-site construction) may be workers from other provinces and countries.

[15] The KM/TMP job estimates including spin-offs were generated using an Input-Output (I-O) model. To estimate employment and other economic spin-off effects, I-O models generate regional economic impact estimates by tracing the industries involved in a study region throughout successive rounds of supply linkages. At each step, they trace the portion of the inputs required from each industry, which are supplied locally (within the regional economy being modeled). Input-Output analyses consider a wide range of job impacts and include the following categories of effects:

> *Direct Effects* — first round impacts of a set of expenditures, i.e. those occurring before the involvement of supporting supply linkages;
> *Indirect Effects* — impacts generated through subsequent purchases by suppliers of materials and services to sustain the original activities;
> *Induced Effects* — impacts generated by workers spending incomes earned through direct and indirect employment activities;
> *Total Effects* — the sum of the direct, indirect, and induced effects.

The KM/TMP job estimates including spin-offs were generated with the Statistics Canada I-O Model, which allows for detailed analysis of nearly 300 industries by province. In this Report, we consider job estimates specifically for BC, but it should be understood that the KM/TMP jobs analysis also provides job estimates for Alberta and other provinces.

Job estimates including spin-offs can be useful for understanding how a project may affect total economic activity and employment in various sectors and locations. But these estimates can be inaccurate, or even misleading, especially as a measure of net benefits for a province (BC) or region (Metro Vancouver).[16] As opposed to jobs on-site, jobs elsewhere (off-site, upstream, and downstream) are difficult to measure and estimates thereof are based on various data, assumptions, and methodology. Put very simply, job estimates with spin-offs should be very carefully reviewed and interpreted.

Careful review and interpretation are especially warranted in the case of TMX, where almost 90% of jobs estimated by KM/TMP would be off-site, upstream, and downstream. Moreover, most of the workers on-site building TMX will not be local. Construction projects like TMX are short-term and highly specialized, and there will be relatively few BC workers available to build TMX.

KM/TMP estimates that 30% of the workers in Metro Vancouver will be local and only 5-10% elsewhere in BC. Labour from inside the regions along TMX will be only 16%[17] of the total BC direct construction workforce. The direct construction workforce building TMX would average about 300 local workers over a two year period for all of BC, including 200 workers in Metro Vancouver and 100 elsewhere in BC.

KM/TMP estimates that building TMX would provide 300 on-site construction jobs for local workers over a two year period for all of BC. This is a negligible amount of employment in the context of the BC economy with employment now exceeding 2.3 million.

3.2.3 Jobs including Spin-offs: SFU-TGG Initial Estimate

Given our concerns about the accuracy and meaningfulness of KM/TMP's job estimates, we have developed a SFU-TGG Estimate of jobs including spin-offs for building TMX.

As a starting point, we reviewed the KM/TMP job estimates and comparing them job estimates for other major crude pipeline projects. As explained in Section 3.2.2, jobs with spin-offs are estimated with an economic model, which is a highly simplified representation of how the economy actually operates.[18] This economic model estimates employment based on project expenditures.

[16] http://www.hydro.mb.ca/projects/development_plan/bc_documents/nfat_business_case_chapter_13_integrated_comparisons_of_development_plans_multiple_account_analysis.pdf

[17] Calculated as a weighted average.

[18] See footnote 15 for an explanation of how these estimates were generated and the spin-offs included.

In analyses of employment impacts, it is standard practice to provide results in terms of multipliers. In particular, a useful summary metric is jobs per dollar (person-years of employment per $1 million of project-related spending). Multipliers facilitate comparison of results within and across studies. With results expressed in terms of multipliers, projects (and other activities) with differing levels of spending can be compared to determine relative intensity of impacts.

KM/TMP estimates that developing and constructing TMX in BC would cost $3.2 billion (2012 $ excluding financing cost), resulting in 36,000 person-years of employment in BC (including a very wide range of economic spin-offs). KM/TMP thus estimates that TMX would result in 11.3 person-years of BC employment per $1 million project costs.

The KM/TMP TMX jobs multipliers are substantially higher than those estimated in studies for other crude pipeline projects. Enbridge estimates that developing and constructing the Northern Gateway project would result in only 5.5 person-years of BC employment per $1 million project costs.[19] The BC jobs multiplier estimated by Enbridge for Northern Gateway is less than half the multiplier estimated by KM/TMP for TMX (5.5 vs. 11.3 person-years of BC employment per $1 million project costs).

It is notable (and surprising) that there could be such a big difference in multipliers. TMX and Northern Gateway are broadly similar projects,[20] and Enbridge and KM/TMP reportedly used similar methodology to estimate job impacts (including a very wide range of economic spin-offs).[21]

Based on the limited information now available, it is not possible to fully resolve why the KM/TMP TMX job estimates are so high relative to the Enbridge Northern Gateway estimates. But from what we do know, the Enbridge Northern Gateway BC jobs multiplier appears to be a much more reasonable starting point for assessing likely actual job impacts for BC pipeline projects, including TMX.[22]

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[19] https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/832978/B83-4_-_Attachment_2_-_Public_Interest_Benefit_Evaluation_-_Update_and_Reply_Evidence_-_A2V1R8.pdf?func=doc.Fetch&nodeid=832978

[20] TMX and Northern Gateway both include a large expenditure component for facilities in BC (including pipeline and marine and storage terminals), as well as a smaller expenditure component for pipeline and other facilities in Alberta.

[21] Projects costs and multipliers for both TMX and Northern Gateway are in terms of 2012 $ excluding financing cost. KM/TMP and Enbridge both used the Statistics Canada I-O Model. See footnote 12 for more details on I-O models.

[22] The Enbridge Northern Gateway jobs multipliers (for individual provinces and for all of Canada) are broadly similar to those estimated in studies for other pipeline projects, while the KM/TMP TMX jobs multipliers are substantially higher. See for example, studies by TransCanada for Energy East and Enbridge for Line 9, which used the Statistic Canada I-O Model (as did the KM/TMP TMX and Enbridge (footnote continued on next page)

We have thus developed the SFU-TGG Initial TMX jobs estimate based on a jobs multiplier of 5.5 person-years of BC employment per $1 million project costs (matching the Enbridge Northern Gateway BC multiplier) and a cost to build TMX of $3.0 billion in BC (matching the KM/TMP assumptions for expenditures in 2016-2018).[23] On this basis, building TMX results in an estimated 16,000 person-years of employment in BC (including a very wide range of spin-offs throughout the supply chain and economy). Averaged over a 3-year period for construction and related activity, this is about 5000 jobs/year (about 0.2% of the provincial total).

The SFU-TGG Initial TMX jobs estimate is much lower (less than half) of the KM/TMP jobs estimate (16,000 vs. 36,000 person-years of BC employment, including a very wide range of economic spin-offs).

3.2.4 Jobs including Spin-offs: SFU-TGG Final Estimate

When adjusted as indicated, our SFU-TGG Initial TMX jobs estimate may still substantially overstate likely actual job impacts. Labour demand is expected to grow faster than labour supply in BC, resulting in tight labour market conditions.[24] As shown in Section 3.2.2, much of the labour for building TMX would not be local. So if TMX is built, it could significantly displace other economic activity (and particularly jobs) in BC; some of the job impacts being estimated for BC may not actually occur and/or would provide jobs for workers from outside of BC (instead of local workers).[25]

(footnote continued from previous page)
Northern Gateway studies) http://www.energyeastpipeline.com/wpcontent/uploads/2013/09/Energy-East-Deloitte-Economic-Benefits-Report.pdf
https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=965026&objAction=Open

[23] As indicated in footnote 13, KM/TMP analyzes job impacts for building TMX based on BC project expenditures of $3.2 billion (2012 $ excluding financing cost), over a 7-year period (2012-2018). KM/TMP estimates that these expenditures will be concentrated into a 2-year construction period (2016-2017), with some in 2018 following project in-service. But approximately 9% of the total ($0.2 billion) would be expended in 2012-2015. The TMX project expenditures in 2012-2015 (and any associated job impacts) are prior to construction and have already occurred or will soon occur regardless of whether TMX is permitted and constructed. Thus, our alternative estimates of job impacts are based on TMX project expenditures for construction and follow-up (estimated by KM/TMP as $3.0 billion in 2016-2018), since these are the expenditures (and associated job impacts), which are contingent upon whether TMX is permitted and constructed.

[24] http://www.workbc.ca/WorkBC/media/WorkBC/Documents/Docs/BCLMOutlook.pdf

[25] The job impacts estimated by KM/TMP for TMX (as well as by Enbridge for Northern Gateway and TransCanada for Energy East) include a very wide range of economic spin-offs. Job impacts were estimated using an Input-Output (I-O) model, which is a highly simplified representation of how the economy actually operates. In particular, I-O models assume that there will be no supply constraints for labour and other resources and that people employed as a result of the proposed project would otherwise be unemployed. Job estimates generated with I-O models will tend to overstate actual net job impacts, especially in a context of tight labour market conditions. For more details on I-O models, see footnotes 15 and 22 and Conference Board Report (2013), p. 57 (PDF p.125).

As discussed in Section 3.2.2, KM/TMP estimates that most of the on-site workers building TMX will not be local. Labour from inside the regions along TMX will be only 16%[26] of the total BC direct construction workforce. It is possible that some of these non-local workers will come from other parts of BC, but most will probably come from outside the province.

From a BC perspective, it is most relevant to consider employment benefits in terms of jobs for BC residents, who would not be otherwise employed, and exclude jobs for residents of other provinces and countries.[27] If the job estimate for building TMX is adjusted to net out employment for non-local workers, the result is a substantially lower and more relevant estimate of employment benefits for BC.[28]

Based on the limited information now available, it is difficult to quantify how much the SFU-TGG Initial TMX jobs estimate could overstate likely actual job impacts. But especially given the expected tight labour market conditions, developing and constructing TMX might actually result in only 12,000 (or less) person-years of employment in BC (including a very wide range of economic spin-offs). Averaged over a 3-year period for construction and related activity, this is 4000 jobs/year (or less), which is less than 0.2% of the provincial total.

Given expected labour market conditions and other constraints on BC economic activity for the period when TMX might be constructed, it is unlikely that there will actually be a large increase in overall BC employment and economic activity due to TMX. To the extent that building TMX has benefits for BC jobs and workers, these benefits are likely to be relatively small (less than 0.2% of the provincial total), as well as short-term (over a 2-3 year period).

This SFU-TGG Final Estimate demonstrates that developing and constructing TMX might actually result in only one-third (or less) of the BC jobs estimated by KM/TMP for

[26] Calculated as a weighted average.

[27] Thus, from a BC perspective, employment may not be a benefit if the workers are not BC residents (and taxpayers, see footnote 64); however, in determining benefits from a provincial perspective, it is relevant to consider spending by these non-resident workers, especially while on-site/in-province. In some economic cost-benefit analysis, employment is also not a benefit if the workers are migrants who did not reside in-province prior to the project; these migrants might become provincial taxpayers, but they will also require provincial services, such that revenues and costs are offsetting. http://www.hydro.mb.ca/projects/development_plan/bc_documents/nfat_business_case_chapter_13_integrated_comparisons_of_development_plans_multiple_account_analysis.pdf

[28] KM/TMP estimates that building TMX in BC will require 3800 person-years of direct construction workforce, and that 84% of these workers will be non-local. Thus, the direct construction workforces includes about 3200 person-years of employment for non-local workers. Netting out these non-local workers would reduce KM/TMP's employment estimate for building TMX (36,000 person years) by about 9%. And netting out these non-local workers out would reduce the SFU-TGG Initial Estimate (16,000 person years) by about 20%.

TMX (12,000 or less vs. 36,000 person-years of BC employment, including a very wide range of economic spin-offs).

Averaged over a 3-year period for construction and related activity, actual results (including a very wide range of economic spin-offs) will be 4000 jobs/year (or less) of BC employment, compared to the 12,000 jobs/year based on KM/TMP's estimates. The short-term employment benefits for BC of building TMX are illustrated in Figure 1.

3.3 Building TMX: Short-term employment benefits for Metro Vancouver

3.3.1 Jobs including Spin-offs: KM/TMP Estimate

On the basis of KM/TMP's estimates including a wide range of economic spin-offs, developing and constructing TMX would result in 19,000 person-years of employment in Metro Vancouver.[29] Averaged over a 3-year period for construction and related activity, this is about 6000 jobs/year.

Total employment in Metro Vancouver now exceeds 1.3 million. So with all the spin-offs estimated by KM/TMP, the jobs from building TMX operations would be about 0.5% of the regional total. This would be a somewhat significant impact, albeit short-term. But as will be explained below, KM/TMP's employment estimates are very high relative to likely actual impacts for developing and constructing TMX. See Figure 1.

3.3.2 Jobs with Spin-offs vs. Direct Construction Workforce: KM/TMP Estimate

Separate from its job estimates with spin-offs, KM/TMP has also estimated the jobs on-site (direct construction workforce). As discussed in Section 3.2.2, KM/TMP estimates that building TMX would require a direct construction workforce averaging about 600 workers/year over a two-year period in Metro Vancouver.

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[29] This estimate of Metro Vancouver jobs (19,000 person-years) is based on BC jobs (KM/TMP jobs estimate of 36,000 person-years for building TMX) and assumes that slightly over half of BC jobs will be in Metro Vancouver. KM/TMP estimates jobs including spin-offs at the provincial level and does not split out jobs in Metro Vancouver, vs. elsewhere in BC. As explained by KM/TMP, regional job impacts can be approximated by allocating provincial jobs to the regions along the TMX routing based on regional share of provincial labour force. Metro Vancouver has slightly over half of the provincial labour force (and employment).
https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2393468/B5-38_-_V5B_ESA_13of16_SOCIOEC_-_A3S1S7.pdf?func=doc.Fetch&nodeid=2393468 p. 7-177.

To the extent that a smaller share of the provincial job impacts are located in Metro Vancouver, there will be fewer jobs in the region relating to TMX. Metro Vancouver might actually have only half (and perhaps substantially less) of the provincial job impacts relating to TMX. KM/TMP estimates that only about one-third of the BC direct construction workforce would be located inside Metro Vancouver. The TMX routing through BC traverses the province, from the Alberta border near Jasper to Burnaby, and less than 10% of this routing is located in Metro Vancouver. But pipeline construction within highly urbanized areas such as Metro Vancouver tends to be more complex, costly, and labor-intensive. And the TMX Project also includes major expansions of existing Trans Mountain Pipeline facilities in Metro Vancouver, at both the Westridge Marine Terminal on Burrard Inlet and crude storage on Burnaby Mountain.

Thus, for Metro Vancouver, the direct construction workforce for TMX (about 1300 person-years) is less than 7% of total jobs with spin-offs estimated by KM/TMP for building TMX (about 19,000 person-years). As shown by this comparison, 93% of the jobs estimated by KM/TMP for building TMX would be off-site, up-stream, and downstream.

Job estimates with spin-offs should be very carefully reviewed and interpreted, especially in the case of TMX, where 93% of jobs estimated by KM/TMP would be off-site, upstream, and downstream. Moreover, most of the workers on-site building TMX will not be local. KM/TMP estimates that local workers will provide only 30% of the direct construction workforce in Metro Vancouver. The direct construction workforce building TMX period in Metro Vancouver would average about 200 local workers/year over a two-year period. This is a negligible amount of employment in the context of the Metro Vancouver economy with employment now exceeding 1.3 million.

3.3.3 Jobs including Spin-offs: SFU-TGG Initial Estimate

Given our concerns about the accuracy and meaningfulness of KM/TMP's job estimates, we have developed a SFU-TGG Estimate of jobs including spin-offs for building TMX.

As shown in Section 3.2.3, the KM/TMP job estimates are very high relative to job estimates for other pipeline projects and likely actual impacts. On the basis of our SFU-TGG Initial Estimate for BC, building TMX would result in less than 9000 person-years of employment in Metro Vancouver.[30] Averaged over a 3-year period for construction and related activity, this is about 3000 jobs/year (about 0.2% of the regional total).

This SFU-TGG Initial TMX jobs estimate is much lower (less than half) of the Metro Vancouver jobs based on KM/TMP's estimates for TMX (9000 vs. 19,000 person-years of Metro Vancouver employment, including a very wide range of economic spin-offs).

3.3.4 Jobs including Spin-offs: SFU-TGG Final Estimate

As shown in Section 3.2.4, The SFU-TGG Initial Estimate may still overstate likely actual job impacts. Especially given the tight labour market conditions expected for the period when TMX might be constructed, building TMX might actually result in only 6000 (or less) person-years of employment in Metro Vancouver (including a very wide range

[30] This estimate of Metro Vancouver jobs (less than 9000 person-years) is based on BC jobs (SFU-TGG Initial Estimate of 16,000 person-years for building TMX) and assumes that slightly over half of provincial jobs will be in Metro Vancouver. See footnote 29 for more details on assumption that slightly over half of provincial jobs will be in Metro Vancouver.

of economic spin-offs).[31] Averaged over a 3-year period for construction and related activity, this is 2000 jobs/year (or less), which is substantially less than 0.2% of the regional total.

Given expected labour market conditions and other constraints on Metro Vancouver economic activity for the period when TMX might be constructed, it is unlikely that there will actually be a large increase in overall Metro Vancouver employment and economic activity due to TMX. To the extent that building TMX has benefits for BC jobs and workers, these benefits are short-term (over a 2-3 year period) and likely to be relatively small (substantially less than 0.2% of the regional total).

This SFU-TGG Final Estimate demonstrates that developing and constructing TMX might actually result in only one-third (or less) of the Metro Vancouver jobs based on KM/TMP's estimates for TMX. Actual results (including a very wide range of economic spin-offs) will be 6000 or less person-years of Metro Vancouver employment, compared to the 19,000 person-years based on KM/TMP's estimates.

Averaged over a 3-year period for construction and related activity, actual results (including a very wide range of economic spin-offs) will be 2000 jobs/year (or less) of Metro Vancouver employment, compared to the 6000 jobs/year based on KM/TMP's estimates. The short-term employment benefits of building TMX for in Metro Vancouver are illustrated in Figure 1.

3.4 Operating TMX: Long-term employment benefits for BC and Metro Vancouver

The long-term employment benefits of operating TMX are minimal for BC and Metro Vancouver. See Figure 2.

3.4.1 Jobs Including Spin-offs: KM/TMP Estimate

Including a very wide range of spin-offs throughout the supply chain and economy, KM/TMP estimates that operating TMX would result in 1500-2000 jobs/year in all of BC,[32] over a 20-year period.[33]

[31] This estimate of Metro Vancouver jobs (6000 or less person-years) is based on BC jobs (our Independent Assessment of 12,000 or less person-years for building TMX) and assumes that slightly over half of provincial jobs will be in Metro Vancouver. See footnote 29 for more details on assumption that slightly over half of provincial jobs will be in Metro Vancouver.
[32] See footnote 15 for an explanation of how these estimates were generated and the spin-offs included.
[33] The KM/TMP estimates are based on the 20-year period for which KM/TMP has firm contracts in place for shippers to use TMX. But TMX might actually operate for far more than 20 years and thus have job
(footnote continued on next page)

KM/TMP estimates a range of employment impacts for operating TMX. The low end of the range (1500 jobs/year including spin-offs) assumes that TMX only transports the volume of crude specified in the firm contracts in place for shippers to use TMX.[34] In this scenario, TMX is estimated to generate annual revenues of $644 million.[35]

The high end of the range (2000 jobs/year including spin-offs) assumes that TMX is also used for non-firm/spot transactions in addition to the firm contracts, such that TMX capacity is fully utilized.[36] In this scenario, TMX is estimated to generate annual revenues of $835 million.[37]

The KM/TMP employment analysis characterizes these two scenarios as minimum and maximum effects, with reality likely to fall somewhere in between.[38]

In the context of the BC economy, the long-term employment benefits of TMX are minimal. Total employment in BC now exceeds 2.3 million. Even with all the spin-offs and the maximum effects estimated by KM/TMP, operating TMX would result in only 2000 jobs/year, which is less than 0.1% of the current provincial total. And with the minimum effects estimated by KM/TMP, operating TMX would result in only 1500 jobs/year, which is substantially less than 0.1% of the current provincial total.

