Trans Mountain Pipeline ULC (Trans Mountain)
Trans Mountain Expansion Project
Certificate of Public Convenience and Necessity OC-065
Application pursuant to section 211 of the Canadian Energy Regulator Act
Segment 5.3 (Pípsell area)
File OF-Fac-Oil-T260-2013-03 61

Information Request to Trans Mountain from Stk'emlúpsemc te Secwépemc Nation

Due Date: September 11, 2023

1.1 National Park Standards

Reference: C26029-2 – Reply Evidence of Trans Mountain ("**Reply**") at para 6

Preamble: In the Reference, Trans Mountain states that it "has proposed an extensive suite of mitigation measures for the proposed deviation…including reclaiming the disturbed land to National Park standards."

Request: What is the National Park standard? Please provide a copy of this standard

Trans Mountain Response:

Please refer to Trans Mountain's response to CER 1.1 (including attachment) [Filing ID C25972-2 and C25972-4], which outlines reclamation measures to be implemented for construction in the deviation area to meet the National Park Standard.

As noted in the IR response, the National Park Standard refers to the commitment by Trans Mountain to implement the same standards for execution and monitoring of work as those adhered to for TMEP construction activities within Jasper National Park (i.e., the National Park Standard). Using the Management Objectives and Desired End Results (MO/DERs) set by Parks Canada as a framework, Trans Mountain will re-establish the natural ecosystems to a state where they are compositionally and functionally similar to the early seral species of the native plant community that occurred pre-disturbance, which is compatible with surrounding vegetation and land uses. Trans Mountain will continue to use MO/DERs as a framework during the post construction environmental monitoring program. This program will examine the effectiveness of the reclamation measures implemented for the Project and will require additional measures should the goals and targets not be met. Trans Mountain will meet the MO/DERs during the execution phase through a combination of mitigation measures designed to minimize disturbance (e.g., minimize ground disturbance and utilize matting as an avoidance measure for disturbance where possible), restore site drainage and contours, restore wildlife habitat, protect site specific features, prevent the development of new access, and revegetate the area with appropriate species.

1.2 Typical Installation Cost for Micro-Tunneling

Reference: C26029-2 – Reply at para 10

Preamble: In the Reference, Trans Mountain states that "[t]he evidence in this proceeding is that Trans Mountain's determination, that micro-tunneling is "economically infeasible", is based on the fact that the conditions being encountered in the subject micro-tunneling segment are such that continuing to implement the micro-tunneling for this discrete segment would require Trans Mountain to incur costs that are unreasonably in excess of the construction costs normally associated with trenchless construction."

Request: Please also provide answers to the following questions:
What was the original budgeted cost of micro-tunnelling for the subject micro-tunnelling segment at the time micro-tunnelling was agreed to by Stk'emlúpsemc te Secwépemc Nation ("**SSN**")?

What was the budgeted cost of micro-tunnelling for the subject micro- tunnelling segment at the time of the Deviation Application (i.e., the current cost)?

Please provide documentation in support of the answers to the above questions.

Trans Mountain Response

The forecasted budget to complete Tunnel Drive #2, prior to start of tunnelling, was $24,700,000, not including the construction of Shaft-1 or Shaft-2. The current Forecast at Completion (FAC) for Tunnel Drive #2, including the mitigation measures, is $58,900,000.

Trans Mountain has identified the cost to complete for best and worst case scenarios in its response to CER 2.3.

1.3 Technical Feasibility

Reference: C26029-2 – Reply at para 11

Preamble: In the Reference, Trans Mountain states that its "determination that micro-tunneling is not "technically feasible" is based on significant physical, geological and financial impediments to utilizing the currently contemplated micro-tunneling methodology, materials, technologies, equipment and practices."

Request: Please list and describe all "significant physical", "geological", "materials", "technologies", "equipment", and "practices" that have resulted in Trans Mountain's determination that micro-tunneling is not "technically feasible".

Please provide information regarding Trans Mountain's technical team who advised that micro-tunnelling is not "technically feasible", including names, credentials, and experience.

Trans Mountain Response

Trans Mountain has previously identified in the Deviation Application, its response to CER 1, and Reply Evidence the physical impediments, financial impediments, technical challenges, and critical risks that may occur during the completion of the shaft, restart of the tunnel, and remaining risks present for the crossing. A risk assessment for Tunnel Drive #2 has been completed. In addition, a 'cost to complete' analysis has been prepared identifying the costs incurred to date and the costs associated with identified risks (see Trans Mountain's response to CER 2.3). The combination of all of these factors and information was considered in Trans Mountain's determination regarding the technical and economic feasibility of the crossing.

Mr. Corey Goulet, P. Eng., Chief Project Execution Officer, directs all teams involved in the construction execution of the Project. Mr. Sam Wilson, P. Eng., Director Trenchless Crossings, leads the team responsible for the execution of the Jacko Lake micro-tunnels. Curricula vitae for Mr. Goulet and Mr. Wilson were filed with the Commission in support of their roles as witnesses for Trans Mountain in this proceeding.