The long-term employment benefits of TMX are also minimal in the context of the Metro Vancouver economy. Total employment in Metro Vancouver now exceeds 1.3 million. Meanwhile, only a portion of total BC jobs relating to TMX would be in Metro Vancouver (vs. elsewhere in the province).[39] So even with all the spin-offs estimated by KM/TMP,

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impacts over a longer period. The existing Trans Mountain Pipeline has been in operation for more than 60 years.

[34] TMX has a nominal total capacity of 590,000 barrels/day, with firm contracts in place for about 410,000 barrels/day (about 70% of total capacity), leaving nominal capacity of about 180,000 barrels/day (about 30% of total capacity) available for non-firm/spot transactions.

[35] These annual revenues for TMX are in addition to $300 million in annual revenues for the existing KM/TMP system. These annual revenues for TMX ($644 million) are for the entire project in both BC and Alberta. The cost to build TMX are mainly in BC (69.5% of the total project), so it is reasonable to assume that a similar portion of the project revenues are attributable to the BC component of TMX. On this basis, TMX in BC will generate annual revenues of about $448 million.

[36] See footnote 34.

[37] As explained in footnote 35, these annual revenues for TMX are for the entire project in both BC and Alberta. Based on the portion of TMX costs in BC, TMX in BC will generate annual revenues of $580 million if the project capacity is fully utilized.

[38] Conference Board Report (2013), p. 39.

[39] KM/TMP estimates jobs including spin-offs at the provincial level and does not split out jobs in Metro Vancouver, vs. elsewhere in BC. Slightly over half of BC labour supply (and employment) is in Metro Vancouver, and on this basis the region might have a similarly large share of provincial job impacts relating to TMX. But only a relatively small portion of the TMX project is located within Metro Vancouver,
(footnote continued on next page)

TMX operations would result in about 800-1100 jobs in Metro Vancouver, which is less than 0.1% of the regional total.

The BC and Metro Vancouver economies are growing. Even if TMX is not built, BC and Vancouver will in the future have substantially more population, labour force, employment, and other economic activity. TMX's minimal long-term employment benefits are even less significant in the context of this growth

Provincial growth will be concentrated in Metro Vancouver, which is expected to add another 400,000 jobs by 2041.[40] TMX would not significantly add to this growth.

But as the BC and Metro Vancouver economies continue to grow, the costs and risks associated with TMX will increase. In the future, there will be even more people, jobs, and other economic activity that are proximate to TMX and could be negatively impacted by TMX.

Moreover, as will be explained below, KM/TMP's employment estimates are very high relative to likely actual impacts for developing and constructing TMX.

3.4.2 Jobs with Spin-offs vs. Direct Operating Workforce

The KM/TMP job estimates (discussed in Section 3.4.1) include a very wide range of spin-offs throughout the supply chain and economy. Put simply, in addition to the KM/TMP staffing (direct operating workforce), these employment estimates include other jobs on-site and off-site (contractors providing construction, engineering, technical, and support services); upstream (in the supply chain); and downstream (as workers spend income from jobs upstream, off-site and on-site).

Jobs with spin-offs are estimated with an economic model, which is a highly simplified representation of how the economy actually operates.[41]

Separate from its job estimates with spin-offs, KM/TMP has also estimated the KM/TMP staffing (direct operating workforce). KM/TMP estimates that operating TMX will create only 50 direct full time jobs in BC (plus another 40 jobs in Alberta).

Thus, for all of BC, the direct operating workforce for TMX (40 jobs/year) is 2-3% of total jobs with spin-offs estimated by KM/TMP for operating TMX (1500-2000 jobs/year

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so the region might actually have less (and perhaps substantially less) than half of provincial job impacts relating to TMX. See footnote 29 for more details.

[40] http://www.metrovancouver.org/about/publications/Publications/20110729RegionalGrowthStrategyProjections20062041_TH.pdf

[41] See footnote 15 for an explanation of how these estimates were generated and the spin-offs included.

person-years). As shown by this comparison, virtually all (97-98%) of the jobs estimated by KM/TMP for operating TMX would be contractors (on-site and off-site), up-stream, and downstream.

Job estimates including spin-offs can be useful for understanding how a project may affect total economic activity and employment in various sectors and locations. But these estimates can be inaccurate, or even misleading, especially as a measure of net benefits for a province (BC) or region (Metro Vancouver).[42] As opposed to KM/TMP staffing, jobs elsewhere (contractors, upstream, and downstream) are difficult to measure and based on various data, assumptions, and methodology. Put very simply, job estimates with spin-offs should be very carefully reviewed and interpreted.

Careful review and interpretation are especially warranted in the case of TMX, where virtually all (97-98%) of jobs estimated by KM/TMP would be contractors, upstream, and downstream.

We are particularly concerned about KM/TMP's jobs analysis, in light of the range of employment impacts that KM/TMP has estimated for jobs with spin-offs from operating TMX. As explained in Section 3.4.1, the low end of KM/TMP's range (1500 jobs/year including spin-offs) assumes that TMX only transports the volume of crude specified in the firm contracts with shippers. The high end of the range (2000 jobs/year including spin-offs) assumes that TMX is also used for non-firm/spot transactions in addition to the firm contracts, such that TMX capacity is fully utilized.

At the high end of the range, with TMX fully utilized, it is estimated to generate 30% more revenue than at the low end of the range, with TMX only partially utilized.[43] And on that basis, KM/TMP estimates that there will 30% more jobs with spin-offs if KM/TMP is fully utilized. Put more simply, KM/TMP assumes that jobs with spin-offs for operating TMX are directly proportional to TMX revenues.

But it is unlikely that there would actually be sizable additional jobs as a result of higher TMX utilization and revenues. Pipelines (and associated facilities) are very capital intensive and highly automated, such that operating costs are largely fixed, rather than variable with utilization.[44] As a result, higher utilization may increase revenues much more than it increases operating costs (and jobs). Thus, KM/TMP may have

[42] http://www.hydro.mb.ca/projects/development_plan/bc_documents/nfat_business_case_chapter_13_integrated_comparisons_of_development_plans_multiple_account_analysis.pdf

[43] See footnotes 35 and 37 for more details on the revenues generated by TMX.

[44] Moreover, to the extent there are some additional operating costs with higher pipeline utilization, these type of incremental expenditures (notably additional electricity for pumping) may have small job impacts.

substantially higher profits if TMX is more fully utilized, but there may be little or no added employment benefits for BC.

More generally, we are skeptical that operating TMX will have result in the number of jobs with spin-offs estimated by KM/TMP, given that TMX is an expansion of the existing KM/TMP system. The resulting operating efficiencies will result in lower costs for KM/TMP, as well as lower job impacts for BC.[45]

3.4.3 Jobs including Spin-offs: SFU-TGG Estimate

Given our concerns about the accuracy and meaningfulness of KM/TMP's job estimates, we have developed a SFU-TGG Estimate of jobs including spin-offs for operating TMX.

As a starting point, we reviewed the KM/TMP job estimates and compared them with job estimates for other major crude pipeline projects. In particular, we focused on the Enbridge Northern Gateway and Energy East projects, since they each have components that are broadly similar to the BC component of TMX. In particular, we reviewed the job estimates with spin-offs for operating the BC component of Enbridge Northern Gateway and the Quebec component of Energy East.[46]

Enbridge estimates that operating Northern Gateway would result in 2103 jobs/year (including spin-offs) in BC.

TransCanada estimates that operating Energy East would result in 539 jobs/year (including spin-offs) in Quebec.

Compared with Northern Gateway, the Energy East Quebec component is more similar to TMX. Energy East (Quebec) and TMX (BC) have similar capital costs (and thus scale of facilities being operated). Moreover, they both involve adding a new crude pipeline

[45] TMX will be remotely controlled from KM/TMP's existing control centre in Edmonton, Alberta. Likewise, TMX will be maintained from existing KM/TMP bases in BC and Alberta, and operations and maintenance activities for KM/TMP will scheduled to coincide with activities on the existing KM/TMP system. The TMX staffing estimated by KM/TMP (50 jobs in BC and 40 jobs in Alberta) is in addition to the existing staff that operates the existing KM/TMP system.

[46] As discussed in footnote 20, TMX and Northern Gateway both include a large expenditure component for facilities in BC (including pipeline and marine and storage terminals), as well as a smaller expenditure component for pipeline and other facilities in Alberta. The total Energy East project is much larger than TMX or Northern Gateway, but the Quebec component has facilities similar to the BC projects (including pipeline and marine and storage terminals). See footnote 22 for more details on Energy East.

and other facilities largely paralleling an existing pipeline system operated by the same company.[47]

By comparison, Northern Gateway (BC) has numerous factors that will increase operating costs and associated employment. Northern Gateway is a much larger and more complex project, as indicated by capital costs that are substantially higher (about 50%). Northern Gateway would involve operations on a new right-of-way in remote areas, as well as a new, very large marine terminal.

Consistent with the factors above indicating higher operating costs and associated employment for Northern Gateway (BC), this project would require a much larger direct operating workforce than the 50-full time workers required for TMX (BC). Enbridge estimates that operating Northern Gateway (BC) will require 78 workers, plus another 113 workers supplying services associated with operations of the Kitimat Terminal (including tug operators, pilots, emergency response staff and various other service providers).

Thus, compared with the jobs estimate for operating Northern Gateway, the jobs estimate for operating Energy East (539 jobs/year) is more indicative of likely job impacts for TMX. But it is possible that TMX in BC will have somewhat higher operating costs and associated employment than would Energy East in Quebec. Notably, portions to the TMX BC routing are mountainous and remote, while the Energy East routing in Quebec is mostly in broad, relatively flat terrain proximate to the St. Lawrence River.

On this basis, it is reasonable to estimate that operating TMX might actually result in only 800 (or less) jobs/year in BC (including a very wide range of economic spin-offs). This is substantially less than 0.1% of the provincial total.

Operating TMX might actually result in only 400 (or less) jobs/year in Metro Vancouver (including a very wide range of economic spin-offs).[48] This is substantially less than 0.1% of the regional total.

Labour demand is expected to grow faster than labour supply in BC, resulting in tight labour market conditions (where the demand for workers surpasses the supply of

[47] In Quebec, Energy East would be an all new crude pipeline largely paralleling existing gas pipelines operated by TransCanada; in other provinces such as Ontario, Energy East would convert existing gas pipeline to crude service.

[48] This estimate of Metro Vancouver jobs (400 or less jobs/year) is based on BC jobs (our Independent Assessment of 800 or less jobs/years for operating TMX) and assumes that slightly over half of provincial jobs will be in Metro Vancouver. See footnote 29 for more details on assumption that slightly over half of provincial jobs will be in Metro Vancouver.

workers).[49] Especially in a context of tight labour market conditions, actual job impacts will be substantially lower than estimated by KM/TMP and possibly lower than the high end of the range estimated by SFU-TGG (800 jobs/year in BC and 400 jobs/year in Metro Vancouver).[50] Thus, TMX's minimal long-term employment benefits may be even less significant.

The long-term employment benefits of operating TMX for BC and Metro Vancouver are illustrated in Figure 2.

3.5 Operating TMX: Long-term Municipal Tax Benefits for BC and Metro Vancouver

The long-term municipal tax benefits of operating TMX are small for BC and Metro Vancouver. See Figure 3.

KM/TMP estimates that operating TMX will result in additional annual property tax revenues of $23.2 million for BC communities along the TMX routing, including $7.5 million for the four Metro Vancouver communities ($6.2 million for Burnaby and a total of $1.3 million for Coquitlam, Langley Township, and Surrey).[51]

BC property taxes are a relatively small expenditure for KM/TMP, equivalent to about 4-5% of the revenues generated by the TMX project.[52] Benefits from KM/TMP expenditures (including property taxes) have already been taken into account as part of the employment benefits from operating TMX.[53] Thus, the TMX benefits in terms of municipal property taxes (dollars) are not in addition to the TMX benefits in terms of employment (jobs). Rather, tax revenues are another way of valuing the overall set of benefits for TMX.

TMX will result in some increased tax revenues for communities along the TMX routing, and in turn this could result in some employment benefits (notably from increased

[49] http://www.workbc.ca/WorkBC/media/WorkBC/Documents/Docs/BCLMOutlook.pdf
[50] See footnote 25.
[51] https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2393468/B5-38_-_V5B_ESA_13of16_SOCIOEC_-_A3S1S7.pdf?func=doc.Fetch&nodeid=2393468 pp. 7-185 – 7-185. KM/TMP elsewhere provides a lower estimate ($22.1 million) of additional property tax revenues for BC communities. https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2392679/B1-4_-_V2_3of4_PROJ_OVERVIEW_-_A3S0R0.pdf?func=doc.Fetch&nodeid=2392679 p. 2-42
[52] As explained in footnotes 35 and 37, the BC component of TMX is estimated to generate annual revenues of at least $448 million, and could be as high as $580 million if TMX capacity is fully utilized.
[53] Property taxes are a component of overall operating costs for TMX. The estimates of long-term jobs with spin-offs from operating TMX (see Section 3.4) are based on total operating costs for TMX or total revenues (which are higher than operating costs). So TMX property taxes have already been considered in terms of the jobs with spin-offs from operating TMX.

municipal spending). The employment benefits associated with increased property tax revenues are included in the long-term jobs with spin-offs estimated by KM/TMP and SFU-TGG.

That said, it is useful and informative to consider TMX benefits from a variety of perspectives; this helps us to evaluate how TMX will affect BC and Metro Vancouver and to place these benefits in the relevant provincial and regional contexts.

BC property taxes are a cost for KM/TMP, and a benefit for BC municipalities. For KM/TMP, BC property taxes are a small cost, equivalent to about 4-5% of the revenues generated by TMX. For BC municipalities, additional property tax revenues from TMX are a very small source of revenue in the context of overall municipal revenues.[54] In 2013, the BC communities that would receive tax revenues from TMX had over $2.4 billion ($2400 million) in total municipal revenues (from taxes and other sources).[55] Additional property tax revenues from TMX are an average of only 0.9% of 2013 total municipal revenues in these communities.[56]

Property tax revenues from TMX are especially small in the context of the four Metro Vancouver communities along the TMX routing. In 2013, these four communities had over $1.7 billion ($1700 million) in total municipal revenues (over $450 million in Burnaby and a total of almost $1.3 billion ($1300 million) in Coquitlam, Langley Township, and Surrey). Additional property tax revenues from TMX are thus only 0.4% of 2013 total municipal revenues (from taxes and other sources) for these communities (1.4% in Burnaby and an average of 0.1% in the other three).[57]

As shown in Section 3.4, the BC and Metro Vancouver economies are growing. Even if TMX is not built, BC and Metro Vancouver will in the future have substantially more population, labour force, employment, other economic activity, and municipal tax

[54] The BC communities that would receive property tax revenues from TMX are mostly municipalities, but also include 3 Regional Districts outside of Metro Vancouver. Thus, it should be understood that "municipal" in this section of Report in some cases can refer (in part) to Regional Districts.
[55] http://www.cscd.gov.bc.ca/lgd/infra/library/Schedule401_2013.xls
http://www.cscd.gov.bc.ca/lgd/infra/library/Schedule901_2013.xls
[56] Additional property tax revenues from TMX are an average of 1.9% of 2013 revenues specifically from taxes and grants in lieu of taxes (so excluding revenue from other sources) in these communities. While property tax revenues from TMX are typically small in the context of total tax and overall revenues for each community, revenues from TMX would be more significant in a few communities (notably Clearwater and Thompson-Nicola Regional District).
[57] Incremental tax revenues from TMX are 0.9% of 2013 revenues specifically from taxes and grants in lieu of taxes (so excluding revenue from other sources) for the four Metro Vancouver communities (2.2% in Burnaby and an average of 0.2% in the other three).

revenues.[58] TMX's small municipal tax benefits are even less significant in the context of this growth.

Also, in evaluating the municipal property tax benefits from TMX, it is relevant to consider that TMX may result in sizeable costs for these municipalities (and other BC communities). In Section 4, we will consider economic costs/risk of TMX for BC and Metro Vancouver, focusing on major spills that could have very high costs, notably for the communities along the TMX routing. But even prior to consideration of spill costs, it should be noted that that increased revenues from property taxes can be accompanied by increased costs to provide services (including infrastructure such as roads) that will be impacted by the proposed project.[59]

Moreover, as the BC and Metro Vancouver economies continue to grow, the costs and risks associated with TMX will increase. In the future, there will be even more people, jobs, other economic activity, and municipal tax revenues that are proximate to TMX and could be negatively impacted by TMX.

TMX will only provide additional property tax revenues to the communities directly along the routing, but TMX could negatively impact communities in a broader area. Notably TMX will provide only a small amount of incremental tax revenue ($7.5 million as estimated by KM/TMP) for the four Metro Vancouver communities directly along the TMX routing, but it could negatively impact the City of Vancouver and the entire Metro Vancouver region. The incremental tax revenues from TMX are even smaller in the context of overall municipal revenues in the broader area that could be negatively impacted by TMX. The long-term municipal tax benefits for BC and Metro Vancouver are illustrated in Figure 3.

3.6 Fiscal benefits for governments

KM/TMP also estimates TMX will have fiscal benefits for BC in terms of increased tax revenues for the provincial and federal governments. These fiscal benefits include the

[58] See for example Financial Plans for the four Metro Vancouver communities along the TMX routing:
http://www.burnaby.ca/Assets/our+city+hall/financial+reports/2014+Provisional+Financial+Plan.pdf
http://www.coquitlam.ca/Libraries/City_Hall_Files/City_of_Coquitlam_Financial_Plan_2014.sflb.ashx
http://www.tol.ca/Portals/0/township%20of%20langley/mayor%20and%20council/bylaws/Bylaw%204988%20-%202013%20-%202017%20Five%20Year%20Financial%20Plan.pdf?timestamp=1414865889288
http://www.surrey.ca/files/2014-2018_Financial_Plan_for_web(4).pdf

[59] Put another way, property taxes can be viewed as a fee for services, albeit a fee that may not be closely matched to the cost of services for individual taxpayers.

three following components, which will be considered in the sections below: building TMX, operating TMX, and increased revenues for crude producers. See Figure 4.

3.6.1 Building TMX

The fiscal benefits of building TMX are small for BC and Metro Vancouver, as well as very short-term (concentrated into a 2-3 year period of construction and related activity).[60] Moreover, the benefits estimated by KM/TMP are very high relative to likely actual benefits from building TMX.

KM/TMP estimates that building TMX will result in increased tax revenues for the BC provincial government of $309 million/year (2012 $).

Averaged over a 3-year period for construction and related activity, this is about $100 million/year. BC provincial government total revenues are now in the order of $43 billion/year ($43,000 million/year (2012 $)).[61] Thus, the increase in BC government revenues estimated by KM/TMP for building TMX ($100 million/year for 3 years) is equivalent to about 0.02% of current provincial government revenues ($43 billion/year).

KM/TMP also estimates that building TMX will result in increased tax revenues to the federal government, and that BC will receive $86 million of fiscal benefits via federal spending.[62] Averaged over a 3-year period for construction and related activity, this is about $30 million/year.

Including both increased tax revenues for the provincial government and increased federal tax revenues spent in BC, KM/TMP estimates that building TMX will result in total fiscal benefits for BC of $394 million. Averaged over a 3-year period for construction and related activity, this is about $130 million/year, which is equivalent to about 0.03% of current annual provincial government revenues.