Dr. Erez Allouche, PhD., P. Eng. is Trans Mountain's subject matter expert (SME) in HDDs. Dr. Allouche specializes in the design of complex HDD crossings. His design experience also includes crossings utilizing other trenchless methods such as Micro-tunneling, Direct Pipe, Pipe Jacking, Auger Boring, Pipe Ramming, Down the Hole Hammer and Horizontal Direct Bores. Dr. Allouche is responsible for construction oversight of 73 major crossings (HDD, DP, MTBM) associated with the 980 km long, 36"/42" diameter TMEP. Crossings are approximately 400 m – 2,300 m in length. Responsibilities include review of designs and contractors' submissions, SME for the Project, overseeing revised and new trenchless designs, including the installation of fiber optic-based leak detection and communication cables.

Reference: C26029-2 – Reply at para 20

Preamble: In the Reference, Trans Mountain states that it has "provided extensive details about why continuing with micro-tunneling for tunnel drive #2 is not technically feasible in the Application and its response to CER IR No. 1.2."

Request: Please provide all relevant inspection records, including records on cutterhead disc replacements due to hard rock.

Trans Mountain Response

For the following reasons, Trans Mountain declines to provide "all relevant inspection records".

As described in the Deviation Application, Trans Mountain undertook significant efforts to engage with SSN Joint Council and its technical advisors commencing in May 2023. As part of those engagement efforts, and as described in the Deviation Application at paragraph 42, Trans Mountain provided to SSN extensive information respecting the proposed deviation. The information that Trans Mountain provided included all daily inspection reports for Tunnel Drive #2. Because those records are in the possession of SSN, Trans Mountain submits that SSN has sufficient information in its possession on this matter.

Further, the information that SSN is requesting in the question is voluminous, consisting of thousands of pages of records. The filing of the requested information on the record of this proceeding is not warranted by any relevance that those records may have, or their limited potential significance in the context of this proceeding.

1.4 Challenges Between Pads 1 and 2

Reference: C26029-2 – Reply at para 12

Preamble: In the Reference, Trans Mountain speaks of "significant technical challenges being encountered on the micro-tunnel drive between pads 1 and 2 and the associated risks to completing construction in that regard."

Request: Please provide all relevant information regarding the "significant technical challenges being encountered on the micro-tunnel drive between pads 1 and 2."

To SSN's knowledge, Tunnel Drive #2 (between Pad 1 to 2) tunneling progress has been inactive approximately 42% of time prior to Shaft-6 construction mainly due to equipment failures. Please provide all relevant information regarding the reason for the lengthy delays on Tunnel Drive #2.

Accordingly, please also provide answers to the following question: Are all other tunnel drives on schedule?

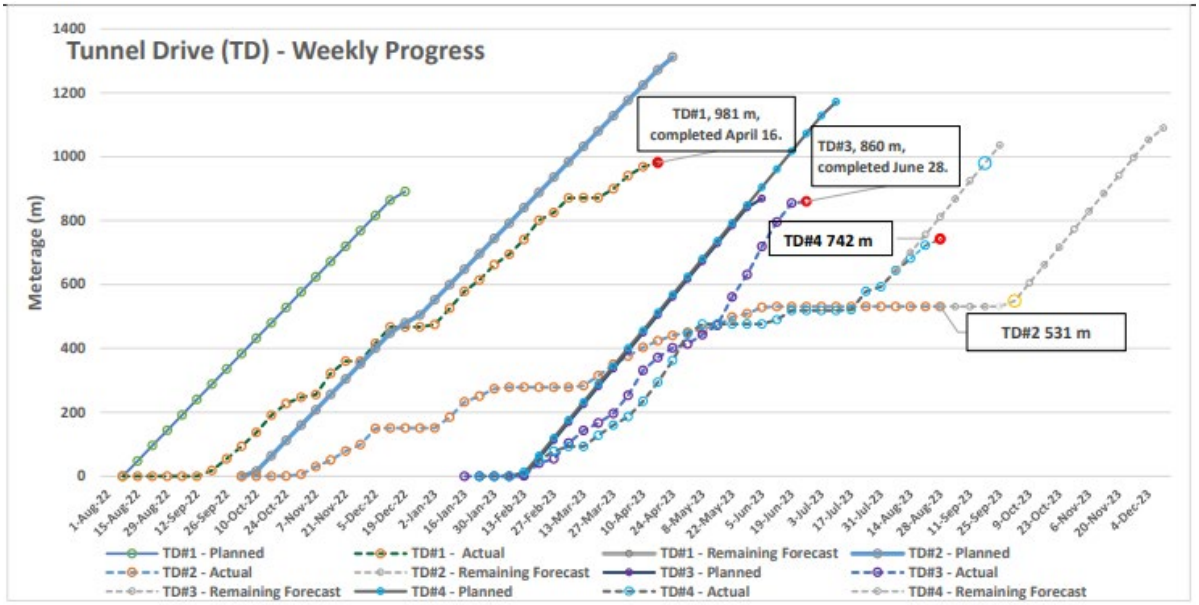
Trans Mountain Response

Trans Mountain has previously provided a detailed description of the technical challenges encountered on Tunnel Drive #2 in the Deviation Application at paragraphs 19-23, in Trans Mountain's response to CER 1.2, and in Trans Mountain's Reply Evidence at paragraphs 23-25.

Tunnel Drive #2 commenced on October 27, 2022 and was stopped on June 15, 2023 for the construction of Shaft-6. A total of 232 days elapsed between start and stoppage. A summary of productive time is identified in the table below. The time associated with equipment troubleshooting accounted for approximately 12.5% of the total days.

Description	Days
Active Tunnelling Days	120
Christmas Break, incl ramp down and ramp up	26
Cutterhead Interventions	7
Control Surveys	3
Equipment Trouble shooting	29
Identification of vertical deviation and mitigation steps 1 and 2	47

The image below identifies the planned schedules for all of the tunnel drives with respect to actual progress. All of the tunnel drives experienced a slight delay at the beginning of their respective drives which can be described as commissioning and startup of the MTBMs. The delay of Tunnel Drive #4 is attributed to the switch over of contractors (approximately 1 month) and the suspension of Tunnel Drive #4 while Tunnel Drive #3 exits into the shared Launch / Reception shaft (approximately 1 month).


Tunnel Drive (TD) - Weekly Progress
Meterage (m)
1400
1200
1000
800
600
400
200
0
TD#1, 981 m, completed April 16.
TD#3, 860 m, completed June 28.
TD#4 742 m
TD#2 531 m
1-Aug-22
15-Aug-22
29-Aug-22
12-Sep-22
26-Sep-22
10-Oct-22
24-Oct-22
7-Nov-22
21-Nov-22
5-Dec-22
19-Dec-22
2-Jan-23
16-Jan-23
30-Jan-23
13-Feb-23
27-Feb-23
13-Mar-23
27-Mar-23
10-Apr-23
24-Apr-23
8-May-23
22-May-23
5-Jun-23
19-Jun-23
3-Jul-23
17-Jul-23
31-Jul-23
14-Aug-23
28-Aug-23
11-Sep-23
25-Sep-23
9-Oct-23
23-Oct-23
6-Nov-23
20-Nov-23
4-Dec-23
TD#1 - Planned
TD#1 - Actual
TD#1 - Remaining Forecast
TD#2 - Planned
TD#2 - Actual
TD#2 - Remaining Forecast
TD#3 - Planned
TD#3 - Actual
TD#3 - Remaining Forecast
TD#4 - Planned
TD#4 - Actual
TD#4 - Remaining Forecast

1.5 Breakdown of Costs in Table 1

Reference: C26029-2 – Reply at para 13

Preamble: In the Reference, Trans Mountain provides a table titled, "Table 1 – Costs to Address Upward [Reinforced Concrete Jacking Pipe ("**RCJP**")] Migration".

Request: Please provide a detailed breakdown of all costs in Table 1, including and specifically Stage 2 & Stage 3 costs.

Trans Mountain Response

A breakdown of costs for the Mitigation steps is provided in Table 1.5-1 below.

Table 1.5-1: Breakdown of Costs for Mitigation Stages 1-3

Mitigation	Description	Estimated Cost Impact	Total
Stage 1 - Invert flushing			$0.75 M
Stage 2 - Apply ballast weight at the inverts of pipes			$9.12 M
2.1	March to May - Additional labour and Equipment cost spent installing mitigations, reduced ROP	$4,600,000	
2.2	May to June - Additional labour and Equipment cost spent installing mitigations, reduced ROP	$4,200,000	
2.3	Ballast Materials	$320,000	
Stage 3 - Shaft construction (Shaft #6) and abandonment of impacted tunnel drive segment			$22.17 M
3.1	Bothar Labour + Materials (June 14 - Aug 26 (74 days)	$8,330,000	
3.2	Labour + Equipment (Aug 26-Oct 9) (44 Days)	$4,940,000	
3.3	FES Shaft 6 Construction	$7,100,000	
3.4	Safety Boss	$600,000	
3.5	TVC Site Support	$1,200,000	

1.6 Breakdown of Costs for Tunnel Drive #2 and Comparative Costs

Reference: C26029-2 – Reply at para 14

Preamble: In the Reference, Trans Mountain states that, "prior to starting micro-tunneling, Trans Mountain expected the total construction costs for tunnel drive #2 to be approximately $23 million."

Request: Given that Tunnel Drive #2 is about 1/3 complete, please provide a detailed breakdown and receipts of costs for the expected Tunnel Drive #2 total of approximately $23 million.

Please also provide an answer to the following question:
What is the projected cost for Trans Mountain's proposed horizontal directional drilling ("**HDD**")/conventional open trench ("**COT**") in the same 1.3km?

Please provide detailed costs and schedule for HDD/COT (including potential cost/schedule impact of re-drilling due to initial failure (i.e., best and worst- case scenario).

Trans Mountain Response

Trans Mountain has provided a detailed table identifying the best- and worst-case cost estimates for micro-tunneling and COT / HDD, and associated assumptions in the estimates, in response to CER 2.3.

For the following reasons, and as contemplated by Rule 34(2)(b) of the *National Energy Board Rules of Practice and Procedure, 1995*, Trans Mountain is not able to provide "receipts of costs for the expected Tunnel Drive #2 total of approximately $23 million" because the requested information is not available.