The fiscal benefits estimated by KM/TMP substantially overstate likely actual fiscal benefits for BC. As shown in Section 3.2, building TMX might actually result in only one-third (or less) of the BC jobs estimated by KM/TMP. And to the extent that jobs are

[60] See footnote 13.
[61] http://www.bcbudget.gov.bc.ca/2013_June_Update/default.htm
http://www.bcbudget.gov.bc.ca/2014/default.htm
[62] KM/TMP analyzes a scenario where increased federal tax revenues filter down to the provinces through transfers and other program expenditures, which are assumed to be distributed on a straight per capita basis. BC has about 13% of the total Canadian population, and thus it is assumed that BC will receive 13% of the total federal tax revenues estimated for TMX.

overestimated, other measures of economic activity (including fiscal benefits) will also be overstated.[63]

The BC employment estimated by KM/TMP includes temporary workers that reside outside of BC.[64] As a result, fiscal benefits related to these jobs may flow to the home provinces of these temporary workers, rather than to BC.[65]

Also, the fiscal benefits estimated by KM/TMP assume that any federal tax revenues from TMX flow back to the provinces, including BC.[66] But federal revenues could be used for deficit reduction, rather than spending. Likewise, if they are spent, they might be distributed on a different basis than that assumed by KM/TMP, such that BC receives a smaller share.

Within the limited resources and time available for preparation of this Report, we cannot readily quantify the likely fiscal benefits for BC from building TMX. But our preliminary SFU-TGG Estimate is that they are likely less than $180 million, or $60 million/year averaged over a 3-year period for construction and related activity. These fiscal benefits for BC from building TMX are equivalent to about 0.01% of current annual provincial government revenues.

[63] KM/TMP's analysis of fiscal benefits includes the following types of taxes: personal income, corporate profits, indirect (notably GST/PST), and other (notably contributions to social security programs). These taxes are tightly linked to jobs (and spending of income from jobs), although somewhat less so for corporate income taxes (which also has strong linkages to economic activity that is capital intensive). So compared with building TMX, operating TMX will not have as strong a relationship between jobs and fiscal benefits. KM/TMP's estimated fiscal benefits from operating TMX are heavily weighted towards corporate taxes, as compared with the fiscal benefits from building TMX which have a larger component of personal income taxes and other taxes linked to jobs. See Conference Board Report (2013), pp. 25-27, 36-37.

[64] As discussed in Sections 3.1.1 and 3.1.4, KM/TMP estimates that most of the workers building TMX will not be local. Labour from inside the regions along TMX will be only 16% (calculated as a weighted average) of the total BC direct construction workforce. It is possible that some of these non-local workers will come from other parts of BC, but most will probably come from outside the province.

[65] Within the limited resources and time available for this project, we have not been able to more fully investigate this issue. But based on preliminary research, it is our understanding that personal income taxes are typically based on location of permanent residence, rather than location of work. A person files a tax return for the province in which they are residing on December 31 of the taxation year. A person will be determined to be resident in the province in which they have the most significant residential ties. See http://www.cra-arc.gc.ca/tx/tchncl/ncmtx/fls/s5/f1/s5-f1-c1-eng.html.

[66] See footnote 62 for more details on the scenario assumed by KM/TMP. The KM/TMP analysis points out that transfer of fiscal benefits from the federal government to the provinces is contingent upon federal revenues being spent, rather than be used to reduce the deficit.

In turn, any fiscal benefits flowing to Metro Vancouver will be even smaller, perhaps in the order of half of the provincial benefits.[67]

3.6.2 Operating TMX

The long-term fiscal benefits of operating TMX are small for BC and Metro Vancouver.

KM/TMP estimates that operating TMX will result in increased tax revenues for the BC provincial government of $36-47 million/year (2012 $).[68] This is equivalent to about 0.01% of current provincial government revenues.

KM/TMP also estimates that operating TMX will result in increased tax revenues to the federal government, and that BC will receive $10-12 million/year of fiscal benefits via federal spending.

Including both increased tax revenues to the provincial government and increased federal tax revenues spent in BC, KM/TMP estimates that operating TMX will result in total fiscal benefits for BC of $46-60 million/year. This is also equivalent to about 0.01% of current annual provincial government revenues.[69]

The fiscal benefits estimated by KM/TMP substantially overstate likely actual fiscal benefits for BC. As shown in Section 3.4, operating TMX might actually result in only about half (or less) of the BC jobs estimated by KM/TMP. And to the extent that jobs are overestimated, other measures of economic activity (including fiscal benefits) will also be overstated.[70]

Also, as discussed in Section 3.6.1, the fiscal benefits estimated by KM/TMP assume that any federal tax revenues from TMX flow back to the provinces, including BC. But federal revenues could be used for deficit reduction, rather than spending. Likewise, if they are spent, they might be distributed on a different basis than that assumed by KM/TMP, such that BC receives a smaller share.

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[67] As discussed in Sections 3.2.1 and 3.3.1 and footnote 39, Metro Vancouver has slightly more than half of the province's population and economy, but the region might not receive this large a share of any fiscal benefits from TMX.

[68] As was explained in Section 3.3, KM/TMP analyzes two scenarios for TMX operations: minimum effects with $644 million in annual revenue from firm contracts with shippers, and maximum effects with $835 million in annual revenue including non-firm transactions.

[69] BC provincial government total revenues are now in the order of $43 billion/year (2012 $). See footnote 61 for sources.

[70] See footnote 63 for discussion of the relationships between jobs and fiscal benefits. As explained there, compared with building TMX, operating TMX will not have as strong a relationship between jobs and fiscal benefits. Also, to the extent that TMX is used for non-firm transactions, this may result in relatively little additional employment, but it will provide additional revenue to KM/TMP and in turn fiscal benefits via federal and provincial corporate income taxes.

Within the limited resources and time available for preparation of this Report, we cannot readily quantify the likely fiscal benefits for BC from operating TMX. But our preliminary SFU-TGG Estimate is that they could be $35-45 million/year (or less). These fiscal benefits for BC from operating TMX are equivalent to about 0.01% of current annual provincial government revenues.

In turn, any fiscal benefits flowing to Metro Vancouver will be even smaller, perhaps in the order of half of the provincial benefits.[71]

3.6.3 Increased Revenues for Crude Producers

Alberta tar sands production has been growing, and pipeline capacity (including on the existing KM/TMP system) is constrained. TMX would provide tar sands producers with substantially expanded pipeline capacity to deliver their production to markets. Moreover, TMX would connect tar sands to Pacific tidewater, facilitating access to US West Coast and Asian markets.

KM/TMP estimates that TMX will result in higher heavy crude prices and increased revenues for tar sands producers, with resulting fiscal benefits for BC.[72] The estimated increase in revenues to tar sands producers is quite large, averaging $1.5-2.3 billion/year[73] (2012 $, over a 20-year period).[74] But as explained below, the estimated fiscal benefit for BC is quite small, averaging $27-40 million/year (2012 $, over a 20-year period).[75]

The KM/TMP fiscal analysis of increased revenues for crude producers first estimates increased tax revenues (and royalties) paid directly by the crude producers to the provincial and federal governments. BC is not a heavy crude producer, so it receives no fiscal benefits in terms of tax revenues paid directly to the provincial government.

[71] See footnote 67.
[72] The KM/TMP analysis assumes that TMX will affect pricing for all Western Canadian heavy crude production. Most of this is Alberta tar sands, but there is also some non-tar sands heavy crude production in Alberta and Saskatchewan. Thus, when we refer to tar sands in this section, it should be understood to sometimes include the relatively small amount of Western Canadian non-tar sands heavy crude.
[73] The upper end of the range ($2.3 billion/year) is for the KM/TMP Base Case, and the lower end of the range $1.5 billion/year) is for an alternative case, with results for the other alternative case falling within this range.
[74] See footnote 33 for more details on 20 year period.
[75] The upper end of the range ($40 million/year) is for the KM/TMP Base Case, and the lower end of the range $27 million/year) is for an alternative case, with results for the other alternative case falling within this range.

But the KM/TMP fiscal analysis then considers a scenario where the increased federal tax revenues flow back to the provinces, including BC.[76] And on that basis, KM/TMP estimates that BC will receive $27-40 million/year of fiscal benefits via federal spending of the tax revenues from tar sands producers. This equivalent to less than 0.01% of current annual provincial government revenues.[77]

To recap, KM/TMP estimates that TMX will result in higher crude prices and increased revenues, some of which will be paid in taxes to the federal government, and some of which will then flow back to BC. KM/TMP estimates that BC will receive only $27-40 million/year of fiscal benefits, which is less than 2% of the $1.5-2.3 billion of the increased (before tax) revenues that tar sands producers are estimated to receive due to TMX.

Based on KM/TMP's own analysis, it is clear that BC will receive (at most) only a tiny share of TMX benefits from increased revenues for crude producers. The issue of how benefits are shared will be further considered in Section 3.7. The remainder of this section will review KM/TMP's analysis, in order to develop an Independent Assessment of likely fiscal benefits to BC from increased revenues to crude producers.

The KM/TMP fiscal analysis of increased revenues for crude producers is based on a separate crude market analysis, which estimates increased revenues to crude producers from TMX.[78]

The KM/TMP analysis forecasts that TMX will benefit all tar sands producers (whether or not they are shippers on TMX). KM/TMP assumes that TMX will help to relieve constraints on overall pipeline capacity and reduce the need for higher priced rail deliveries; as a result, prices (net of pipeline and other logistics cost) are estimated to be higher for all tar sands production.

By connecting tar sands to Pacific tidewater, TMX would facilitate access to US West Coast and Asian markets. The KM/TMP analysis forecasts that tar sands producers will receive higher prices (net of pipeline and other logistics costs) selling into these markets (notably California and China), rather than into markets with pricing based on the US Gulf Coast market. In estimating higher revenues to crude producers from TMX, the

[76] See footnote 62 for more details on the scenario assumed by KM/TMP. The KM/TMP analysis points out that transfer of fiscal benefits from the federal government to the provinces is contingent upon federal revenues being spent, rather than be used to reduce the deficit.
[77] BC provincial government total revenues are now in the order of $43 billion/year (2012 $). See footnote 61 for sources.
[78] IHS Kelly Evidence (2013), https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2385938/B1-5_-_V2_4of4_PROJ_OVERVIEW_-_A3S0R1.pdf?nodeid=2392869&vernum=-2 App. A, (PDF pp.1-68)

KM/TMP analysis specifically assumes that shippers with firm capacity on TMX will use 50% of this capacity for deliveries to China and thus receive higher prices for these deliveries. This pricing benefit to TMX shippers is in addition to the pricing benefit for all tar sands producers discussed in the previous paragraph.

We have extensive expertise concerning crude markets, and in particular have undertaken extensive reviews of crude market analyses for other major crude pipeline projects.[79] But in the context of the limited resources and time available for this Report, we have undertaken a relatively brief review of the KM/TMP crude market analysis. As explained above, the KM/TMP fiscal analysis estimates that BC shares receives less than 2% of increased revenues to crude producers. Thus, we did not undertake an extensive review of the KM/TMP crude market analysis, since increased revenues for crude producers (even if greatly overstated) have only a relatively small impact in terms of fiscal benefits for BC.

Based on available information and a number of considerations, it is credible that TMX will have benefits for tar sands producers in terms of increased revenues;[80] however, these benefits are both difficult to predict and could be of considerably smaller magnitude than claimed in the KM/TMP analysis.

Crude markets are rapidly evolving, highly dynamic, and subject to substantial volatility and uncertainty, both short and long-term. Thus, it cannot be easily predicted how pricing for crudes will evolve over time and specifically how much price advantage there may be for selling into US West Coast and Asian markets, rather than into markets with pricing based on the US Gulf Coast market. The KM/TMP crude market analysis is based on crude price forecasts and other assumptions that are now almost a year old. Meanwhile, crude markets and pricing continue to evolve very rapidly.

In recent years, the North American oil system has been undergoing dramatic shifts that are large, rapid, ongoing, and possibly accelerating. Put very simply, Canadian and US crude production is rapidly increasing, but Canadian and US demand for refining products is stagnant or falling, such that crude imports (from overseas) are rapidly falling and product exports (to overseas) are rapidly rising.

[79] http://www.thegoodman.com/pdf/TGG20130422_SierraetaI_KeystoneXL_DSEISComments.pdf https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/981156/C13-6-11_-_Attachment_E-_TGG_Evidence_NEB_Line_9B_20130806_-_A3J7U2.pdf?func=doc.Fetch&nodeid=981156

[80] As discussed in footnote 34, KM/TMP has firm contracts in place with shippers for about 410,000 barrels/day, about 70% of total TMX capacity. This sizable commercial backing for TMX is a strong indication that TMX will have significant benefits for tar sands producers.

While various forecasts have begun to take these dramatic shifts into account, there is typically a significant lag. So it is fair to say that forecasts are now often a lagging indicator of emerging shifts in oil markets. At some point in the future, conditions may begin to stabilize, and forecasts may catch up to more fully reflect emerging future realities. But for now and quite possibly for at least the next few years, each new forecast will reflect major changes then emerging, and thus may differ substantially from prior forecasts.

In particular, oil market forecasts will likely continue to play catch up until the boom in shale/tight oil production levels off, or at least until it becomes better understood and its future evolution becomes more predictable.

We are very aware of the difficulties of energy forecasting and policymaking, in general and especially in a period of very rapid change. We share the view of some other energy market analysts that the recent shifts in North American oil system (notably the rapid increase in production from shale/tight oil, hydraulic fracturing (fracking), and horizontal drilling) are likely to be ongoing and possibly accelerating, as they have been for natural gas. But there are very large uncertainties associated with these shifts, and many (including numerous environmental organizations) continue to be skeptical that these shifts are likely to be sustained and are sustainable (in a variety of senses).

The lagging nature of oil market forecasts (and oil market analysis more generally) matters for evaluating TMX. There is a wide range of opinion regarding future crude prices (for both North American and global markets). Given the shifts underway in North America and globally, crude prices have recently declined substantially from the levels of the preceding several years. In particular, the decline in waterborne imports into North America is certainly affecting crude pricing in North American markets, and this large decrease in imports has also begun to put substantial downward pressure on global crude prices.[81]

The TMX crude market analysis assumes that there will be a sizable price advantage for selling into US West Coast and Asian markets, rather than into markets with pricing based on the US Gulf Coast market. But large pricing differentials between these

[81] This decline in crude prices is in line with our previous analyses of crude markets (see footnote 79), as well as the predictions of some other analysts; see for example, Verleger http://www.pkverlegerllc.com/assets/documents/TIE_W13_Verleger.pdf and Citi, Energy 2020: Independence Day https://www.citivelocity.com/citigps/ReportSeries.action https://ir.citi.com/dY2GZTnBVKoXNrT1sVyHcQCSQNAUUsl%2F8pXCARkTtvUOa8zDR2EckBRtxCGyJoDVW58uAgJ35%2BU%3D

markets (and more generally between North American and global crudes) may not be sustainable given evolving market conditions.

More generally, the KM/TMP market analysis assumes there will be substantial ongoing growth in tar sands production. In the Base Case, production doubles over the assumed 20-year period of TMX operations; while in the alternative Low and High Cases, production grows by 56% and 133%, respectively. Even leaving aside all of the other reasons why ongoing growth in tar sands production may not be preferable or achievable, tar sands expansion could be curtailed in the context of lower crude prices.

Thus, while it is credible that TMX will benefit tar sands producers, these benefits could be of considerably smaller magnitude than estimated in the TMX crude market analysis and assumed in the KM/TMP fiscal analysis.

Also, as discussed in Section 3.6.1, the fiscal benefits estimated by KM/TMP assume that any federal tax revenues from TMX flow back to the provinces, including BC. But federal revenues could be used for deficit reduction, rather than spending. Likewise, if they are spent, they might be distributed on a different basis than that assumed by KM/TMP, such that BC receives a smaller share.

Within the limited resources and time available for preparation of this Report, we cannot readily quantify the likely fiscal benefits for BC from increased revenues for crude producers. But our preliminary estimate is that they could be $0-30 million/year. These fiscal benefits for BC are equivalent to substantially less than 0.01% of current annual provincial government revenues.

In turn, any fiscal benefits flowing to Metro Vancouver will be even smaller, perhaps in the order of half of the provincial benefits.[82]

Figure 4 illustrates the annual fiscal benefits for BC from TMX.

3.7 BC Share of TMX Benefits

BC's share of TMX benefits is an important issue to be considered. We have already provided some consideration of this issue as part of our review of the KM/TMP employment, fiscal, and crude market analyses in Sections 3.2 through 3.6. In this Section (3.7), we will focus on the issue of BC's share of TMX benefits so that the information from multiple analyses can be used in combination to provide useful insights into how TMX benefits will be shared.

[82] See footnote 67.

As discussed in Section 2, the five minimum requirements that must be met for the BC government to consider the construction and operation of heavy-oil pipelines within its borders include:

> British Columbia receives a fair share of the fiscal and economic benefits of a proposed heavy-oil project that reflects the level, degree and nature of the risk borne by the government, the environment and taxpayers.[83]

Our detailed review of the KM/TMP employment, fiscal, and crude market analyses provides some useful insights into BC's share of TMX benefits. As shown in Sections 3.2 through 3.6, the KM/TMP analysis of TMX benefits substantially overstates the likely actual benefits, especially for BC. Nonetheless, a review of the KM/TMP analysis provides useful insights into how TMX benefits will be shared.

In Section 3.7.1, we analyze how the benefits from building the BC component of TMX will be shared between BC, other provinces, and the federal government. In Section, 3.7.2, we show how the benefits from operating the BC component of TMX will be shared between KM/TMP, BC (including BC municipalities along the TMX routing), other provinces, and the federal government. Finally, in Section 3.7.3, we analyze how the benefits of increased revenues for crude producers from TMX will be shared between tar sands producers, BC, Alberta, other provinces, and the federal government. See Figure 4.

3.7.1 Building TMX

Based on the KM/TMP employment analysis, the employment benefits of building the BC component of TMX mainly occur within BC. About three-quarters of total Canadian jobs from building the BC component of TMX are in BC, with the remaining one-quarter in supply chain and other spin-offs located in other provinces.[84]

As shown in Sections 3.3.3 and 3.3.4, the KM/TMP employment analysis substantially overstates the likely actual jobs from building the BC component of TMX. The BC share of actual jobs from building the BC component of TMX could be substantially lower than the three-quarters share indicated by the KM/TMP jobs estimate.

The short-term jobs building TMX are estimated to have a large component of temporary non-local workers (84% of the direct construction workforce). It is possible that some of these non-local workers will come from other parts of BC, but most will

[83] See footnote 8.

[84] In this section (3.7.2), we focus on the sharing of benefits from operating the BC component of TMX, as opposed to operating the entire project (which also includes an Alberta component). As such, "other provinces" includes Alberta, but does not include the benefits in Alberta and elsewhere from operating the Alberta component of TMX.

probably come from outside the province. And given the tight labour market conditions expected for the period when TMX might be built, many BC jobs are expected to be filled by new migrants relocating from other provinces and countries.[85]

From a BC perspective, jobs located in BC may not actually be a net benefit for the province if the labour supply is workers from other provinces (and countries).[86] Thus, to the extent that building TMX results in jobs located in BC, this employment benefit may be shared with other provinces (and countries).

As shown in Section 3.6.1, the KM/TMP analysis of TMX fiscal benefits substantially overstates the likely actual benefits for BC. KM/TMP estimates that building TMX will result in total fiscal benefits for BC of $394 million, or about $130 million/year, averaged over a 3-year period for construction and related activity). But our preliminary SFU-TGG Estimate is that they are likely less than $180 million, or less than $60 million/year averaged over a 3-year period for construction and related activity.