At paragraph 14 of its Reply Evidence, Trans Mountain clearly stated that the $23 million referenced in the question was the total construction costs for Tunnel Drive #2 that Trans Mountain *expected* it would cost to complete Tunnel Drive #2. That estimate was made prior to Trans Mountain commencing the micro-tunneling, and prior to any of those costs being incurred. For that reason, Trans Mountain does not have invoices that relate to costs that it *expected* to incur.

Trans Mountain has provided on the record of this proceeding a significant amount of information related to the costs that it has incurred for micro-tunneling at Tunnel Drive #2, and submits that with that information, SSN is in possession of sufficient information related to the costs of micro-tunneling at Tunnel Drive #2, in accordance with Rule 34(2).

Further, invoices related to the costs incurred for the micro-tunneling would be voluminous, and producing those invoices on the record of this proceeding would not only place an undue burden on Trans Mountain but would not be warranted by any relevance that those records may have, or the limited potential significance of those invoices in the context of this proceeding.

Many of the invoices that relate to the micro-tunneling work would also contain commercially sensitive information, including but not limited to financial and commercial information that Trans Mountain consistently treats on a confidential basis. Any public interest that would be served by disclosure of such information would be outweighed by Trans Mountain's (and the contractor's) interest in maintaining confidentiality over those documents.

1.7 Impact on In-Service Date

Reference: C26029-2 – Reply at para 15

Preamble: In the Reference, Trans Mountain states that "continuing with micro-tunneling would likely delay the in-service date for the [Project]".

Request: Please provide the latest Project construction schedule. The current latest schedule provided to SSN is from July 13, 2023

Please provide answers to the following questions:
When did Trans Mountain realize that the schedule would not be met?

Did Trans Mountain know the schedule would not be met prior to May 2023?

To SSN's knowledge, Bothar (tunnelling contractor) was removed from Pad 3 tunneling project (i.e., Trans Mountain changed contractors). What effect did the removal of Bothar from Pad 3 tunnelling project have on the In-Service Date?

Trans Mountain Response

Trans Mountain has provided information on Project schedule in the response to CER 2.3.

Trans Mountain, through an iterative process identified the potential for schedule impact due to the vertical deviation at the time of the mitigation measures 1 and 2 not being successful. As the plans for Shaft-6 were developed and refined (May 2023), technical and schedule risks became apparent. Trans Mountain determined that it was no longer technically or economically feasible to continue, as it identified in its response to CER 1.

The replacement of Bothar with The Tunnelling Company as Contractor did not have an effect to the overall schedule and does not impact the technical or economic assessment of Tunnel Drive #2.

1.8 Previously Disturbed Lands

Reference: C26029-2 – Reply at para 19

Preamble: In the Reference, Trans Mountain states that, "The pads and roads listed above associated with the micro-tunneling comprise roughly 5.18 hectares of disturbance … In contrast, the proposed deviation will consist of roughly 4.83 hectares of new disturbance. All of this new disturbance will occur on privately held, previously disturbed lands"

Request: As the area to be disturbed by the HDD pads and COT does not appear to be disturbed, please provide evidence of disturbance as per the following quote: *"the proposed deviation will consist of roughly 4.83 hectares of new disturbance. All of this new disturbance will occur on privately held, previously disturbed lands.*"

Trans Mountain Response

Trans Mountain's reference to previously disturbed lands reflects the general levels of disturbance that exist throughout the overall Pipsell area. Disturbance in the Pipsell area includes mining activities, access road development, ongoing cattle grazing / ranching and historical pasture improvement activities (including fencing), as well as Trans Mountain Line 1 and current Trans Mountain construction work on TMEP agreed to by SSN. If the deviation is approved by the Commission, planned Project construction in the deviation area will create an area of additional ground disturbance within the construction footprint as Trans Mountain describes in response to CER 2.3, which will be restored through Trans Mountain's reclamation practices to equivalent capability allowing all ongoing land uses to continue.

1.9 Ground Conditions for Tunnel Drive #2

Reference: C26029-2 – Reply at para 24

Preamble: In the Reference, Trans Mountain states that "the ground conditions being experienced in tunnel drive #2 are different, and more challenging, than the conditions experienced on tunnel drives #1 and #3. The technical challenges experienced to date on tunnel drive #2 (as described in the Application and Trans Mountain's response to CER IR No. 1.2c))17 were not reasonably foreseeable at the time Trans Mountain agreed to pursue micro-tunneling for this segment of the [Project]."

Request: Please provide any communication between Trans Mountain and Bothar (tunnelling contractor) and Herrenknecht (micro-tunnelling boring machine ("**MTBM**") manufacturer) regarding the issues, mitigation and go-forward strategies for Tunnel Drive #2.

Please also provide answers to the following questions:

How are the ground conditions different and more challenging (excluding the upward migration, which would be addressed by implementing Phase 3A mitigation)?

If the ground conditions are different and more challenging, will this make the HDD more challenging as well?

How have the conditions been seen to be different than the bore hole data predicted?

Was the tunnel boring manufacturer consulted regarding the "Humping" issue?

Trans Mountain Response

Trans Mountain declines to provide "any communication" between Trans Mountain and Bothar or Herrenknecht on the basis that this requested information is voluminous, consisting of hundreds to thousands of pages of records. Producing these communications on the record of this proceeding would not only place an undue burden on Trans Mountain but would not be warranted by any relevance that those communications may have, or the limited potential significance of those communications in the context of this proceeding.

Trans Mountain was in constant communication with Bothar and relevant consultants. When the vertical deviation was initially flagged by the tunneling contractor on January 25, 2023, the MTBM was situated 250 m away from Shaft-1. The deviation of the tunnel alignment is a result of operational and geotechnical challenges, not because of issues with the MTBM, therefore, Herrenknecht was not directly consulted to correct the deviations. The vertical alignment correction mitigation measures executed to date were proposed by the tunneling contractor with vast tunneling experience from international projects. As the identification and preparation of mitigation measures was an iterative process, summary presentations were completed and circulated. A presentation on May 25th (dated May 15, 2023) summarizes the work completed on the planning by all parties (See Attachment 1.9).

The ground conditions on Tunnel Drive #2 are more challenging than those on Tunnel Drive #1 and Tunnel Drive #3 due to the greater length through harder rock formations.

The depth of the HDD profile is within +/- 5 m of the micro-tunnel alignment, thus, the assessment made to date regarding the Rock Quality Designation (RQD) of the remaining length of the tunnel drive applies to the HDD operation as well. The key factor worth noting is

that the micro-tunnel excavates a 2.571 m diameter hole whereas the HDD will ream out to final diameter of 48” (1.22 m) in multiple ream passes. The reduction in the volume of bedrock that requires removal will greatly reduce the time spent downhole. The cuttings from the tunneling operation have been within the geotechnical consultant’s assessment made to date.

1.10 Machinery and Technical Details

Reference: N/A

Preamble: Intermediate Jacking Stations ("**IJS**") are a useful tool to increase the drill head pressure without causing an over pressure elsewhere in the pipe and will help get the drill moving again after the long period of being idle.

Request: Please provide details on the IJS that were used in Tunnel Drive #2. Were all IJS used in all tunnels at Pípsell/Jacko Lake the same manufacturer, model, specification, etc.?

Please provide the RCJP (i.e., tunnel pipe) installation tallies for all tunnels. If the tallies do not show where and how many IJS were installed, please also include that information for all tunnels.

Trans Mountain Response

Trans Mountain disagrees with the description of IJS in the preamble. The primary objective of the intermediate jacking station (IJS) is to provide additional jacking force to the MTBM during tunneling via hydraulic cylinders installed at predefined intervals to overcome resistance and assist in maintaining alignment by providing necessary thrust to steer the MTBM.

Detail schematics of each tunnel drive's pipe plan are shown in Attachment 1.10 and listed below. In addition, the engineering drawings for the IJS pipes are included. All IJS utilized were the same manufacturer, model, and specifications.

Supporting Documents:

- Jacko Lake Drive 1 Pipe Plan 20230403
- Jacko Lake Drive 2 Pipe Plan 20230623
- Jacko Lake Drive 3 Pipe Plan 20230623
- Jacko Lake Drive 4 Pipe Plan 20230418
- 01-13283-M002-XM0513201_0_IFC – Jacko Lake - IJS Leading Pipe Details
- 01-13283-M002-XM0513202_0_IFC - Jacko Lake - IJS Leading Pipe Reinforcements
- 01-13283-M002-XM0513301_0_IFC – Jacko Lake - IJS Trailing Pipe Details
- 01-13283-M002-XM0513302_0_IFC - Jacko Lake - IJS Trailing Pipe Reinforcements
- IJS spacer and cylinder

1.11 Time and Risk to Complete Tunnel

Reference: C26029-2 – Reply at para 25

Preamble: In the Reference, Trans Mountain states that "Given the length of tunnel remaining to be completed and the formations expected to be encountered, Trans Mountain maintains that proceeding with tunnel drive #2 is highly risky. If the risks identified in Trans Mountain's response to CER IR No. 1.2c) materialize, they have the potential to delay tunnel completion by months or jeopardize Trans Mountain's ability to complete the tunnel at all."

Request: Please provide answers to the following questions:

Why weren't these formations "expected" previously?

Do these expected formations pose a lesser risk in HDD?

If the risks identified do not materialize, how long will it take to complete the tunnel?

What are the Trans Mountain's experts' odds on the ability to complete this segment with micro-tunnelling?

Trans Mountain Response

The interpreted geotechnical data of Tunnel Drive #2 was available after Thurber's geotechnical investigations, prior to start of tunnelling. Trans Mountain did not expect the looser overburden above bedrock near launch to impact the tunnel vertical alignment significantly. The culmination of the inherent risks of the drive and the impact of the issues experienced, increases the risk level of the crossing remaining to be completed.

The formations do not pose a significant risk for the planned Horizontal Directional Drill (HDD). The HDD methodology allows for temporary surface casing to mitigate any unfavourable surficial materials and the ability to remove tooling entirely out of the hole at regular intervals to check on tooling wear and replace as required. Over the past two years, Trans Mountain has undertaken a number of complex HDD crossings in hard rock formation throughout Spreads 5A and 5B. The significant experience gained and the successful completion of crossings of similar lengths in hard rock formations form the basis for Trans Mountain's high degree of confidence that the proposed HDD will be successful.