Within the limited resources and time available for preparation of this Report, our review of fiscal benefits from operating TMX focused on the benefits for BC, as opposed to how these benefits were shared between BC and the other provinces and the federal government. But the review we undertook does provide some insights about how these fiscal benefits are shared.

KM/TMP estimates that just over half of increased tax revenues from building TMX flow to the federal government, as opposed to the provinces. The KM/TMP fiscal analysis is based on the KM/TMP employment analysis, which estimates that building TMX in BC will result in significant employment in BC, with some supply chain and other spin-offs in other provinces. Thus, the increased tax revenues from building TMX are mainly related to job income, as opposed to corporate income.[87] And this mix of income results in provincial tax revenues that are almost as large as federal tax revenues.

The KM/TMP fiscal analysis considers a scenario where the taxes paid to the federal government will flow back to the provinces on a per capita basis.[88] BC has only a small part of the Canadian population (about 13%), so it does not receive much benefit from

[85] http://www.workbc.ca/WorkBC/media/WorkBC/Documents/Docs/BCLMOutlook.pdf
[86] As discussed in footnote 27, employment may not be a benefit from a provincial perspective, if the workers are migrants who did not previously reside in-province.
[87] See footnote 63 for more details on the types of taxes considered in the KM/TMP fiscal analysis.
[88] See footnote 49 for more details on the scenario assumed by KM/TMP.

the assumed federal transfers; in reality, BC might receive a smaller share or possibly no direct benefit from tax revenues paid to federal government.[89]

Building TMX does provide some benefits to BC, in the form of increased tax revenues; however, these benefits are small, both absolutely and relatively.

Building TMX in BC also provides some benefits to the other provinces,[90] in the form of increased provincial tax revenues from supply chain and other spin-offs located in the other provinces. But these direct benefits to other provinces are small.

Relative to direct fiscal benefits, the other provinces could receive a somewhat larger benefit from building TMX in BC if federal revenues are flowed back to the provinces, especially if distributed so that BC receives only a small share as assumed in the TMX fiscal analysis.

Overall, BC receives less than half the fiscal benefits from building TMX in BC.

3.7.2 Operating TMX

Based on the KM/TMP employment analysis, the employment benefits of operating the BC component of TMX mainly occur within BC. About three-quarters of total Canadian jobs from operating the BC component of TMX are in BC, with the other one-quarter in supply chain and other spin-offs located in other provinces.[91]

As shown in Section 3.4.3, the KM/TMP employment analysis substantially overstates the likely actual jobs from operating the BC component of TMX. So it is possible that the BC share of actual jobs from operating the BC component of TMX could be lower than the three-quarters indicated by the KM/TMP jobs estimate.

In contrast with the short-term jobs building TMX that are estimated to have a large component of temporary non-local workers, jobs operating TMX are long-term and thus may be more likely to employ workers that are (or become) BC residents (and taxpayers). Given the tight labour market conditions expected for the period when TMX might be in-service, many BC jobs are expected to be filled by new migrants relocating

[89] The KM/TMP analysis points out that transfer of fiscal benefits from the federal government to the provinces is contingent upon federal revenues being spent, rather than be used to reduce the deficit.
[90] In this section (3.7.1), we focus on the sharing of benefits from building the BC component of TMX, as opposed to building the entire project (which also includes an Alberta component). As such, "other provinces" includes Alberta, but does not include the benefits in Alberta and elsewhere from building the Alberta component of TMX.
[91] In this section (3.7.2), we focus on the sharing of benefits from operating the BC component of TMX, as opposed to operating the entire project (which also includes an Alberta component). As such, "other provinces" includes Alberta, but does not include the benefits in Alberta and elsewhere from operating the Alberta component of TMX.

from other provinces and countries.[92] From a BC perspective, employment for workers, who did not previously reside in BC, may not constitute a net benefit for the province.[93] Thus, to the extent that operating TMX results in jobs located in BC, this employment benefit may be shared with workers from other provinces (and countries).

All of the property tax revenues from TMX operating in BC would flow to BC municipalities, but these property taxes are small, both absolutely and relatively.

KM/TMP is estimated receive annual revenues of at least $448 million from the BC component of TMX, and revenues could be as high as $580 million if TMX capacity is fully utilized.[94] Meanwhile, BC property taxes ($23.2 million/year) are a relatively small expenditure for KM/TMP, equivalent to about 4-5% of the revenues generated by the TMX project.

As shown in Section 3.6.2, the KM/TMP analysis of TMX fiscal benefits substantially overstates the likely actual benefits for BC. KM/TMP estimates that BC will receive fiscal benefits from operating TMX of $46-60 million/year, equivalent to about 10% of the revenues generated by the TMX project. But our preliminary SFU-TGG Estimate is that they could be only $35-45 million/year (or less), which is less than 8% of the revenues generated by the TMX project.

Within the limited resources and time available for preparation of this Report, our review of fiscal benefits from operating TMX focused on the benefits for BC, as opposed to how these benefits were shared between BC and the other provinces and the federal government. But the review we undertook does provide some insights about how these fiscal benefits are shared.

Increased tax revenues from operating TMX mainly flow to the federal government, as opposed to the provinces. This reflects that TMX generates large corporate revenues and thus sizable government revenues from corporate profit taxes, which mainly flow to the federal government. In particular, operating TMX generates large revenues for KM/TMP, which in turn pays a portion of these revenues in taxes, mainly to the federal government.

The KM/TMP fiscal analysis considers a scenario where the taxes paid to the federal government will flow back to the provinces on a per capita basis.[95] BC has only a small part of the Canadian population (about 13%), so it does not receive much benefit from

[92] http://www.workbc.ca/WorkBC/media/WorkBC/Documents/Docs/BCLMOutlook.pdf
[93] As discussed in footnote 27, employment may not be a benefit from a provincial perspective, if the workers are migrants who did not previously reside in-province.
[94] See footnotes 35 and 37 for more details of how these revenues were estimated.
[95] See footnote 49 for more details on the scenario assumed by KM/TMP.

the assumed federal transfers; in reality, BC might receive a smaller share or possibly no direct benefit from tax revenues paid to federal government.[96]

Thus, the benefits of operating TMX in BC flow mainly to KM/TMP, in the form of increased revenues (before tax) and profits (after tax). Operating KM/TMP does provide some benefits to BC, in the form of employment and increased tax revenues; however, these benefits are very small, both absolutely and relatively.

Operating TMX in BC also provides some benefits to the federal government, in the form of increased tax revenues. In turn, the benefits to the federal government may flow back to the provinces, but (in the scenario assumed in the KM/TMP fiscal analysis), BC receives only a 13% share, with the other 87% going to the other provinces.

Building TMX in BC also provides some direct fiscal benefits to the other provinces, in the form of increased provincial tax revenues from supply chain and other spin-offs located in the other provinces. But these direct benefits to other provinces are small.

Relative to direct fiscal benefits, the other provinces could receive a much larger benefit from TMX operations in BC if federal revenues are flowed back to the provinces, especially if distributed so that BC receives only a small share as assumed in the TMX fiscal analysis.

Overall, BC receives less than half of the fiscal benefits from operating TMX in BC. Put simply, most of the fiscal benefits go to the federal government, and if flowed back to the provinces, almost all of this will go to the provinces other than BC

All of the property tax revenues from TMX operating in BC would flow to BC municipalities, but these property taxes are small, both absolutely and relatively.

Moreover, the fiscal and municipal property tax benefits to BC are small relative to the other benefits from operating TMX. The benefits of operating TMX in BC flow mainly to KM/TMP, in the form of increased revenues (before tax) and profits (after tax).

3.7.3 Increased Revenues for Crude Producers

As shown in Section 3.6.3, the KM/TMP analysis of fiscal benefits from increased revenues for crude producers may substantially overstate the likely actual benefits for BC. But a review of the KM/TMP analysis provides useful insights into how the fiscal and other benefits of increased revenues for crude producers will be shared. Based on

[96] The KM/TMP analysis points out that transfer of fiscal benefits from the federal government to the provinces is contingent upon federal revenues being spent, rather than be used to reduce the deficit.

the KM/TMP fiscal analysis, BC receives only a tiny portion (less than 2%) of the benefits of increased revenues for crude producers from TMX.[97]

Crude producers retain the large majority (almost 68%) of these benefits, with the remainder (32%) paid in taxes and royalties to the federal (13%) and provincial governments (Alberta 18% and Saskatchewan 1%).[98] In turn, the KM/TMP fiscal analysis assumes that the taxes paid to the federal government will flow back to the provinces on a per capita basis. BC has only a small part of the Canadian population (about 13%), so it does not receive much benefit from the assumed federal transfers.

Thus, BC gets less than 2% of the total benefits (BC gets 13% of the federal transfers, which are coincidentally 13% of the increased revenues to crude producers). Alberta gets almost 20% of the increased revenues to crude producers (18% directly in provincial taxes and royalties, plus another less than 2% from federal transfers).[99] The rest of Canada (other than Alberta and BC) gets 11% (1% in taxes and royalties directly to Saskatchewan, plus another 10% from federal transfers).

To summarize the results of the KM/TMP analysis, TMX has large benefits for crude producers in terms of increased revenues, but BC gets less than 2% of these benefits. The large majority (68%) of these benefits are retained by the tar sands producers as net revenues after taxes and royalties, with most of the remainder (20%) going to Alberta.[100]

3.7.4 Conclusions

As shown in Sections 3.7.1, 3.7.2, and 3.7.3, BC receives only a very small share of the benefits from TMX.

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[97] In this section (3.7.3), we focus on the sharing of benefits from increased revenues to crude producers. These benefits result from the entire TMX project (including components in both BC and Alberta), which benefits crude producers via higher crude prices (net of pipeline and other logistics costs). As such, BC and Alberta are each considered individually as beneficiaries, and "other provinces" are provinces other than BC and Alberta. Likewise, tar sands producers are considered

[98] As explained in footnote 72, the KM/TMP analysis assumes that TMX will affect pricing for all Western Canadian heavy crude production, including the relatively small amount in Saskatchewan. Thus, the KM/TMP analysis estimates that Saskatchewan will receive some benefit from higher crude producer revenues, via taxes and royalties paid directly to the provincial government.

[99] Alberta has 11% of the Canadian population, and KM/TMP's fiscal analysis thus assumes that Alberta will receive 11% of the total federal tax revenues estimated for TMX. Thus, Alberta gets almost as large a share of federal transfers (11%) as does BC (13%). But in addition to federal transfers, Alberta receives much larger benefits via taxes and royalties paid directly to the provincial government.

[100] As discussed in footnotes 41 and 43, the KM/TMP analysis considers a Base Case and two alternative cases. The detailed data reported here for share of benefits are based on KM/TMP's Base Case. But the results are very similar for the two alternative cases. In all cases, BC gets less than 2% of the total, with the large majority (68-70%) retained by the tar sands producers as net revenues after taxes and royalties, and most of the remainder going to Alberta (18-20%).

Most of the benefits from TMX go to tar sands producers and KM/TMP.

TMX would provide tar sands producers with substantially expanded pipeline capacity to deliver their production to markets. Moreover, TMX would connect tar sands to Pacific tidewater, facilitating access to US West Coast and Asian markets. KM/TMP estimates that TMX will result in higher heavy crude prices and increased revenues for tar sands producers.

The estimated increase in revenues to tar sands producers is quite large, averaging $1.5-2.3 billion/year (2012 $, over a 20-year period).[101]

Meanwhile, the estimated fiscal benefit for BC is relatively tiny, averaging $27-40 million/year (2012 $, over a 20-year period).[102] In terms of allocation of the benefits, BC gets less than 2% of the total benefits from increased revenues for crude producers.

Moreover, as has been shown above, the TMX benefits from increased revenues for crude producers are a big part of overall benefits for TMX. Put simply, BC gets a tiny share of the most important benefit, such that BC gets a small share of overall benefits for TMX.

As starkly illustrated in the bottom bar graph of Figure 4, the benefits are unevenly distributed among the provinces; and particularly unevenly distributed between the tar sands producers and the provinces. Of the $2.270 billion in increased revenues to tar sands producers (before-tax) from TMX raising crude prices, BC would a get less than 2% (or C$40 million) at the high range. In contrast, Alberta would receive 20% of these benefits and other provinces, 11% (despite assuming no additional spill risk). The big winners are the tar sands producers, who keep 68% (or C$1.1534 billion) of the increased revenues after tax.

[101] See footnote 73 for more details on the range estimated. See footnote 33 for more details on 20 year period.
[102] See footnote 75 for more details on the range estimated.

4 Economic Costs/Risks of TMX for BC and Metro Vancouver

While we have provided an approximation of the economic benefits of TMX (under a range of possible conditions), there is a high degree of uncertainty and a broad range of potential costs. Despite the impossibility of making a precise determination of the costs (or the risks) associated with the proposed pipeline, this Report can offer guidance concerning the relative magnitude of the costs versus the benefits.

Specifically, our main area of disagreement with KM/TMP is not related to the costs of smaller (or even average) spills, but rather the magnitude of bad to worst-case scenarios that are possible with a pipeline that runs through Metro Vancouver (proximate to people, water and economic activity) and with the potential of a spill to sea. Using a range of relevant real-world examples of major oil and gas transport accidents, we determine a range of bad to worst-case scenario costs for an onshore spill in Section 4.1. In Section 4.2, we discuss the concentration of current and future risks of a worst-case scenario (now and in the future) in Metro Vancouver. Section 4.3 examines the potential costs and risks of a marine spill resulting from TMX and Section 4.4 reviews KM/TMP's estimates for the worst-case scenarios. Section 4.5 outlines our concerns about KM/TMP's capability to cover damages in a worst-case scenario. In Section 5, we compare approximated benefits with this range of bad to worst-case scenario costs.

4.1 Range of Bad-to-Worst-Case Scenario Costs for an Onshore Spill

We are highly concerned with the catastrophic impacts of a major TMX pipeline rupture, particularly in the more densely populated areas (proximate to people, water and economic activity) along the route (and particularly as it crosses Metro Vancouver). We will make the case that KM/TMP, a wholly-owned subsidiary of Kinder Morgan has vastly underestimated these potential costs. The Company has estimated that the potential cleanup and damage costs of an oil spill under the worst-case scenario would range from C$100-$300 million.[103] The Report will demonstrate in this section that the costs of a bad scenario could start at $1 billion with a worst-case scenario ranging from $2-$5 billion. See Figure 5.

[103] This estimate is a rounding off of the results of high damage cost scenario (i.e. worst-case scenario) filed by KM/TMP as part of its evidence in the current NEB case. See footnote 120 for more details.

We have limited our cost analysis to costs that directly affect economic activity and can be somewhat readily (albeit approximately) quantified using market economics. These costs escalate very quickly in more populated urban areas. Moreover, as we have witnessed firsthand in Quebec in 2012 and Qingdao (China) in 2013, a major crude accident can result in the loss of human life. Therefore our determination of worst-case examples will be derived from examples of onshore spills. As discussed in Section 4.3, TMX will also increase tanker traffic and thus the risk of marine spills. Such spills will further increase the costs/risks of TMX.

To illustrate the range of cost magnitudes and potential effects of an accident or malfunction on TMX, we have selected a variety of relevant examples of major oil and gas transport accidents in a variety of relevant locations ranging from a somewhat populated area (Marshall, MI), to a small town (Lac-Mégantic), to a residential area in an urban setting (San Bruno, CA), to a densely populated urban area with an accompanying marine spill (Qingdao, China). Some of these examples are more directly comparable than others, but we have provided the range of examples to highlight that a major accident/rupture on TMX will have very high costs with respect to damage and disruption of infrastructure, particularly in Metro Vancouver.

The four relevant examples described in the table below are:

1. the spill of tar sands dilbit from Enbridge's Line 6B in Marshall, MI (2010)
2. the explosion, fire and spill of Bakken crude from a train derailment in Lac-Mégantic, QC (2013)
3. San Bruno natural gas pipeline rupture, explosion and fire in the San Francisco metropolitan area (2010)
4. the crude oil pipeline rupture, explosion and fire in Qingdao with accompanying marine spill (2013).

For each example, the table below will provide:

1. description of the disaster;
2. the cost and sources of the cost data;
3. the relevance of the example to TMX.

Description of Accident	Cost	Relevance to TMX
Enbridge's Line 6B Spill in Marshall, MI (2010):[104] A 30" pipeline ruptured and spilled over 840,000 gallons (20,000 bbl) of AB dilbit into an HCA (High Consequence Area) near the Kalamazoo River in Marshall, MI, a town of 8,000 people. The crude spilled into hundreds of acres of wetlands, a creek and the Kalamazoo River causing widespread devastation. 300 people suffered adverse health effects from benzene exposure.	Approximately **US$1.1 billion** in cleanup costs, plus US$3.7 million in civil penalty to Enbridge and at least US$22 million (to a maximum of $86 million) in EPA fines. The cleanup period lasted over four years, ending in October 2014. The dilbit has not been completely removed and some oil remains on the river bottom.	- Line 6B was carrying AB dilbit at the time of spill and KM/TMP plans to transport dilbit and other heavy crude on TMX - Marshall spill occurred in an ecologically sensitive area with proximity to wetlands, waterways and human population; there are several similar HCAs along the TMX route in BC, which are somewhat populated (as well as Metro Vancouver which is much more densely populated). - In light the Line 6B spill, the EPA has expressed concern regarding the additional impacts of dilbit spills (vs. conventional oil), with a particular concern with spills on waterways. There is evidence that dilbit sinks in water making it significantly more difficult to clean up. - Despite widespread devastation of Kalamazoo and area, the Line 6B spill is nowhere near the worst-case scenario for TMX, which runs through densely populated areas in Metro Vancouver and could damage and disrupt major infrastructure and possibly cause loss of life and a spill to water. - Line 6B is a 30"/762 mm pipeline whereas TMX is a 36"/914 mm pipeline, which could result in greater spill volumes.
Lac-Mégantic Tragedy (2013):[105] 63 DOT-111 tanker cars from a unit train carrying light Bakken crude from ND derailed in a small Quebec town, resulting in a fire and explosions, which incinerated the downtown core, levelled more than 40 buildings, left 47 dead and another 2000 forced from their homes. About 6 million litres (37,600 bbl) of crude were released.	Cleanup and damages costs are now estimated at **over US$1 billion** from various sources and could be higher. The July 2014 US government RIA indicates that damage estimates for Lac-Mégantic are still evolving (and increasing). It assumes Lac-Mégantic damages (including monetized loss of life) of **US$1.2 billion**, but the actual damages could be much higher - possibly as high as US$2.7 billion.	- Demonstrates the consequences of a crude oil accident in a small town by a lake, thus proximate to people, water and economic activity - Like Bakken, dilbit also has hazardous characteristics (notably flammability) - Serious concerns about who will bear the financial responsibility for the disaster - Nor is Lac-Mégantic anywhere near the worst-case scenario: a major pipeline rupture in Metro Vancouver could do far more damage (in terms of property, infrastructure and loss of life) than the derailment at Lac-Mégantic. - A major rupture of a 36" pipeline could result in as large a spill as Lac-Mégantic (or possibly larger) in either an HCA or a non-HCA.