If none of the risks identified previously for the micro-tunnel drive materialize, the planned end of tunneling operations would be expected to be January 2024. See Trans Mountain's response to CER 2.3. Grouting and demobilization follow the completion of tunnelling, with pipe insertion, tie-in, and hydrotest to follow. The identified additional pieces of work, post tunnel completion, extend mechanical completion to April 2024. However, the schedule could extend by months or, in worst case, the MTBM could become immovable. In this scenario, a new disturbance and rescue shaft could be required to rescue the machine, or abandonment may be required if inaccessible. Please refer to CER 2.1 d) for further information regarding the feasibility of the rescue shaft.

Trans Mountain has identified the continuation of the micro-tunnel as a high risk due to the period of no movement and the compounding risks identified in Trans Mountain's response to CER 1.2 c) [C25972].

1.12 Site-Specific Geotechnical Investigations

Reference: C26029-2 – Reply at para 27

Preamble: In the Reference, Trans Mountain states that "Since the time of the 2021 presentation, Trans Mountain has completed further design iterations and investigative reviews of the HDD for the proposed deviation, which would be approximately 450 metres long. Trans Mountain has also completed site- specific geotechnical investigations."

Request: Please provide answers to the following questions:
What "site-specific geotechnical investigations" has Trans Mountain completed to support HDD and COT design and construction?

Have more bore holes been drilled?

How do these investigations provide Trans Mountain the assurance that HDD will be successful?

Trans Mountain Response

Two geotechnical boreholes (TEL-JL-BH2 and TEL-JL-BH14), seismic refraction, and electrical resistivity tomography completed for the micro-tunnel alignment have been utilized to assess the Horizontal Directional Drill (HDD) feasibility. The existing boreholes were completed at both the entry and exit points of the planned HDD. Additionally, formations have been inferred based on the cuttings and materials that the micro-tunnel has progressed through to date. No additional boreholes are required to confirm feasibility of the HDD. The information garnered identified the following strata for the HDD to progress through:

- Entry: Intersecting shallow unconsolidated coarse-grained soil such as fill, clay, till, for the initial 60 m which will be cased down into the diorite bedrock.
- Drill Alignment: Majority of the profile is anticipated to be in diorite bedrock based on the geotechnical information and cuttings from the micro-tunnel operation.
- Exit: Based on the adjacent borehole, the last 50 m of the crossing is anticipated to be in stiff clay. Based on the information collected to date, no additional geotechnical investigation is required.

The formations identified in the existing geotechnical investigations provide high confidence to Trans Mountain, Trans Mountain's HDD Contractor, and Trans Mountain's engineering consultants that an HDD, as engineered, is feasible. Please also refer response to SSN 1.11.

1.13 Evidence of Similar Rock Conditions

Reference: C26029-2 – Reply at para 28

Preamble: In the Reference, Trans Mountain states that "[t]he HDD is expected to be successfully installed in this formation, similar to other HDDs completed in similar rock conditions on the Project."

Request: Please provide evidence that Trans Mountain has crossed "similar" rock conditions.

Trans Mountain Response

Please refer to Trans Mountain's response to CER 2.2 a).

1.14 Experience Completing HDD Crossings in Similar Formations

Reference: C26029-2 – Reply at para 30

Preamble: In the Reference, Trans Mountain states that "Trans Mountain is currently successfully executing several hard rock crossings with similar rock quality designations over lengths that are much greater than the 450 metres for the HDD that is part of the proposed deviation. Based on Trans Mountain's experience completing HDD crossings within bedrock over greater lengths elsewhere along the route of the Project, Trans Mountain expects the proposed HDD crossing of the Jacko Lake Hill will be successful."

Request: Please provide detailed examples of Trans Mountain's experience completing HDD crossings in similar formations (not only "bedrock" as stated in the Reference). In doing so, please include the following information: ground conditions, HDD diameter, length, depth below grade, and contractor utilized for the respective project.

Trans Mountain Response

A list of completed and in progress HDD crossings between Spreads 2 and 7B as part of the Trans Mountain Expansion Project is provided in Table 1.14-1 below.

Table 1.14-1: HDD Crossings completed/in progress on the Trans Mountain Expansion Project

Spread	Crossing Name	Length (m)	Status	Contractor	Borehole Size	Ground Conditions	Depth (m) beneath a River or Road
2	Range Road 95	535	Complete	DHD	48"	Sandstone, Mudstone, Siltstone	28.7
2	Pond Crossing	1372	Complete	DHD	48"	Siltstone, Sandstone, Clay Shale/Till	31.6
2	Lobstick River	558	Complete	Crossing Company	48"	Clay, Sandstone, Siltstone, Mudstone	26.8
2	Bench Creek	479	Complete	DHD	48"	Sand, Clay, Sand	21.2
2	Saskatchewan Avenue	807	Complete	DHD	48"	Clay, Siltstone, Sandstone	15.9
2	Range Road 40 & HWY 16	496	Complete	Crossing Company	48"	Clay, Sand, Gravel, Siltstone, Mudstone, Sandstone	21.1
2	Pembina River	1220	Complete	DHD	48"	Clay, Siltstone, Sandstone	50.1
2	Wolf Creek #3	1361	Complete	DHD	48"	Clay, Sand, Sandstone, Mudstone	42.5