[104] For more details, see Goodman and Rowan (2013), op. cit., pp. 35-38. For a 2014 update to the findings of Goodman and Rowan, see Inside Climate News (http://insideclimatenews.org/news/20140828/enbridge-faces-maximum-fine-86-million-kalamazoo-spill)

[105] For more details, see Goodman and Rowan (2013), op. cit., pp. 38-42. For a 2014 update to Goodman and Rowan see the Canadian TSB's Lac-Mégantic runaway train and derailment investigation summary (http://www.tsb.gc.ca/eng/rapports-reports/rail/2013/r13d0054/r13d0054-r-es.pdf), as well as the findings of the DOT/PHMSA Regulatory Impact Analysis (RIA) on Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, http://www.regulations.gov/contentStreamer?objectId=09000064817f3a1f&disposition=attachment&contentType=pdf

Description of Accident	Cost	Relevance to TMX
San Bruno Natural Gas Explosion and Fire (2010):[106] This PG&E pipeline disaster occurred in the San Francisco metropolitan area in a residential area with homes proximate to the pipeline. The rupture released 47.6 million ft^3 of gas, which caught fire, destroyed 38 homes and damaged 70. The disaster left 8 people dead, many injured and many more evacuated.	The final costs for the San Bruno disaster cannot yet be determined due to ongoing litigation and extensive mismanagement problems at PG&E. In September 2014, the California Public Utilities Commission (CPUC) levied a $1.4 billion penalty (still to be finalized) in addition to $635 million penalty, which PG&E has previously been required to pay. PG&E would then face CPUC penalties of over US$2 billion for the San Bruno accident, as well as extensive other safety failures. Moreover, PG&E could face another US$1billion in federal penalties for total of US$3billion in penalties. While the costs of San Bruno have not been finalized, our preliminary estimate (subject to updating) of the cost of the accident (including damages, penalties and other costs) is **$2 billion or more.**	- Demonstrates the devastation caused by a major pipeline accident in a residential neighbourhood in an urban area: extensive property damage and loss of life. - Particularly in Burnaby, TMX passes through residential neighbourhoods and under streets, just beside where people live and sleep. - Natural gas is very dangerous and we are not equating crude and gas pipelines but the accident is relevant because it is an example of an urban pipeline disaster. Compared with crude pipelines, there are typically many more gas pipelines in urban areas because the gas gets piped directly to consumers. - Because San Bruno disaster occurred in a highly populated urban area, it is getting closer to worst-case scenario. However a TMX spill in Metro Vancouver in a highly sensitive residential, commercial or industrial location (notably in Burnaby) could create even more extensive damage and disruption to infrastructure, result in a spill to water/ocean, and cause greater loss of life.

[106] For more details, see Goodman and Rowan (2013), op. cit., pp. 42-45. For a 2014 update to the findings of Goodman and Rowan see two news reports on the status of the penalties to PG&E: http://fuelfix.com/blog/2014/09/02/pge-fined-1-4-billion-for-deadly-2010-blast/ and http://www.sfgate.com/bayarea/article/1-4-billion-penalty-urged-for-PG-amp-E-in-San-5728611.php

Description of Accident	Cost	Relevance to TMX
Qingdao Crude Oil Pipeline Rupture, Fire, Explosion (2013):[107] Crude spilled from a Sinopec pipeline entered into a municipal drainage trench (storm sewers) and led to an explosion inside the trench. Several explosions occurred throughout the city, ripping up roads, overturning cars, damaging property, and resulting in a major urban disaster, which left 62 dead, and 136 injured. Environmental damage was widespread and included a spill to the sea caused by an explosion in the drainage system near the port. The marine spill spread over 3000 m^2 resulting in severe contamination of the sea and killing marine life. The exact terrestrial and sea spill volumes are not known, but they are reported as "large." (In general there is less transparency about the details of the disaster compared to the North American examples.)	We are unable to provide the full official costs of the disaster since compensation to the victims has not been finalized. In Sinopec's 2013 Annual Report, the company has estimated a "direct economic loss" of RMB 751.72 million (**US$124.3 million** at the time the announcement was made). However, Sinopec has also pledged compensation for the victims of the tragedy, but has yet to disclose the amount. This disaster has a significantly higher death toll than either San Bruno (which will likely cost PG&E US$2-3 billion) or Lac-Mégantic (which will cost US$1-2 billion) and likely higher overall devastation. If the Qingdao tragedy occurred in Canada or the US, damages could be **in excess of US$3 billion and possibly in excess of US$5 billion.**	- We are not implying that a TMX spill in Metro Vancouver would create the same extent of damage as a disaster in a Chinese city of 8 million. However, Qingdao demonstrates, in a way that the other examples do not, how a major crude spill in an urban area (with impacts to the urban infrastructure) can have very catastrophic impacts in terms of human suffering and loss of life and extensive damage to property and the environment. - As is the case in Metro Vancouver, the Qingdao pipeline was originally on the city outskirts, but this area is now heavily developed; and the number of buildings and population density have increased with many buildings in close proximity to the pipeline. The existing Trans Mountain routing has become heavily encroached upon by development. The new proposed routing through Metro Vancouver reduces proximity to development along the existing routing, but any routing for TMX will be problematic in such a heavily developed area. - Like Qingdao, Burnaby is a coastal port, so TMX entails the risk of a marine spill or a spill to waterways, which flow to the sea.[108] As noted above, there are serious concerns with dilbit spills to water since they are difficult to clean. A complete clean up of the sea spill in Qingdao is likely impossible due to heavier asphalt-like components of the oil that have sunk to the sea bottom, making it difficult to find and remove. "Such components degrade slowly, and will continue to be toxic and harmful to marine environment and offshore aquaculture."[109] Given this report, the spill in Qingdao was likely heavy crude. If anything, dilbit could be even more challenging to clean.

[107] See Sinopec Corp. 2013 Annual Reports and Accounts, p. 31. http://english.sinopec.com/download_center/reports/2013/20140323/download/2013_Annual_Report.pdf; as well as several 2014 news articles on the impacts and compensation: http://www.businessinsider.com/chinese-oil-giant-sinopec-to-pay-big-over-pipeline-blast-that-killed-more-than-60-people-2014-1; http://www.syntao.com/Themes/Theme_Page_EN.asp?Theme_ID=112&Page_ID=16786; http://www.china.org.cn/business/2014-01/13/content_31174352.htm

[108] Burnaby has 60 creeks, two lakes, and the Fraser River. TMX crosses and parallels the Fraser River in Coquitlam, upstream of Burnaby's Fraser River shoreline.

[109] http://www.syntao.com/Themes/Theme_Page_EN.asp?Theme_ID=112&Page_ID=16786

Even with a narrow economic definition of costs (which excludes many environmental impacts such as upstream GHGs, compromised ecosystem services, damage to plant and animal habitat, harm to plant and animal species, and broader human health impacts beyond injuries and death related to an accident), the potential cost of TMX under a bad to worst-case scenario are very high. In fact, under a range of malfunction/accident scenarios, these costs could escalate from significant to catastrophic.

The Marshall MI example demonstrates that a pipeline accident involving a significant dilbit spill to water in a somewhat populated non-metropolitan area (or in a less populated area with very environmentally sensitive water and other resources) would cost approximately **US$1 billion**. There are a number of HCAs (High Conequence Areas) along the TMX routing in BC, which are somewhat populated and/or have very environmentally sensitive water and other resources.[110] In BC and specifically along the TMX routing, topography and other factors concentrate infrastructure, other development, and environmentally sensitive water and other resources into constrained corridors (notably valleys). Trans Mountain Pipeline has proposed that TMX would deviate from the existing Trans Mountain routing in some areas. This new routing would reduce proximity to populated and other sensitive areas along the existing routing, but any TMX routing can be problematic in areas of BC where populated and other sensitive areas are concentrated owing to topography and other factors.

Therefore the $US 1 billion cost of Marshall can be used as the basis for the cost of a bad-case (but not worst-case) scenario in BC. The Lac-Mégantic example describes the damage and death toll from a fire and explosions in a small town involving a derailed train transporting Bakken crude. Based on various sources, the US Government's Regulatory Impact Analysis (RIA) on Enhanced Tank Car Standards and Operational Controls estimated that the Lac-Mégantic tragedy cost **US$1.2 billion** (including monetized loss of life), but noted the costs were still evolving and the actual damages could be much higher - possibly as high as **US$2.7 billion**.[111]

It is notable that the RIA concluded that major crude by rail accidents could result in damages per accident of US$1.2 billion or more, with multi-billion dollar damages

[110] https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2498451/B255-37_-_Part_6.2_Risk_Results_Report_-_A4A4E9.pdf?func=doc.Fetch&nodeid=2498451
https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2498756/B255-38_-_Part_6.2_Risk_Results_Report_Attachment_A_-_A4A4F0.pdf?func=doc.Fetch&nodeid=2498756

[111] DOT/PHMSA Draft Regulatory Impact Analysis on Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, July 2014. http://www.regulations.gov/contentStreamer?objectId=09000064817f3a1f&disposition=attachment&contentType=pdf

(estimated at $5.8 billion or more) from a very high consequence accident (in areas with high proximity to people, water, and economic activity). The RIA estimates for higher consequence events (i.e. major catastrophic accidents resulting in large releases of crude/ethanol and a sizable number of injuries and fatalities) are based on the Lac-Mégantic accident, together with various assumptions about potential major catastrophic accidents that could occur in the US. Like the authors of this Report, the RIA concludes that Lac-Mégantic is not a worst case for a catastrophic rail accident since the accident occurred in a small town in a mainly rural area, albeit in a downtown area very proximate to the rail line and accident. Compared with Lac-Mégantic, a major rail accident in an area that was more populous, congested, and/or sensitive could result in much larger damages (including fatalities).[112]

While Marshall had devastating effects on wetlands and the Kalamazoo River, and the Lac-Mégantic tragedy killed 47 people and incinerated a small town, neither is near the worst-case scenario for TMX. A major pipeline rupture in Metro Vancouver could do far more damage (in terms of property, infrastructure and loss of life) than either of these catastrophes. As indicated above, a major rupture of a 36" pipeline under pressure could result in as large a spill as Lac-Mégantic (or possibly larger) in either an HCA or a non-HCA.

San Bruno and Qingdao provide relevant examples of how costs can rapidly escalate when a disaster occurs in an urban area, which damages and disrupts infrastructure and affects large numbers of people. While the costs of the San Bruno disaster have not been finalized, our preliminary estimate (subject to updating) of the cost of the accident (including damages, penalties and other costs) is **$2 billion or more.**

As indicated above, the full official costs of the Qingdao disaster are not still be determined since compensation to the victims has not been finalized. Sinopec has estimated a "direct economic loss" of **US$124.3 million**. However, Sinopec has also pledged compensation for the victims of the tragedy, but has yet to disclose the amount. $124.3 million in "direct economic loss" is very low and reflects the fact that internalized costs probably are typically lower in China, in part because externalities are so high (i.e., large costs are not internalized). It is challenging and controversial to estimate externalities even in North America. And it is even more difficult in China where there tends to be a lack of data and transparency.

[112] Over the 20 year period 2015-2034, under the current safety regime, the RIA estimates there could be nine high consequence events similar to Lac-Mégantic (which would have environmental damages and monetized injury and fatality costs exceeding US$1.15 billion per event) and one very high consequence event with 5 times larger consequences (costs exceeding US$5.75 billion).

It is fair to say that if an event like Qingdao occurred in North America, it would have cost far more. This disaster has a significantly higher death toll than either San Bruno (which will likely cost PG&E US$2-3 billion) or Lac-Mégantic (which will cost US$1-2 billion). If the Qingdao tragedy occurred in Canada or the US, damages could be **in excess of US$3 billion and possibly in excess of US$5 billion**. As indicated in the table above, we are not implying that a TMX spill in Metro Vancouver would create the same extent of damage as a disaster in a Chinese city of 8 million. However, Qingdao demonstrates in a way that the other examples do not, how a major crude spill in an urban area (with impacts to the urban infrastructure) can have very catastrophic impacts in terms of human suffering and loss of life and extensive damage to property and the environment.

Under bad to worst-case scenarios, this Report concludes that the potential costs for a major rupture in an HCA but not an urban setting (similar to Marshall) could start at **US$1 billion (bad scenario)**. If a major accident occurred in a more densely populated area (such as Burnaby), damaging and disrupting key infrastructure, and possibly resulting in a spill to water, these costs could escalate to multi-billion dollar damages, potentially as high as **US$2-5 billion (worst-case scenario)**.[113] Given the hazardous characteristics (notably flammability) of dilbit (with sizable amounts of diluent such as condensate), an accident involving this pipeline could also involve loss of human life. We note also that these estimates are very much in line with the RIA findings that major crude by rail accidents could result in damages per accident of US$1 billion or more, with multi-billion dollar damages (estimated at $5.8 billion or more) from a very high consequence accident (in areas with high proximity to people, water, and economic activity)

Our concerns about the high cost of bad to worst-case scenarios are further intensified by recent reports of lack of adequate oil response resources and preparedness in BC for both land and sea spills. If emergency response is delayed, spill damage and cleanup costs increase - often dramatically. Slow and incompetent emergency responses on the part of Enbridge in Marshall, MI and Sinopec in Qingdao turned a pipeline rupture into a disaster in both cases.

[113] The worst-case scenario range was drawn from consideration of the disasters at Lac-Mégantic and San Bruno (and an estimation of the costs of similar accidents in more densely populated more urban areas), as well as the very relevant example of Qingdao (and an estimation of the cost of a similar accident in North America). We are not implying that a TMX spill in Metro Vancouver would create the same extent of damage as a disaster in a Chinese city of 8 million. However, Qingdao demonstrates, in a way that the other examples do not, how a major crude spill in an urban area (with impacts to the urban infrastructure) can have very catastrophic impacts in terms of human suffering and loss of life and extensive damage to property and the environment.

4.2 Concentration of Current and Future Risks in Metro Vancouver

As discussed above, this Report has determined that a bad-case scenario (which could cost US$1billion) would involve a major rupture in in an HCA but not an urban setting (similar to Marshall, MI). A number of areas along the TMX route in BC outside Metro Vancouver are at risk for a bad-case scenario. We have concluded that the worst-case scenario (which could cost US$2 billion to $5 billion) would involve a catastrophic rupture in a more densely populated area damaging and disrupting key infrastructure. The Metro Vancouver region is much more populous and urbanized than the rest of the areas along the TMX route. Therefore Metro Vancouver is currently at the highest risk of a worst-case scenario now and in these risks will only increase over time.

The routing of the existing Trans Mountain pipeline through Metro Vancouver has become heavily developed since the construction of the original pipeline in 1953. This is similar to the situation in Qingdao: when the Chinese pipeline was originally constructed it was on the outskirts of the city, but this area has subsequently developed into a highly urbanized district.

KM/TMP has proposed that TMX would deviate from the existing Trans Mountain routing from about 217th St. in Langley all the way west into Burnaby. This new routing would reduce proximity to development along the existing routing, but any TMX routing will be problematic in such a heavily developed area.[114]

The Metro Vancouver Region includes the following municipalities along the TMX routing: Burnaby, Coquitlam, Surrey and Langley. These communities would then at risk for a worst-case scenario due to the urbanized nature of the region and the specific routing of TMX (and a very high proximity to people, water, and economic activity), combined with a substantially expanded crude storage at the Burnaby Terminal. Substantially expanded marine operations also put these communities at further risk for tanker spills.

Furthermore, the risks and impacts of TMX will only increase over time in Metro Vancouver. It is projected that there will be sizable ongoing growth in population and employment throughout Metro Vancouver, but especially in the municipalities along the

[114] We note with concern that KM/TMP has appealed to Burnaby residents with a letter stating that "[t]he ability to route through Burnaby Mountain would avoid several private homeowners and minimize community disruptions," and threatening that if the Company is unable to complete those studies soon, "we may have to pursue our alternate route through city streets." http://www.lillooetnews.net/burnaby-trans-mountain-both-looking-for-support-in-pipeline-fight-1.1390559#sthash.m3yzlANU.dpuf

TMX routing. [115] And to the extent that the municipalities along the TMX routing are growing (and will in the future be even more populous and have even more employment and other economic activity), this will further increase the potential costs and risks for accidents during the many years in which TMX could be operating.

Moreover, TMX has potential costs and risks for the entire Metro Vancouver region, including the City of Vancouver. And to the extent that the entire Metro Vancouver region is growing, this will further increase the potential costs and risks associated with TMX. The pipeline would result in substantially increased marine operations and potential tanker spills. TMX could thus affect municipalities along the Burrard Inlet and other coastal waters. Moreover, if TMX affects communities directly along the TMX routing and/or along coastal waters, this could in turn have ripple effects in other Metro Vancouver communities. And the potential for harmful ripple effects is significant, given that TMX could directly impact populous communities throughout the region, as well as major infrastructure and the port.

Of all the municipalities along TMX, Burnaby (the third largest city in BC) is exposed to the highest concentration of risks of a worst-case scenario from TMX. This is due to its large and growing population and diverse and growing economy, in combination with the large concentration of oil infrastructure already hosted in Burnaby (including the existing Trans Mountain pipeline, tank farms, and marine terminal; other tank farms and marine terminals; and the Chevron refinery). Burnaby already has a disproportionate exposure to the risks and impacts of oil infrastructure and it is has rejected TMX, arguing that it is not the place for yet more oil infrastructure.

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[115] The following more detailed analysis of Metro Vancouver growth is based on the regional government's "Regional Growth Strategy Projections: Population, Housing and Employment 2006 – 2041: Assumptions and Methods" (December 2011) http://www.metrovancouver.org/about/publications/Publications/20110729RegionalGrowthStrategyProjections20062041_TH.pdf:

The four municipalities along TMX (Burnaby, Coquitlam, Surrey, and Langley Township) are estimated to have a combined population of 0.9 million in 2010, 1.2 million in 2021 and 1.5 million in 2041, as well as combined employment of 415k in 2010, 527k in 2021 and 687k in 2041. These four municipalities together now account for around 40% of Metro Vancouver's population and about one-third of regional employment; however, they are estimated to account for about one-half of total regional growth in population and employment.

It is not surprising that the municipalities along the TMX routing are such a large and growing part of the region. The Vancouver Region has limited remaining semi-rural land that is planned for future urban development, and almost all of the developable land is in the municipalities along the TMX routing. Langley and Surrey together have about 80% of land for future development, with the remainder in Coquitlam and Maple Ridge.

Consistent with past experience, the Vancouver Region is expected to grow mainly via infill and intensification within existing developed areas. Development is expected to become denser, including in the municipalities along the TMX routing, which are already heavily developed (such as Burnaby).

Burnaby has made an assertive and economically sophisticated case against TMX. In explaining its opposition to TMX, Burnaby emphasizes that TMX is inappropriate in the context of a large and growing Burnaby and Metro Vancouver region. Furthermore, TMX has sizable costs and risks, which exceed the benefits for Burnaby, the region, and BC. There is substantial agreement between Burnaby's Council Report on TMX and this Report's analysis on the benefits and costs of TMX.[116]

Metro Vancouver is big and growing, but quite geographically constrained such that development is expected to become denser. In light of this densification and the important risk factors discussed above, this Report concludes (as does the City of Burnaby), that TMX is a high-risk, low-value use of an increasingly high value resource.[117] This is true generally throughout BC, but even more true in the Metro Vancouver region.

4.3 Costs for a Marine Spill

In Section 4.1, this Report has determined that the worst-case scenario would involve a catastrophic pipeline rupture in a more densely populated urban area (as described above), which could also involve a spill to sea or to a waterway. The authors of this Report have considerable experience in estimating the costs of terrestrial spills.

But within the limited resources and time available for preparation of this Report, we cannot readily quantify the worst-case scenario for a marine spill. We have determined, however, that the risks and costs relating to marine operations and increased tanker

[116] For more details on the City of Burnaby's strong arguments against TMX, see (a) Council Report: Kinder Morgan Proposed Trans Mountain Pipeline Expansion, May 23, https://burnaby.civicweb.net/Documents/DocumentList.aspx?ID=12710; and (b) City of Burnaby Website: Proposed Kinder Morgan Trans Mountain Expansion Project (TMEP), What is Burnaby's Position? http://www.burnaby.ca/Proposed-Kinder-Morgan-Trans-Mountain-Expansion-Project.html

[117] By "high value resource," we mean the land, water, ecosystems, communities and economies that are at risk from TMX. Even by the narrowest economic definition, Metro Vancouver and the communities along the TMX route are highly productive economies with high property and land values. Moreover, the route crossed many sensitive areas close to people water and economic activity. As discussed in this section, cleanup and damage costs for a dilbit spills to water are particularly problematic. And a major rupture in an urban area could disrupt and damage key infrastructure, resulting in very high costs. With projected high economic and population growth in Metro Vancouver, the costs of a catastrophic urban spill become even higher. Defining a high value resource more broadly, there is a strong consensus that BC, Metro Vancouver and the Pacific coast are the sites of extraordinary beauty and "a kingdom of abundance," which should be protected for their own sake and for the sake of all humanity. A recent video from the Province of BC illustrates this broader definition of a high value resource and the need to protect it: http://www.hellobc.com/?utm_campaign=ski2014-15ph2&utm_medium=vanityurl&utm_source=wildwithin.ca

traffic will further increase overall costs/risk for TMX, even if a tanker spill would not likely be the worst-case scenario.

TMX will substantially increase tanker traffic accessing the Westridge Marine Terminal on Burrard Inlet in Burnaby. Furthermore, tanker spills can be very be very expensive. In considering the costs and risks of a tanker spill for TMX, there are disastrous real-world examples of offshore spills such as the Exxon Valdez and BP Deepwater Horizon.

However, these examples may not be as directly relevant for TMX. The Westridge Marine Terminal does not accommodate supertankers, so the volume of oil that could be spilled could be considerably less than that of a supertanker.

Nonetheless, the costs and risks of marine spills from TMX could be quite serious. A number of recent reports and incidents[118] have raised concerns that there is a general lack of preparedness for emergency response in BC and that the existing liability available for ship-source spills in insufficient (despite recent Federal announcements[119]). However, in terms of economic costs for TMX, a tanker spill alone would likely not be as expensive a worst-case scenario terrestrial spill in Metro Vancouver as described above.

The risks and costs relating to marine operations and increased tanker traffic will further increase overall costs/risk for TMX, even if a tanker spill would not likely be the worst-case scenario. As discussed in footnote 112, the US Government's RIA related to the tank car safety, estimated that over 20 years there could be nine high consequence events similar to Mégantic (each costing $1.15 billion) and one very high consequence event (costing $5.8 billion). Similarly, TMX could result in a very high consequence event (an catastrophic terrestrial pipeline rupture in a densely populated urban area), as well as a separate high consequence tanker spill. In this way, a tanker spill would add to the overall cost/risk of the worst-case scenario for TMX.

[118] 2012 Fall Report of the Commissioner of the Environment and Sustainable Development, Chapter 2—Financial Assurances for Environmental Risks, Marine Transportation Sector, http://www.oag-bvg.gc.ca/internet/English/parl_cesd_201212_02_e_37711.html (February 2013); "B.C. oil spill response 'gaps' exposed in government email," http://www.cbc.ca/news/canada/british-columbia/b-c-oil-spill-response-gaps-exposed-in-government-email-1.2814468 (Oct 27, 2014).
[119] World-Class Tanker Safety System: New measures to strengthen oil spill prevention, preparedness and response, and the polluter pay principle, http://news.gc.ca/web/article-en.do?nid=847489 (May 2014).

4.4 KM/TMP's C$170-$316 Million Estimate for Worst-Case Scenario is Far Too Low

This Report's main area of disagreement around the potential costs of TMX relates to the cost of a worst-case scenario in an urban area with devastating consequences. Based on real-world examples, we have estimated that costs for such worst-case costs escalate to the multi-billion range, potentially as high as US$2-5 billion. In its evidence in the NEB case, KM/TMP estimates costs for "credible" worst-case spill are only C$170 million in an HCA or C$316M in a non-HCA.[120] This section will discuss why this estimate is far too low and fails to take into account the full-range of worst-case scenarios.

KM/TMP's approach of uses various spill data to determine a worst-case scenario in terms of volumes spilled as well as spill costs per barrel for both cleanup and damage. In other words:

> Cost of worst-case scenario = Volume spilled (in bbl) x Spill cost (in $/bbl) of combined damage and cleanup costs

With relevant data for the volume spilled and the spill costs, this would not be an unreasonable approach.

The following table illustrates how this approach has been used by KM/TMP to determine the worst-case scenario costs in an HCA and a non-HCA. The table then supplies comparative data demonstrating how the Joint Review Panel determined worst-case spill costs earlier this year in its Decision on Northern Gateway. We then provide comparative data from the real-world examples of the accidents Marshall and Lac-Mégantic (based on the review of these accidents above). For both Marshall and Lac-Mégantic, the spill costs per barrel are derived from spill volume and cost data. The final two rows of the table illustrate what the potential costs could be in a high-

[120] https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2393434/B18-14_-_V7_APPG_CLEANUP_COST_POTEN_OIL_SPILL_-_A3S4W8.pdf?func=doc.Fetch&nodeid=2393434 See pp 16, 18, and especially, p. 24,Table B.2. On pp. 16 and 18, KM/TMP rounds off the results of its high damage cost scenario to a range between C$100-300 million. However, a closer review of the results of the high damage cost scenario in Table B.2 (p. 24), shows that costs in the high damage cost scenario range from C$102.9-$315.9 million with the worst-case HCA spill at C$170.2 million and the worst-case non-HCA spill at $315.9 million, which we have rounded up to C$170 million and C$316 million, respectively.

consequence worst-case scenario involving a catastrophic rupture in urban setting (in which the spill costs per barrel could be five times[121] that of Lac-Mégantic.)

Scenario/incident	Volume spilled in bbl	Spill cost in $/bbl (combined cleanup and damage)	Total cost in 2013$ (C$ or US$ as indicated)
KM/TMP's TMX worst case: HCA	12,580 bbl	C$13,532/bbl	C$170M
KM/TMP's TMX worst case: non HCA	25,160 bbl	C$12,556/bbl	C$316M
Northern Gateway Decision worst case	31,500 bbl	C$22,000/bbl	C$693M = $700M rounded up
Marshall, MI rupture	20,000 bbl	US$56,000/bbl	US$1.1B[122]
Lac-Mégantic (LM) disaster	37,600 bbl	US$32,000/bbl - $72,000/bbl	US$1.2-2.7B
Major catastrophe in urban setting based on spill volume at LM and spill cost at LM x 5	37,600 bbl (but could be higher)	US $160,000/bbl - US $360,000/bbl	US$6.0-$13.0B
Major catastrophe in urban setting based on spill volume at LM and total cost of $US 2-5 B	37,600 bbl	US$53,191.49/bbl - $132,978.72 /bbl	US$2.0-$5.0B

The table reveals a number of problems with KM/TMP's worst-case scenario analysis:

[121] We note that the US government DOT/PHMSA Regulatory Impact Analysis (RIA) on Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, http://www.regulations.gov/contentStreamer?objectId=09000064817f3a1f&disposition=attachment&contentType=pdf projected that there could be one very high-consequence event with 5 times larger consequences (costs exceeding US$5.75 billion). The RIA emphasized that Lac-Mégantic is far from the worst-case scenario for a crude-by-rail accident and that damage costs are correlated with population density. These conclusions are supportive of why spill costs per barrel could be five times that of Lac-Mégantic.

[122] In 2013 it was estimated that the damage and cleanup costs for the Marshall spill totaled approximately US$1.0 billion, but estimates now vary from US$1.0-$1.2 billion. In its 2013 Q3 Earnings Conference Call (on November 3, 2014), Enbridge reported that these costs may escalate to US$1.2 billion, which includes fines to the federal government of approximately $47.5 million, which have not been finalized. See http://www.enbridgepartners.com/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=17511 p. 6. To be consistent with KM/TMP's IR response in the current case as cited in footnote 124 (and based on data from Enbridge's 2013 Annual Report), we used a spill cost of US$1.1billion, which is also the middle of the range.

1. KM/TMP is making the case that its worst-case scenario would be in a non-HCA, therefore not in Metro Vancouver. All of examples of worst-case scenarios in this Report involve HCAs and the most expensive worst-case scenarios (San Bruno and Qingdao) occur in highly urbanized areas with high proximity to people, water, and economic activity. KM/TMP justifies its position by maintaining that projected worst-case spill volumes are higher in non-HCAs given that TMX is designed to reduce risks and spill volumes in an HCA. While it may be true that worst-case spill volumes are higher in non-HCAs, KM/TMP has assumed very similar (and very low) spill costs in terms of dollars per barrel for both HCAs and non-HCAs. Based on our own research, as well as the RIA conclusions, damage and cleanup costs for major accidents are highly correlated with population density. Because TMX goes through four densely populated communities in Metro Vancouver, it is surprising that KM/TMP has not provided a more thorough and realistic investigation into the worst-case scenario of a major urban accident.

2. The worst-case volumes spilled from the KM/TMP data are significantly lower than those from the Northern Gateway decision, as well as the actual volume spilled at Lac-Mégantic.

3. As introduced above, our major area of disagreement is that KM/TMP's has vastly underestimated worst-case spill costs (in dollars per barrel), even in comparison with the Northern Gateway decision. The JRP's spill cost/bbl is 63% higher than KM/TMP's spill cost/bbl estimate for an HCA.[123] Using real-world comparative spill-cost data from Marshall and Lac-Mégantic, we note the following: Marshall's spill cost/bbl is more than 4 times higher than KM/TMP's spill cost/bbl estimate for an HCA; Lac-Mégantic's spill cost/bbl is 2.4 to 5.3 times higher than KM/TMP's spill cost/bbl estimate for an HCA.

4. By using low volumes and very low spill costs in its worst-case scenarios, KM/TMP fails to take into account the full range of worst-case scenarios. Part of the problem may be related to the fact that the model used by KM/TMP's expert is based on a data set of oil spills over the period of 1974-1999. This entire data set predates the recent growth in North American production and transport of

[123] It is interesting to note that the worst-case costs for Northern Gateway (i.e. $700 million) are close to this Report's bad-case scenario of a major spill in a non-urban HCA. Although it could be argued that the Northern Gateway spill cost per barrel is on the low side for a worst-case scenario for Enbridge's project, it more comparable to our data for a bad scenario for TMX (starting at US$1 billion). And this makes sense because unlike TMX, Northern Gateway does not cross any very populous urban communities similar to Metro Vancouver.

more hazardous non-conventional crudes. Especially given the hazardous characteristics (notably flammability) of dilbit (with sizable amounts of diluent such as condensate), an accident on TMX could result in loss of human life, particularly in a major urban centre. Furthermore, there is evidence that dilbit sinks in water making it significantly more difficult to clean up, and thus increasing cleanup costs (as exemplified by Marshall)

5. It is clear from the real-world comparative data related to Lac-Mégantic and Marshall that a very large spill cost (of US$1 billion or more) typically requires some combination of large/very large spill volume and a very high spill cost per barrel. This combination can happen and has happened at Lac-Mégantic and Marshall. And these spills are not the worst case of a major rupture in a populous urban area (such as Metro Vancouver).

6. As mentioned above, the final row of the table illustrates what the potential costs could be in a more realistic worst-case scenario involving a catastrophic rupture in urban setting (in which the spill costs per barrel could be five times that of Lac-Mégantic.) Using the spill volumes for Lac-Mégantic with the very high spill costs that are plausible at the high end of the estimates for an urban disaster, a worst-case scenario could cost in the range of the US$6.0-13.0 billion. This worst-case scenario cost is significantly higher than the US$2-5 billion projected as the worst-case scenario in Section 4.1, and serves to illustrate that very high consequence events could be even higher than US$2-5 billion.

7. The final row shows what spill costs per barrel would be necessary to produce $2-5 billion spill using the same volumes as Mégantic: US$53,191.49/bbl - $132,978.72 /bbl. We note that the low end is less than the Marshall spill cost per barrel (US$56,000/bbl) and the high end is only 2.4 times the unit spill cost at Marshall, which seems highly credible given that Marshall is not an urban area. So if anything, the worst-case scenario of US$2-5 billion for a catastrophic urban rupture in Metro Vancouver is conservative.

In the current NEB case, KM/TMP was asked in interrogatories about why the Company was not using the Marshall accident as a basis for worst-case TMX spill costs. KM/TMP reports Marshall cost US$1.122 billion, and $56,000/barrel given a spill volume of 20,000 barrels.[124]

[124] KM/TMP's response to R Allan IR 1.18 q, https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2480550/B40-1_-_Trans_Mountain_Response_to_Allan_R_IR_No._1_-_A3X5V9.pdf?func=doc.Fetch&nodeid=2480550

KM/TMP's position is that Marshall is an atypical event and not a valid basis for estimating TMX spill cost, since a) costs are Marshall were much higher owing to the very slow and bungled response, and b) costs for US spills are generically higher than for Canadian spills.[125]

This Report's position is that worst-case scenarios are by nature unusual events, which are hard to predict, and typically involve multiple errors. They almost always involve extenuating circumstances - malfunctions and/or defects in combination with detection and response mistakes being made and typically many mistakes lining up to create very big problems. In the case of the relevant examples of worst-case scenarios in Section 4.1 (Marshall, San Bruno, Lac-Mégantic), the public had been assured that accidents of this magnitude would not happen, but they did. And they keep happening. Unlike the KM/TMP's model's outdated data set, all the examples in Section 4.1 are very recent (2010 onward). The two crude disasters (Mégantic and Marshall) involved big spills of non-conventional and more hazardous crude and occurred during the North American oil boom, which involves transporting higher volumes of non-conventional and more hazardous crude. Regarding, KM/TMP's position that US spills are generically higher than Canadian spills, Lac-Mégantic, the most expensive onshore oil transportation disaster to date in North America, occurred in Canada, and it is far from a worst-case scenario.

This Report has made a strong case above as to why real-world examples are a better basis for estimating the costs of worst-case scenarios. KM/TMP's estimates of the costs for "credible" worst case spill (C$170 million in an HCA and C$316 million in a non-HCA) are based on a model that underestimates potential spill volumes and vastly

[125] See for example, KM/TMP's response to R Allan IR 1.18 u:
In the case of the Enbridge Line 6B ("Kalamazoo" or "Marshall") release, spill volumes and higher costs were related to extenuating circumstances associated with the spill. Regulators recognize that these circumstances make it an untypical spill. For example:
· The National Transportation Safety Board observed the following: "The rupture and prolonged release were made possible by … failures … that included … Inadequate training of control center personnel, which allowed the rupture to remain undetected for 17 hours and through two startups of the pipeline."
· The NEB Joint Review Panel for the Northern Gateway Project – after examining the evidence – concluded with the view that: "The Panel accepts that the cleanup costs for the Marshall, Michigan spill were orders of magnitude higher because of the extended response time. … For this reason the Panel did not use the Marshall spill costs in its calculations."
Trans Mountain did not rely on the Marshall spill costs to inform the hypothetical spill scenarios that would be relevant to this Application.
https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2480550/B40-1_-_Trans_Mountain_Response_to_Allan_R_IR_No._1_-_A3X5V9.pdf?func=doc.Fetch&nodeid=2480550

underestimates spill costs per barrel. This is particularly true for a worst-case scenario in an urban area (like Metro Vancouver). Low volumes and very low spill costs fail to take into account the full range of worst-case scenarios, and particularly the costs of our worst-case scenario for TMX, i.e. a very high consequence urban rupture in Metro Vancouver. KM/TMP's approach, however, when used with relevant and up-to-date real-world spill data serves to further underscore that our estimate of US$2-5B for a worst-scenario is highly credible and may even be conservative. Figure 5 compares the SFU-TGG cost estimates of a bad to worst-case scenario for TMX against the estimates provides by KM/TMP.

4.5 Concerns about KM/TMP's Capability to Cover Damages in a Worst-Case Scenario

In response to a series of interrogatories in the current case, KM/TMP has assured the NEB that it has sufficient financial capacity to cover its projected worst-case scenario of C$300 million "or even the $1 billion financial capacity that is anticipated to be legislated by the federal government."[126] In its responses, the Company claims to have to have C$750 million in insurance (C$150 million specific to pollution events from KM Canada properties including TMP, plus $600 million for general liability insurance for all KM activities including in the US). KM comments that the details of the new federal requirements (notably for $1 billion in financial capacity) have not been established, but the Company claims it will comply with whatever standards are put in place. In addition to insurance, KM points out that it has extensive other financial resources. However, given the very high costs of a more credible bad to worst-case scenario for TMX (estimated at US$1-5 billion), we have concerns about KM's financial capability, responsibility and willingness to mitigate and compensate for all the potential damages for spills costing $1 billion or more.

In light of the Lac-Mégantic tragedy and concerns around the adequacy of MM&A[127]'s (and other parties') ability and willingness to pay for damages, we are particularly concerned about the following questions surrounding KM's insurance:

[126] See especially KM/TMP response to NEB IRs 1.7-1.10: https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/2456419/B32-2_-_Trans_Mountain_Response_to_NEB_IR_No._1_1_of_2_-_A3W9H8.pdf?func=doc.Fetch&nodeid=2456419

[127] Montreal, Maine & Atlantic Railway, the operator of the unit train which spilled the crude at Lac-Mégantic. MM&A has declared bankruptcy.

1. To what extent will KM/TMP be forced to internalize the costs of a major pipeline accident/spill?

2. To what extent will the NEB direct KM/TMP to provide adequate financial assurances as part of its decision in the TMX application?

3. Given the uncertainty around (1) and (2), to what extent does KM/TMP have the proper incentives to buy enough insurance (as opposed to self-insuring based on an assumption that the full costs of a major pipeline accident/spill will not be internalized)?

4. To what extent will KM/TMP's insurance actually operate to internalize the costs of pipeline accident/spill (as opposed to the insurers acting to limit their payment of claims such that costs are not actually internalized)?

5. Even if KM/TMP were willing to buy adequate insurance, to what extent would such insurance be available at an affordable price?

Within the limited resources and time available for this Report, we have not been able to conduct an in-depth review of KM/TMP's insurance situation, and its legal obligations in compensating for damages. But given our experience with liability issues for pipeline and crude by rail transportation, as well as the high costs of a worst-case scenario, we have concerns about KM/TMP's capability/responsibility to internalize the costs in the event of a major accident/spill (of $1 billion or more).

For smaller spills, it is more credible that KM/TMP could internalize the cost. But for bad to worst-case scenarios (i.e. spills of $1 billion or more), it is possible if not likely that taxpayers will end up paying for some portion of the damages and cleanup. And these liability concerns only increase if spill costs escalate into the multi-billion dollar range.

Finally we note that despite the federal government's May 2014 announcement of a requirement of $1 billion in absolute liability for NEB-regulated pipelines,[128] no legislative changes have been enacted to date in the Canadian Parliament to make this announcement into law; so there is currently no absolute liability requirement for NEB-regulated pipelines.

[128] "Minister Rickford Announces Latest Actions to Enhance Canada's World-Class Pipeline Safety System," May 14, 2014 http://news.gc.ca/web/article-en.do?nid=848059

5 Comparisons of Costs and Benefits: A Summary

5.1 Results of Sections 3 (Benefits) and 4 (Costs)

Section 3 provided estimates of the benefits of TMX for BC (and Metro Vancouver if applicable), including the employment benefits of building and operating TMX, property tax benefits, fiscal benefits, and benefits of increased revenues to crude producers. These respective benefits are contrasted with KM/TMP's estimates. Figures 1 to 4 summarize and compare the respective benefits estimates from SFU-TGG and KM/TMP.

The Report concludes that the benefits of TMX are very small in the context of the BC and Metro Vancouver economies. Moreover, these benefits have been significantly overstated by KM/TMP.