2	McLeod River	1079	Complete	DHD	48"	Clay, Sandstone, Mudstone	48
2	Sundance Creek	493	Complete	Valard Constructio n	48"	Siltstone, Sandstone, Clay Shale/Till	18.2
2	Hardisty Creek	1007	Complete	DHD	48"	Interbedded siltstone/sandst one/mudstone, Clay, Coal	56.1
2	Industrial Area	1310	Complete	DHD	48"	Clay, Sand, Clay Till	22.8
2	Ponoka Creek	710	Complete	Crossing Company	48"	Clay shale, Siltstone, Sandstone	26.5
2	Hunt Creek	609	Complete	DHD	48"	Clay shale, Sandstone	33
2	Amazon Warehouse	1149	Complete	Crossing Company	48"	Clay, Sand	45.2
3/4A	Blue River	816	Complete	Michels	48"	Silt, Sand	28.2
3/4A	North Thompson River #5	737	Complete	Michels	48"	Sand, Silt, Gravel	32.6
3/4A	North Thompson River #6	525	Complete	Michels	48"	Sand, silt, clay	22.2
3/4A	North Thompson River #7	565	Complete	Michels	48"	Sand	29
4B	Raft River	988	Complete	DHD	48"	Gravel, Sand	33.3
4B	Mann Creek	686	Complete	DHD	48"	Gravel, Silt, Sand	32
4B	Town of Clearwater	1262	Complete	DHD	48"	Sand, Gravel, Silt	46.7
5A	Nicola River	684	Complete	DHD	48"	Sand, Silt	31.4
5A	Thompson River	1308	Complete	Michels	48"	Sand, Silt	52.9
5A	Coldwater Creek #2	811	Complete	DHD	48"	Gravel, Sand, Bedrock	31
5A	Coldwater Creek #4	839	Complete	DHD	54"	Sand, Gravel, Bedrock	57.6
5B	Boulder Field	965	Complete	DHD	48"	Bedrock	84.2
5B	Dry Gulch	1820	In progress	DHD	48"	Sand, Gravel, Bedrock	74.2
5B	Mountain 3	2295	In progress	DHD	48"	Sand, Gravel, Boulder, Bedrock	77.1
6	Owl Sanctuary	1100	Complete	Crossing Company	48"	Clay, Sand	50.8
7A	217a Street	450	Complete	Michels	48"	Clay, Sand, Silt	27
7A	East Munday Creek	913	Complete	Crossing Company	48"	Clay, Sand	49.3

7A	West Munday Creek	872	Complete	Crossing Company	48"	Clay, Sand	42.2
7A	Salmon River	750	Complete	Crossing Company	48"	Clay, Sand, Silt	37.9
7A	SFPR Wetland	1443	In progress	Michels	48"	Clay, Sand, Silt, Gravel	29
7B	Fraser River	1,369	Complete	Michels	48"	Sand, Silt, Gravel, Boulder	30

1.15 Cultural Significance of Pípsell Area

Reference: C26029-2 – Reply at para 31

Preamble: In the Reference, Trans Mountain states that "Trans Mountain confirms that all culturally significant features identified by SSN will be avoided and protected during construction of the applied-for deviation. With respect to the directional tree, this feature is located within the HDD section of the proposed deviation and will be avoided by installing the pipeline without surface disturbance in that area."

Request: Please provide an answer to the following question:

What is Trans Mountain's avoidance and protection plan given that the entire Pípsell Area – rather than simply individual features of the Pípsell Area – is, culturally significant and a protected area pursuant to Secwépemc law?

Trans Mountain Response

Trans Mountain appreciates and acknowledges the cultural significance of the Pipsell / Jacko Lake area to SSN. In respect of this importance, Trans Mountain has agreed through the MBA to utilize significant and costly mitigation measures to reduce the overall impact of construction in this culturally significant area. Measures to avoid and protect the area include the efforts Trans Mountain has made to complete trenchless construction through the majority of the Pipsell area. In addition to this, Trans Mountain (with SSN knowledge keepers) has respectfully inventoried site-specific cultural features within the Pipsell area for avoidance, reduced overall disturbance significantly through using reduced grading and low disturbance practices (i.e., matting of access roads and workspaces where feasible), and utilized existing access roads wherever possible. Trans Mountain has and will continue to implement all environmental mitigation measures outlined in the Pipeline EPP.

In addition to the controls and mitigations developed to reduce the overall impact of construction through the Pipsell / Jacko Lake area, Trans Mountain has an established and robust Environmental Compliance Management Plan, Environmental Inspection and Indigenous Monitoring Program to ensure these controls are implemented and effective. Please also see Trans Mountain's response to CER 1.1 and SSN 1.1.

Trans Mountain's personnel have also participated in ceremonies along with SSN spiritual leaders prior to the initiation of certain construction activities as per the guidance of SSN spiritual leaders. Trans Mountain understands that this spiritual practice was a requirement of SSN to facilitate the work and will continue to be fully supported by Trans Mountain as a component of the work to take place along the deviation.