Sections 3.2 and 3.3 show how KM/TMP has overestimated the short-term jobs from building TMX by a factor of three in both BC and Metro Vancouver. The Company maintains that building TMX will create 36,000 person-years of employment in BC (including a wide range of spin-offs). But the Report has determined that TMX will only create 12,000 person-years or less over the 3-year period for construction and related activity. This is equivalent to 4000 jobs/year (or less) and to less than 0.2% of the total provincial employment. Similarly, for Metro Vancouver, the area most at risk for a catastrophic worst-case spill, the Report has determined that building TMX will only create 6,000 person-years or less over this period. This is equivalent to 2000 jobs/year (or less) and to substantially less than 0.2% of the total regional employment. (See Figure 1.)

Section 3.4 discusses long-term jobs from operating TMX. KM/TMP estimates that operating TMX will create only 50 direct full-time jobs in BC, but also claims that a wide range of spin-offs could push the total up to almost 2000 jobs. Once again, these claims are exaggerated: even with a wide range of spin-offs TMX will only create 800 long-term jobs. This is equivalent to approximately 0.03% of total BC employment. Similarly, for Metro Vancouver, the Report has determined that building TMX will only create 1,200 person-years or less over this period. This is equivalent to 400 jobs/year (or less) and to less than 0.03% of the total regional employment. (See Figure 2.)

Section 3.5 demonstrates that TMX would provide only small property tax benefits for BC communities along its route. For BC, these benefits (averaging less than 1% of 2013 total municipal revenues) will be even smaller in the context of projected growth for these communities. (See Figure 3.)

A review of the fiscal benefits in Section 3.6 also demonstrates the tiny returns to BC from TMX. Kinder Morgan's flawed analysis, which overstates jobs, also overstates tax benefits from building and operating TMX. Based on the Company's own estimates regarding the increased revenues to tar sand producers from TMX, BC gets less than 2% of these revenues; tar sands producers retain 68%, and 31% goes to Alberta and other provinces in royalties and corporate income taxes (paid directly to the provinces, or paid to the federal government and then flowed back to the provinces). (See Figure 4.)

Despite KM/TMP's claims of significant economic benefits for BC and Metro Vancouver, the employment benefits are much smaller than the Company has claimed; the property tax benefits are small and even smaller when weighed against the growth projections for the communities along the pipeline route; and fiscal benefits from TMX are tiny for BC.

Regarding the costs of TMX, Section 4 concludes that under a bad to worst-case scenario, the potential costs of a major rupture in a sensitive area, but non-urban setting could start at US$1billion. Under a worst-case scenario involving a catastrophic rupture in an urban setting (such as Metro Vancouver), costs could escalate to US$2-5 billion. Moreover, these costs have been vastly underestimated by KM/TMP, which has estimated a "credible" high-cost damage scenario would cost only C$100-$300 million with the most expensive spill projected in a non-urban, non-sensitive area. (See Figure 5.)

As set out in Section 2, it is impossible to make a precise determination of the costs (or risks) associated with the proposed pipeline; however, the Report can offer useful guidance by comparing an estimate of the economic benefits against a range of bad to worst-case scenario costs.

We have focused on the costs of bad to worst-scenarios because this is our core area of disagreement with KM/TMP in regard to spill costs. Our main concern is not the costs of smaller (or even average) spills because it is likely that KM/TMP's can pay for these spills (via insurance or even self-insurance). Instead, we are most concerned about the costs of bad to worst-case scenarios that are possible given that runs through Metro Vancouver (proximate to people, water and economic activity), with the potential of a spill to water. As discussed in Section 4.5, given the very high costs of a bad to worst-case scenario for TMX, we have concerns about KM/TMP's financial capability, responsibility and willingness to mitigate and compensate for all the potential damages for spills costing $1 billion or more.

To determine a range of bad to worst-case scenario costs for TMX, the SFU-TGG Report has selected a variety of relevant examples of major oil and gas transport accidents in a variety of relevant locations ranging from a somewhat populated area (Marshall, MI), to a small town (Lac-Mégantic), to a residential area in an urban setting (San Bruno, CA), to a densely populated urban area with an accompanying marine spill (Qingdao, China). These examples demonstrate that even with a narrow economic definition of costs, which excludes many broader environmental and human health impacts (notably from increased GHGs), the potential cost of TMX under a bad to worst-case scenario are very high. In fact, under a range of malfunction/accident scenarios, these costs could escalate from significant to catastrophic.

Contrary to KM/TMP's findings, damage and cleanup costs for major accidents are highly correlated with population density. So a worst-case scenario for TMX would involve a major accident in a more densely populated area (such as Metro Vancouver). Under bad to worst-case scenarios, this Report concludes that the potential costs for a major rupture in an HCA but not an urban setting (similar to Marshall) could start at **US$1 billion (bad scenario)**. If a major accident occurred in a more densely populated area (in Metro Vancouver), damaging and disrupting key infrastructure, and possibly resulting in a spill to water, these costs could escalate to multi-billion dollar damages, potentially as high as **US$2-5 billion (worst-case scenario)**. Given the hazardous characteristics (notably flammability) of dilbit (with sizable amounts of diluent such as condensate), an accident involving this pipeline could also involve loss of human life.

5.2 Under a Range of Bad to Worst-Case Scenarios, Costs Will Exceed Benefits

Sections 3 and 4 demonstrate that the benefits of the pipeline are very small and have been significantly overstated by KM/TMP, whereas the worst-case costs of a catastrophic spill are very large and have been vastly understated. Based on evaluation of the economic costs and benefits in Sections 3 and 4, the SFU-TGG Report concludes that under a range of bad to worst-case scenarios, the costs of TMX will exceed, or greatly exceed, the benefits for both BC and Metro Vancouver.

We note once again that we have limited our cost analysis to environmental and socio-economic impacts that directly affect economic activity, and that can be somewhat readily (albeit approximately) quantified using market economics. The consideration of human health and safety and the broader and cumulative environmental and other socio-economic costs (which excludes many broader environmental and human health impacts (notably from increased GHGs) will further increase the overall costs of the Project. However, TGG has concluded that our narrow comparison of more narrowly defined economic costs and benefits (including a more limited consideration of socio-

economic and environmental impacts) is sufficient demonstration that under a range of bad to worst-case scenarios, the costs of TMX will exceed, or greatly exceed, the benefits for both BC and Metro Vancouver.

5.3 Highly Uneven Allocation of Costs and Benefits

In our review of the costs and the benefits of TMX, we have noted that the costs and benefits are very unevenly allocated among various stakeholders and across regions. The biggest costs and potential risks of the project are borne by the inhabitants of urban areas (the four communities Metro Vancouver along the TMX route), where the worst-case scenario related to a major pipeline disaster could occur. Because there is some concern about Kinder Morgan's willingness and ability to pay all of the damages associated with a worst-case scenario, BC and municipal taxpayers are also subject to significant risks. Section 3 concludes that the employment, property tax and fiscal benefits of TMX for both Metro Vancouver and BC are small in the context of the regional and provincial economies, particularly when weighed against the risk of a major spill. (See Figures 1-4.)

As discussed in greater detail in Section 3.7 and starkly illustrated in the bottom bar graph of Figure 4, the fiscal benefits are unevenly distributed among the provinces; and particularly unevenly distributed between the tar sands producers and the provinces. Of the $2.270 billion in increased revenues to tar sands producers (before-tax) from TMX raising crude prices, BC would a get less than 2% (or C$40 million) at the high range. In contrast, Alberta would receive 20% of these benefits and other provinces, 11% (despite assuming no additional spill risk). The big winners are the tar sands producers, who keep 68% (or C$1.1534 billion) of the increased revenues after tax.

Tar sands crude producers will be able to increase profits by accessing higher priced markets via access to tidewater. Furthermore, KM/TMP is also highly motivated to extend its pipeline network and increase profits. Moreover, tar sands producers are facing considerable uncertainty with respect to its Northern Gateway project (and all other major pipeline projects to transport tar sands crude) and are currently pipeline-constrained. As such, KM/TMP and Alberta crude producers are even more highly motivated to tout the supposed benefits of these projects to the citizens of BC and Metro Vancouver. In effect though, the vast majority of benefits from TMX will flow to KM/TMP, Alberta tar sands producers and Alberta whereas the citizens of BC, and Metro Vancouver, in particular, will bear the lion's share of the risks.

5.4 Key Questions to Guide Decision-Making

As indicated in Section 2, there is increasing evidence that the current NEB hearings may not ensure that TMP provide all the necessary information on the costs and

benefits of TMX. In this context, the independent assessment of costs and benefits provided in this Report can offer useful guidance to inform decision-making, and can help British Columbians evaluate if TMX is indeed in the public interest.

Decision-makers must search out the most comprehensive and reliable information and analysis before determining whether projects and supporting policies should be approved. The comparison of economic benefits estimates against a range of bad to worst-case scenario costs in the SFU-TGG Report is sufficient to raise the following serious questions for decision-makers:

1. Are there serious problems with TMX? And more specifically, under a range of bad to worst-case scenarios, do the costs of TMX exceed the benefits?

2. Can the KM/TMP evaluation of the costs and benefits (which concludes that the overall costs are moderate and acceptable compared to the benefits) be relied upon?

3. Is TMX in the public interest of the citizens of BC and Metro Vancouver? More specifically, is BC's fifth condition being fulfilled - i.e. that "British Columbia receives a fair share of the fiscal and economic benefits of a proposed heavy-oil project that reflects the level, degree and nature of the risk borne by the government, the environment and taxpayers?"[129]

In answer to Question 1, the range of bad to worst-case scenarios which start at $1 billion and escalate into the multi-billion dollar range in the case of a major rupture in an urban area (as described in Section 4.1) show unequivocally that there can be serious problems with TMX. As discussed in Section 5.2, based on evaluation of the economic costs and benefits in Sections 3 and 4, the SFU-TGG Report concludes that under a range of bad to worst-case scenarios, the costs of TMX will exceed, or greatly exceed, the benefits for both BC and Metro Vancouver.

The answer to Question 2 is a definitive no. As discussed throughout this Report (and made very clear in Figures 1 through 5), the benefits of the pipeline are very small and have been significantly overstated by KM/TMP, whereas the worst-case costs of a catastrophic spill are very large and have been vastly understated. The Company's evidence before the NEB has overestimated short-term employment benefits by a factor of three. Most other employment and non-employment benefits have also been overstated. On the cost side, the KM/TMP's miscalculations are even more dramatic.

[129] See footnote 8.

Worst-case scenario costs could escalate to the multi-billion dollar range - more than 10 times higher than the C$100-$300 million estimated by the Company.

In answer to Question 3, in light of our evaluation of the costs and benefits, the SFU-TGG Report concludes that TMX is not in the public interest of the citizens of BC and Metro Vancouver. More specifically, it is clear from our discussion of the highly uneven allocation of the costs and the benefits in Section 5.3 that the benefits of the project flow mainly to tar sands producers, KM/TMP and Alberta, whereas the citizens of BC and of Metro Vancouver in particular bear most of the risk of a catastrophic spill. Furthermore, Section 3.7.3 and Figure 4 show that the fiscal benefits are unevenly distributed among the provinces; and particularly unevenly distributed between the tar sands producers and the provinces. Section 3.5 and Figure 3 show that the incremental municipal property tax benefits are very small in the context of the provincial and regional economies. Finally, Sections 3.2, 3.3 and 3.4, and Figures 1 and 2 show that the employment benefits for both BC and Metro Vancouver are small and have been significantly overstated by KM/TMP.

The findings of the SFU-TGG Report clearly show that BC's fifth condition (that BC receive a fair share of the fiscal and economic benefits commensurate to the risk borne by the government, the environment and taxpayers) is very far from being fulfilled by TMX.

5.5 Recommendation

In light of the findings of the SFU-TGG Report regarding the evaluation of the costs and benefits of TMX, we conclude that the pipeline project is not in the economic or public interest of the citizens of BC and, in particular, the citizens of Metro Vancouver. Moreover, TMX completely fails to satisfy BC's fifth condition for the consideration of construction and operation of heavy-oil pipelines within its borders. This Report therefore strongly recommends that the citizens and decision-makers of BC and Metro Vancouver reject this pipeline, which is neither in the economic nor public interest of BC and Metro Vancouver.

Roeland Zwaag

From: Susan Davidson s. 22(1)
Sent: Wednesday, December 17, 2014 9:39 PM
To: publicinput
Subject: Kinder Morgan concerns

I share all 6 of the concerns expressed by the Township, and in addition I am concerned about

* the potential cost to ToL of adequate training and equipping our first responders in the event of pipeline leaks and/or spills (both from the existing line and the proposed new one)

* the potential cost to ToL for police and safety patrols in the event of citizen and First Nation opposition to the proposed new pipeline if it proceeds

* the refusal of the NEB to acknowledge or allow any comment reflecting concern for global climate change - the use of fossil fuel energies needs to be phased out, not expanded.

* the recent blatant disregard for municipal bylaws and policies in Burnaby

* the substantial and undemocratic efforts of our federal government to silence citizen and First Nation opposition to this proposed expansion.

Susan Davidson,
Aldergrove,
s. 22(1)

Roeland Zwaag

From: larri woodrow s. 22(1)
Sent: Wednesday, December 24, 2014 11:32 AM
To: publicinput
Subject: Township wants to hear from residents on pipeline twinning, p8 Langley Times, Dec 23

Mayor, Council & Engineering Staff,

First and uppermost, the pipeline must not run through Redwoods Golf Course. That would be a huge financial mistake given even today's development property raw land values at $1million per acre and more. Running the length of the golf course would reduce land use and invite a huge future financial loss. A route is already in place. Twinning with the existing line is KM's problem. They can do it and restore it. We should not accept their plan for using our golf course, which would be much easier & simpler for them. With twinning along the existing route, the old line would be properly inspected, serviced or replaced.

Second, the NEB process has lost credibility. Langley Township should consider withdrawing & requesting a new NEB process, one that's open and democratic. A provincial environmental review abandoned by our BC Liberals, should be resurrected given the watering down of the federal review process. There's little public trust or faith remaining today in the process. This Opinion in the Vancouver Sun is an excellent summary of present circumstances:
www.vancouversun.com/news/Opinion+Tories=pipeline=firms=growing=apart/10677096/story.html

Please align with the majority of Langley's citizens. Act to halt the "growning apart".
Larri Woodrow
s. 22(1) Walnut Grove

Roeland Zwaag

From: rebecca tin tun s. 22(1)
Sent: Sunday, December 28, 2014 9:36 PM
To: publicinput
Subject: Pipeline Twinning

A little-known fact that I got from Kinder Morgan is that in the past 60 years , the pipeline that they want to twin has had 82 oil spills, 25 of which were especially serious. With a track record like that, they should not be permitted to twin the pipeline at all. Rebecca Tin Tun s. 22(1)

Roeland Zwaag

From: Fred McNeill s. 22(1)
Sent: Monday, December 29, 2014 8:36 PM
To: publicinput
Subject: Comments on the Proposed Kinder Morgan Pipeline

Comments on the Proposed Kinder Morgan Pipeline

For the past 25 years I have lived in Glen Valley within 1/2 mile of the pipeline that has been there for over 50 years. Should a rupture occur near me it is likely we would have oil on our land as it is downhill from the pipeline.

Does that concern me? Not in the least.

As well, I drive over a road the crosses the pipeline daily. From that road I see where the pipeline crosses a farmer's field and it is very apparent that the existing pipeline does not interfere at all with the farming activity.

In addition I can see the helicopters that patrol the line twice daily 365 days a year.

To me the opposition to the pipeline is a fabricated opposition financed and funded by foreign interests in an attempt to curtail the development of the oil sands.Recently, at a town hall meeting in Fort Langley(supposedly to hear both sides) it was made abundantly clear by the 5 Eco -groups that were there that this is their main objective.

I find it very interested that many of the same people who are fear mongering about a pipeline rupture seem to not be concerned at all about the gas pipeline that runs to their homes. Should their gas line rupture or leak (and they leak almost every day-thus the advertising on the radio by Teresen Gas about potential gas leaks) the potential is there for damage AND death.

Our country needs the jobs and revenue provided by projects such as this. We need it to pay for health care, education and other expenses and the services we need and want from our municipal governments. I find it EXTREMELY hypocritical when a union such as the teachers union comes out against pipelines but then asks for a raise in the next breath . Talk about a diss-connect.

In the 50 plus years the pipeline has run thought the township I don't recall even one spill within the township and the same goes for the shipping out of Burrard Inlet. In that same 50 year time span we have put a man on the moon, developed computers and the Internet, sent a vehicle to Mars and many other technological marvels.

I'm sure the technology in pipeline construction and maintenance has made equally impressive strides during the last 50-60 years.

I understand it is POSSIBLE there could be a rupture or earthquake causing damage but so COULD there be a rupture of one of the many dams for hydroelectric power which would kill many people in towns downstream. As well there COULD be explosions at one of the many power plants

We should embrace this pipeline or we could find 100 car trains of oil travelling through or community many times a day. And, as well all know, railroads are beyond the control of municipalities.

Having said that I am in favour of this pipeline, I also think that it should be constructed without any expense incurred by either the township or its citizen and both the township and its citizens should be compensated for any damage or significant inconvenience.

I find it very interesting that there are accusations against Kinder Morgan that they have not answered ANY questions put forth by various groups yet it appears that the TOL has received answers to its questions and is now seeking further answers/clarifications.

In reading through the TOL's original requests for information I notice there is no reference or request for a spill probability in the TOL. Therefore I would like to see the TOL ask the following question,

Based on the history of oil spills/ruptures from the Trans Mountain Pipeline within the boundaries of the TOL since the construction of the original line, what is the probability of a spill/rupture occurring in the TOL during the next 60 years.

Regards

Fred McNeill

Glen Valley

Roeland Zwaag

From: Jody Grainger s. 22(1)
Sent: Thursday, January 01, 2015 10:54 AM
To: publicinput
Subject: Transmountain pipeline

My family does not care where this pipeline goes...it should not happen. The toll this industry has taken on the environment is not worth any amount of financial / economic gain for the country, province, or municipality. I read a quote once that I believe applies to this situation..."It is when the last tree has been cut, the last river been poisoned, and the last fish been caught when we realize we cannot eat money." I would only approve of this expansion if went toward finding another energy source that is renewable and safe to the environment. Too much risk to fill too few pockets, and I would like to save some rivers for my children.

Jody Grainger
Resident of the Township

Roeland Zwaag

From: Almoran s. 22(1)
Sent: Saturday, January 03, 2015 10:33 AM
To: publicinput
Subject: Township seeks public input on Kinder Morgan concerns.

I believe that we as a municipality/province/country need to be open for business. By bringing in as much money as we can we can have a good standard of living. Being open for business should take into account environmental concerns, I believe we can both be open for business and address environmental concerns. I think that we need to have an attitude of how something can be done and should approach this project (and all others) in that frame of mind.

Roeland Zwaag

From: Rawstron s. 22(1)
Sent: Sunday, January 04, 2015 8:27 AM
To: publicinput
Subject: Kinder Morgan Pipeline

TO whom it may concern,

As a property owner very concerned about the effect of the pipeline coming through my property on 7936 – 240th street I hope the TOL can help ensure that we get clarity on what the new added safety zone means – is it also an expansion of the right of way?
It is important that they are clear in what this means now and down the road away after they have got what they wanted – thepipeline in the ground.
What recourse do we have if they do not keep to the agreed upon terms with each property owner and TOL ?
Obviously I would prefer not to have another pipeline come to the coast as we need to develop alternative energy sources and protect the environment but if senior governments allow it we need to be treated fairly and honestly.

Thank you for keeping them attuned to our concerns.