1.16 Expected Duration of Construction Plans in Pípsell Area

Reference: C26029-2 – Reply at para 33

Preamble: In the Reference, Trans Mountain states that "Trans Mountain advanced its construction plans for the Pípsell/Jacko Lake area appropriately, based on the expected duration of that construction work and its sequencing within the overall [Project] execution plan."

Request: Please provide answers to the following questions:

Was the tunneling contractor engaged in Trans Mountain's scheduling estimates for the area?

Was the plan to have four drills run simultaneously from the onset or was that change implemented afterwards?

How did these changes affect the schedule, access to equipment, access to qualified personnel, etc.?

As Trans Mountain states that Tunnel Drive #2 was the longest tunnel at Pípsell/Jacko Lake, why was it not scheduled to begin first?

What was the expected duration of construction plans for the Pípsell/Jacko Lake area and its sequencing within the overall Project execution plan?

Using what methodologies?

Trans Mountain Response

In Section V of its Reply Evidence, Trans Mountain describes in detail the reasons for the timing of commencement of trenchless construction in the Pipsell Area. The quote in the Preamble that Trans Mountain "advanced its construction plans for the Pipsell/Jacko Lake area appropriately" was in response to SSN's assertion that Trans Mountain delayed planning of the trenchless construction by nearly two years. While the quote from Trans Mountain's Reply Evidence was in reference to that asserted two-year delay, and not in specific reference to the execution of Tunnel Drive #2, Trans Mountain provides the following information in response to SSN's questions.

The micro-tunnel contractor was engaged in July 2021 to conduct a trenchless feasibility study of the Jacko Lake alignment.

Trans Mountain's initial strategy was to utilize two AVN2000 machines and complete two tunnel drives per MTBM, however, the strategy was revised upon completion of the second round of geotechnical investigation (completed on March 11, 2022). The supplemental investigation revealed an increase in the unconfined compressive strength (UCS) values of the bedrock sampled especially for Tunnel Drives #2 and #3. Herrenknecht experts were engaged to re-evaluate the equipment selection and recommended the custom 1-ring cutterhead design which was anticipated to increase the tool life by up to 40% in such formation.

Also, two additional AVN2000s were proposed to mitigate a potential scenario where if one of the machines was delayed, it would not hold up the start of a subsequent drive.

Tunnel Drive #1 was launched on September 1, 2022. Tunnel Drive #2 was the second MTBM launched within the Jacko Lake area on October 19, 2022, Tunnel Drive #1 was prioritized because construction of that drive was anticipated to take longer than Tunnel Drive #2.

1.17 Communication of Schedule Concerns

Reference: C26029-2 – Reply at para 36

Preamble: In the Reference, Trans Mountain states that "When [Project] construction started in the Pípsell/Jacko Lake area in Q4 2021, tunnel drive #2 was scheduled to be completed by April 24, 2023. The remainder of the micro- tunneling was to be completed by May 17, 2023, with pipe insertion and final tie-ins to be completed by August 2023 (i.e., approximately 1.5 years after the commencement of construction in the area). This schedule allowed for micro- tunneling to be completed in the Pípsell/Jacko Lake area in alignment with the overall [Project] construction schedule."

Request: Please provide answers to the following questions:

Why was this information not shared with SSN until May 2023?

If the schedule was so far over, why was this not a concern in Q2 2022, Q3, 2022, Q4 2022, or Q1 2023?

Trans Mountain Response

Trans Mountain has maintained continuous engagement with SSN and its consultants on the Project, as evidenced by the extensive Engagement Summary filed as Appendix C to the Application, including with respect to the scheduling of construction in the Pipsell/Jacko Lake area. For example, in May 2022, Trans Mountain provided to SSN a construction schedule that showed Tunnel Drive #2 being complete in April 2023 and the remainder of the micro-tunneling being complete in May 2023. The schedule also showed that construction in this area would be complete by August 2023. Please also see Trans Mountain response to CER 1.2 b).

Commencing in Q1 2023, Trans Mountain progressed through mitigation measures to complete the tunnel drive while maintaining acceptable schedule modifications. When mitigations were not successful, Trans Mountain determined that continuing with micro-tunnelling was not technically or economically feasible.

1.18 Feasibility of Micro-Tunnelling as of July 27, 2023

Reference: C26029-2 – Reply at para 37

Preamble: In the Reference, Trans Mountain states that "Trans Mountain did not use the word "preferred" [on June 14, 2023] because micro-tunneling is still feasible. It is not feasible, for the reasons discussed above."

Request: During the July 27, 2023, site visit, the tunnelling contractor expressed full confidence that micro-tunneling would be ready to commence by the last week of August to the first week of September. Please explain why micro-tunnelling is considered "no longer feasible" since Trans Mountain's submission of the Deviation Application.

Trans Mountain Response

Trans Mountain's Deviation Application stated clearly that micro-tunneling in Tunnel Drive #2 was no longer feasible. Trans Mountain reviewed the input from all of its contractors, consultants, and internal subject matter experts and determined that continuing the tunnel drive was no longer feasible, for the reasons described in the Deviation Application and its evidence in this proceeding.