Grant

Roeland Zwaag

From: Don Maurer s. 22(1)
Sent: Sunday, January 04, 2015 11:07 AM
To: publicinput
Subject: Not in favour of twinning

We at s. 22(1) Street in Langley B.C. are not in favour of Kinder Morgan twinning the existing pipeline through Walnut Grove. They have a right away already...they do not need another. This only doubles the chances of something going wrong within Walnut Grove. (In a worst case scenario we could see whole neighbourhoods wiped off the map...take a look where the lines have ruptured in the past and the devastation...now see how close the pipeline is to our neighbourhood.)

We have recently have had other Municipal decisions which we disagreed with that have lowered house prices in our neighbourhood.

Regards,

Don and Donna Maurer.

Roeland Zwaag

From: John Evanochko s. 22(1)
Sent: Sunday, January 04, 2015 3:25 PM
To: publicinput
Subject: Township wants to hear from residents on pipeline twinning, p8 Langley Times, Dec 23

Mayor, Council & Engineering Staff,

I am submitting to the TOL my opposition to the KM pipeline expansion in any form. Any form of support would make the Township of Langley complicite with the expansion of the environmentally destructive Athabaska Tar Sands, expansion of the LNG industry to support the Tar Sands, with its own environment degrading practices associated with fracking, particularly poisoning the groundwater and the release of methane. Then there are the downstream threats of pipeline leaks and spills, with its release of benzene and other health threatening chemicals, the destruction of marine environments with the loading facility leaks. Then there is the proposed dredging of the Burrard harbour entrance and the eminent threat of a spill in the harbour, destroying the tourist trade associated with the Vancouver/Burnaby/Port Moody water fronts. Further downstream is increased risk of tanker collisions with the increased traffic and the eminent collapse and extinction of the "j" Orca Pod and the negative impact on Indigenous fisheries.

Further downstream is the burning of the oil and the resulting increase in CO2 emissions, driving global warming at a faster rate to an uncertain future related to extreme climate change.

I do not oppose the production of oil in an environmentally sensitive manner, for use as an industrial input into products that our civilization has come to rely upon. What I am opposed to is the expansion of oil production for use as a fuel which drives the increase in emissions and therefore global warming and resultant climate change.

At the same time, the guidelines given to the National Energy Board in regards to what they can consider and whom they can listen too has resulted a degradation of Canadian democracy, resulting in the withdrawal from the hearing of Marc Eliesen — who has 40 years of executive experience in the energy sector, including as a board member at Suncor, who describes the process as a "farce"

For what? An pittance of tax benefits from KM, a few long term jobs and a .$15 a litre increase at the gas pumps resulting from the Tar Sands producers getting a world price per barrel from the local refineries, which are currently being starved by the Tar Sands producer who insist on sending the bitumen offshore.

All the risk and no rewards. Even if the economics were upgraded, it still does not outweigh the downside of supporting the expansion of this bitumen carrying pipeline and ultimately the Tar Sands.

The Oil-by-rail vs pipelines argument is a false choice. The real issue is stopping the reckless and destructive expansion of tar sands bitumen for export.

The NEB process has lost credibility. Langley Township should consider withdrawing and requesting a new NEB process, one that's open and democratic.

I sincerely hope that the Township's request for feedback is not farcical as well, simply an exercise in "letting the dogs bark" and pretend that the public had its say.

What I am encouraging this council to do is pushing our Provincial and Federal gov'ts for financial support in the development of alternate energy, primarily wind, solar and geothermal, the latter being a source that is readily available both close to the lower mainland and in the north east of the province.
http://www.theglobeandmail.com/news/british-columbia/geothermal-alternatives-for-site-c-are-more-cost-effective-industry-group/article21784675/

Thank you the opportunity to provide input into a critical decision not only for our community, but for the entire Lower Mainland and ultimately for the health of the entire planet, which supports the existence of our civilization.

Respectfully

John N. Evanochko

Roeland Zwaag

From: Sean Marte s. 22(1)
Sent: Tuesday, January 06, 2015 10:19 PM
To: publicinput
Subject: Kinder Morgan Transmountain Pipeline - Round 2 Intervener Questions

Hello,

As a resident of the Township of Langley I have concerns about the planned TMEP project. There are 4 areas that I do not feel Kinder Morgan has addressed adequately in there proposal to the NEB nor in their subsequent answer to the TOL round 1 intervener responses.

1.
TMEP pipeline surveying and construction may incur additional policing costs for the TOL. These costs could include regular and additional resources to enforce injunctions necessary for the safety of construction workers and equipment. Will Trans Mountain commit to compensating the TOL for any or all of the additional policing costs incurred between January 2, 2016 and the completion of the TMEP construction? If Trans Mountain will not commit to covering 100% of these costs, please provide your reasoning for why the TOL taxpayers should cover the remaining costs?

2.
Trans Mountain's response to TOL IR# 1.20: "In the event that dilbit were to be spilled, the procedures for cleaning up the spill would be similar to cleaning up a conventional crude spill. Trans Mountain completed research to study the fate and behavior of diluted bitumen in large simulation spill tanks and was able to demonstrate the effectiveness of conventional equipment in recovering the spilled material."

My understanding is Trans Mountain's laboratory tests showed that floating dilbit can be cleaned up with conventional equipment. As such these laboratory tests failed to demonstrate that conventional equipment is sufficient to clean up a real world spills. Dilbit can sink under certain conditions which, are not well understood in marine environments and less understood in fresh waster environments like the Fraser River. Below are links to back up my claims about the properties of dilbit. Therefore I disagree with this validity of the response provided to the TOL for IR #1.20.

Does Trans Mountain's emergency response plan account for cleaning up sunken dilbit? What equipment will Trans Mountain use to clean up sunken dilbit in the Fraser River? What percentage of the sunken dilbit will be unrecoverable with this equipment under various spill scenarios? How long will the clean up take under a worse case spill?

2.1. The NEB panel for the Northern Gateway project found that the evidence presented on the Marshall, Michigan, spill demonstrates that dilbit can sink in some circumstances.
http://gatewaypanel.review-examen.gc.ca/clf-nsi/dcmnt/rcmndtnsrprt/rcmndtnsrprtvlm2chp6-eng.html

2.2. An Environment Canada study published Nov. 30, 2013 found that Alberta dilbit can sink under the presence of sediment, waves and weathering.
http://www.ec.gc.ca/scitech/6A2D63E5-4137-440B-8BB3-E38ECED9B02F/1633_Dilbit%20Technical%20Report_e_v2%20FINAL-s.pdf

3.
My understanding is that Trans Mountain currently has $750 million of spill liability insurance. (page 1-46)
https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2385938/B1-1_-_V1_SUMM_-_A3S0Q7.pdf?nodeid=2385048&vernum=-2

The SFU Economic Costs and Benefits TMX report is in disagreement with the Trans Mountain's credible bad case and worse case spill scenario clean up costs by a factor of 10. The report indicates the Kalamazoo spill clean up, penalties and fines cost Enbridge 1.1 billion USD.
http://www.sfu.ca/content/dam/sfu/mpp/HomepageFeatureArticles/Economic%20Costs%20and%20Benefits%20of%20the%20Trans%20Mountain%20Expansion%20Project%20%28TMX%29%20for%20BC%20and%20Metro%20Vancouver_20141110.pdf

Taking Kalamazoo as a baseline bad case spill scenario I would apply a few factors for the TMEP project

x 1.44 increase in pipeline area (36" dia compared to 30" dia)
x 1.18 exchange rate
A similar spill from the TMEP pipeline could cost 1.9 billion CAD or more to clean up.

Will Trans Mounting commit to increasing it liability insurance from 750 million to 2 billion CAD?

4.
My fourth area of concern is spill detection at the small end of the spectrum. How much dilbit could leak underground undetected under various possible senarios? Especially as many TOL residences rely on underground aquifers for their fresh water, which are crossed by the proposed pipeline. If a small leak in the pipeline were to develop how will Kinder Morgon detect this leak and identify the location? Are there mass flow (or similar sensors) in the pipeline and how far apart are they?What is the accuracy of the proposed leak detection system and how small of a leak can occur undetected? Will contamination of a water supply be the first indicator of a small leak? Is it Kinder Morgan's policy to repair all leaks regardless of size, location (i.e. difficulty in locating and/or repairing) and repair cost as quickly as is possible?

Regards,
Sean Marte, P.Eng.

Roeland Zwaag

From: The O'Callaghans s. 22(1)
Sent: Wednesday, May 07, 2014 9:51 PM
To: publicinput
Subject: KinderMorgan concerns

I have a number of concerns re the Kinder Morgan pipeline expansion project.

- I live in Forest Knolls. The pipeline runs approximately one kilometer north of our property. A significant leak could result in my husband and I being forced to evacuate, health issues from the fumes, reduced property value, etc. Homes near the Enbridge Kalamazoo River spill faced all of these issues.
- If there were a major earthquake, would the pipeline leak?
- Did Kinder Morgan consider building the pipeline to earthquake proof standards such as the Alaska Pipeline?
- In the event of a major earthquake and a pipeline leak, how would the leak be controlled and the pipeline be repaired - given the inevitable road damage and other earthquake aftermath?
- In the event of a major Fraser River flood, would the pipeline leak?
- It is quite possible in the event of a 1948-type flood that significant mudslides and damage by trees flowing down the river would cause a pipeline spill.
- In that event, how would the pipeline leak be controlled and repaired?
- Does the Township of Langley have the resources - financial, equipment, personnel, etc. to be able to respond to a significant leak? I believe that I read that the City of Burnaby is still awaiting settlement from Kinder Morgan re the pipeline leak several years ago.
- Does the Township of Langley personnel have the training to safely deal with a significant leak? Will Kinder Morgan supply adequate training?
- If a leak happened near Salmon River during winter or spring, with the high water table, the ground is so soft. Would it be possible for equipment to deal with the clean-up of a spill under these conditions?
- If a leak happened in this area, the commercial impact to Fort Langley stores might be considerable. Would small business owners be compensated adequately? The tourism trade may be impacted for many years.
- A leak that escaped into the Fraser River would seriously impact tourism, fishing, the rowing clubs, campers, hikers and so much more besides the salmon fishery and wildlife!
- The Walnut Grove area has built up significantly since the original pipeline was installed sixty years ago. Installing a second pipeline will be very disruptive to many homeowners.

I am not sure if the Township of Langley can ask questions re the tanker traffic.

I believe that I read that the tankers will be so large that they could only sail under the Lions Gate Bridge at low tide...

We keep hearing that climate change will cause the world's oceans to rise by several inches. I have heard that many coastal cities are investigating ways to mitigate this impact. What plans does Kinder Morgan have in this event?

Did they consider having the pipeline go to Cherry Point, Washington instead?

I read of one suggestion to have the pipeline run to the Roberts Bank area instead? Was this considered?

I am not sure if the Township of Langley can ask questions re the decommissioning of the existing pipeline at this time.

- What is the expected lifespan of the existing pipeline?
- What are the plans to remove it safely?

Thank you for this opportunity for input.

Mary O'Callaghan
s. 22(1)
Langley, BC

Roeland Zwaag

From: Geraldine Jordan s. 22(1)
Sent: Thursday, May 08, 2014 9:51 PM
To: publicinput
Subject: Pipeline Feedback

To Whom It May Concern,

I am a homeowner at s. 22(1) Langley, BC.

The location of the proposed project on the west side of the Redwoods Golf course is completely unsuitable. The proposed location is immediately upslope to more than 1000 residents, in an earthquake-prone zone. Any leak resulting from a faulty pipe, or initiated from a natural disaster, will be devastating on the community and long-term deleterious effects will be experienced by the community and the surrounding environment, including the Redwoods golf course and all landscape elements downstream of this height of land. Building a pipeline at the height of land (which is the west edge of the Redwoods Golf course) is an untenable geographic location.

Air impacts

Negative impacts due to construction include diesel fumes, noise pollution, dust from soil disturbance, etc. Negative on-going impacts include those from maintenance, such as diesel fumes, noise pollution, etc. The risk of catastrophic fire in the event of a pipeline leak after an earthquake poses an enormous threat to air quality.

Land impacts

Negative land impacts include disruption of natural habitat and wildlife disturbance. Moreover, risk of leaks pose an enormous risk to land resources. Pipeline damage has been previously documented after earthquake events in other geographic locations (e.g., Christchurch, New Zealand). As the Redwoods area is located in a region with the risk of a megathrust earthquake, pipeline damage would have catastrophic outcomes for land, including human communities, wildlife habitat, agricultural land, forested areas, recreational areas, etc.

Water impacts

Negative impacts on water include the enormous risk to ground water and surface water. Specifically, East Munday Creek drains to the north, parallel to the west boundary of the Redwoods Golf course. A number of tributaries of East Munday Creek intersect with the boundary of the Golf Course. The main stem of East Munday Creek is, on average, estimated at 400 m downslope and to the west of the western edge of the golf course. The negative externality of this risk to water resources is substantial.

Socio-economic impacts

Human activity would be severely and negatively impacted during the construction phase. Noise pollution, which has no upper limit of decibel caps for construction, will negatively stress residents. Documented noise level stress includes increased blood pressure and increased risk of heart attacks. Additionally, compaction which is used in the construction of pipelines, shakes the ground, causing seismic waves to be propagated through ground and attenuate any nearby structures. The shaking of dwellings by 1000-lb plate compactors is extremely distressing for residents. Compaction disturbance is considered "noise" in the by-laws, and therefore residents are not protected by this extremely disturbing construction activity. Human activity is also impacted due to the risk of leakage. This will decrease the property values of the neighbouring homes. Additionally, there are two elementary schools (Topham Elementary School and Ecole des

Voyageurs), one preschool (attached to Topham Elementary School) and a number of private home daycares within close proximity to the proposed route on the western edge of the Redwoods Golf course. All these facilities are downslope of the proposed pipeline route.

The potential negative environmental and socio-economic effects of the proposed Kinder Morgan pipeline project are larger than any benefit that the Township and its residents will receive.

Sincerely,
Geraldine Jordan
s. 22(1) Langley, BC

Roeland Zwaag

From: David Jordan [redacted]
Sent: Thursday, May 08, 2014 10:00 PM
To: publicinput
Subject: Public input on TransMountain pipeline
Attachments: TOL Request for feedback regarding TMP expansion May 2014.pdf

Please see attached pdf outlining my concerns regarding the Kinder Morgan TransMountain pipeline expansion. I've included a copy of the text below.

To Whom it May Concern,

Kinder Morgan Canada (KM) has recently submitted an application to the National Energy Board of Canada to twin their existing TransMountain Pipeline (TMP) through Langley, British Columbia.

I am a resident and homeowner at s. 22(1) who lives within close proximity to the proposed TMP corridor. I respectfully request the Township of Langley (TOL) to raise the following concerns to the National Energy Board (NEB) in its official capacity as registered interveners to the NEB hearings, which I understand will be scheduled sometime later this year.

As currently proposed by KM in appendix 1 (see attached), if the expanded TMP were to be located on the west side of the Redwoods golf course approximately 300 homes single family homes, two elementary schools and a major recreational business enterprise will be impacted in the Redwoods neighbourhood. Impacts would include conflicts with existing municipal utility infrastructure, potential traffic disruption during construction, current and future environmental impacts to trees, air and water courses as well as business disruption to the Redwoods golf course.

The drainage divide for stream tributaries to East Munday Cr. follows a line approximately southwest to northeast across the height of land at 217 St and 88 Ave., thence running northwards across the Redwoods golf course. A decision to route the TMP expansion to the west of that drainage divide would be placing a very significant number of TOL homeowners, as well as two schools, Topham elementary and Ecole des Voyageurs elementary at great risk in the event of an oil spill from the pipeline. This is an unacceptable risk the TOL should not be prepared to take. Notwithstanding the environmental damage that would occur as a result of a oil spill, the resulting socio-economic toll to the Redwoods neighbourhood would be incalculable.

I respectfully request the TOL to conduct further follow-up regarding the potential deleterious impacts of a west side Redwoods golf course routing of the TMP and to bring these concerns to the NEB hearings in due course.

Thank you,

David Jordan
s. 22(1)
Langley, BC s. 22(1)

David A. Jordan
Assistant Professor
Geography and Environmental Studies
Trinity Western University
Langley, BC
V2Y 1Y1

[redacted]

Roeland Zwaag

From: Lionel Pandolfo s. 22(1)
Sent: Thursday, May 08, 2014 11:04 PM
To: publicinput
Subject: Public input regarding the proposed Trans Mountain Pipeline Expansion Project
Attachments: ComKMpipeToL.docx

To whom it may concern,

Attached to this e-mail message, please find a file containing my comments concerning the proposed Kinder Morgan Trans Mountain Pipeline Expansion Project through northwest Langley. I focus on the area of northwest Langley because this is where I own property and where my family lives.

Thank you for considering my comments.

Sincerely yours,

Lionel Pandolfo

s. 22(1)
Langley, BCs. 22(1)
s. 22(1)

I am writing to provide comments on the proposed Trans Mountain Pipeline Expansion Project through the Langley Township. This is following a request by the Township of Langley to seek public input on the matter. Input is requested on three specific issues:

1. The potential environmental and socio-economic effects of the proposed project;
2. The suitability of the design and location of the proposed project;
3. Potential impacts of the project on landowners and land use.

My family lives at s. 22(1) in the area of Walnut Grove within Langley. This is the area that I consider in my comments.

I understand that the initial pipeline routing of 1953 cuts through Walnut Grove. Because Walnut Grove has seen extensive residential construction within the last sixty years, I suspect that the company Kinder Morgan wants to avoid making its Trans Mountain Pipeline Expansion go through the heart of Walnut Grove altogether. Hence, Kinder Morgan proposed that the pipeline expansion follow the existing Trans Mountain pipeline until close to Walnut Grove. Then, the pipeline expansion would bifurcate and traverse the Salmon River floodplains between Fort Langley and Walnut Grove to reach 96th Ave. This was Kinder Morgan original corridor for the northwest corner of Langley Township. Following negative feedback on this routing, Kinder Morgan is proposing a different corridor between the existing Trans Mountain pipeline and 96th Ave. The new north-south corridor is situated to the west of the Redwoods golf course and to the east of the residential area of 216th Street. As intervener to the National Energy Board (NEB), I urge the Township of Langley to convince the NEB that this new corridor should not be considered by Kinder Morgan for its pipeline expansion project. A few reasons should make clear why this is so.

Concerning point 1 above: The area east of 216 St, between 88th Ave and 96th Ave is a dense residential area now. Many families with young children live there. The potential environmental and socio-economic effects could be huge. First, during the construction phase of the pipeline expansion, potential disturbance from seismic activity (either testing load bearing of ground or via compaction of substrate), noise, dust and, possibly, chemical pollution will impact human and wild life of the area. Second, because of the topography of the area, if an oil spill ever occurs all the bitumen will roll over the properties along 216 Street. This would be a catastrophic disaster for all the residents of this area. Not only would their health be affected, but they would also be hit financially as their properties would lose value and the residents would lose earning from their jobs. The Township revenue will also be affected because of the loss of taxable assets. For all these reasons, the original corridor through the Salmon River floodplains should be preferred to the corridor to the west of the golf course.

Concerning point 2 above: As described in the foregoing paragraph, the location of the new corridor for pipeline expansion is not suitable because of its close proximity to the residential area of 216th Street between 88th Ave and 96th Ave. The Salmon River floodplains are not a residential area and, in the unfortunate case of a spill, the oil will remain in that area.

Concerning point 3 above: During the construction phase of the pipeline expansion, home owners along the east side of 216th Street will not be able to enjoy the use of their land. If a spill occurs, one can forget about land use for a long time.

For all the above reasons, it is important that the Township of Langley convince the NEB to force Kinder Morgan to build its expansion pipeline somewhere else than the area to the west of the Redwoods golf course.

Thank you for considering my comments.

Lionel Pandolfo
s. 22(1)