

**Trans Mountain Pipeline ULC
Trans Mountain Expansion Project
NEB Hearing Order OH-001-2014
Responses to Information Request from
City of Vancouver**

F-IR 2(c).2.2 Geotechnical Investigation

Reference:

- i. DRAFT Preliminary Geotechnical Report on Westridge Marine Terminal Offshore Geotechnical Investigations, Proposed New Westridge Marine Terminal, Trans Mountain Expansion Project, Burnaby, BC, Canada. Golder Associates. February 20, 2015 Section 3.1, Offshore Geotechnical Investigation p.3 (A4I6E9 at PDF p. 6).
- ii. [DRAFT Preliminary Geotechnical Report on Westridge Marine Terminal Offshore Geotechnical Investigations, Proposed New Westridge Marine Terminal, Trans Mountain Expansion Project, Burnaby, BC, Canada. Golder Associates. February 20, 2015 Section 4.0 Subsurface Conditions p.7 (A4I6E9 at PDF p. 9).
- iii. DRAFT Preliminary Geotechnical Report on Westridge Marine Terminal Offshore Geotechnical Investigations, Proposed New Westridge Marine Terminal, Trans Mountain Expansion Project, Burnaby, BC, Canada. Golder Associates. February 20, 2015 Section 4.1.4 Glacial Till/Till-like Deposit (Unit 4) p.11 (A4I6E9 at PDF p. 14).
- iv. DRAFT Preliminary Geotechnical Report on Westridge Marine Terminal Offshore Geotechnical Investigations, Proposed New Westridge Marine Terminal, Trans Mountain Expansion Project, Burnaby, BC, Canada. Golder Associates. February 20, 2015 Section 4.2 Summary p.12 (A4I6E9 at PDF p. 15).
- v. DRAFT Preliminary Geotechnical Report on Westridge Marine Terminal Offshore Geotechnical Investigations, Proposed New Westridge Marine Terminal, Trans Mountain Expansion Project, Burnaby, BC, Canada. Golder Associates. February 20, 2015 Section 5.1 Prominent Site Condition and Key Geotechnical Challenge p.13 (A4I6E9 at PDF p. 16).
- vi. DRAFT Preliminary Geotechnical Report on Westridge Marine Terminal Offshore Geotechnical Investigations, Proposed New Westridge Marine Terminal, Trans Mountain Expansion Project, Burnaby, BC, Canada. Golder Associates. February 20, 2015 Section 5.2.1 Further Field Investigation and Laboratory Testing p.14 (A4I6E9 at PDF p. 17).
- vii. DRAFT Preliminary Geotechnical Report on Westridge Marine Terminal Offshore Geotechnical Investigations, Proposed New Westridge Marine Terminal, Trans Mountain Expansion Project, Burnaby, BC, Canada. Golder Associates. February 20, 2015 Section 5.2.2 Further Geotechnical Engineering Analysis p.14 (A4I6E9 at PDF p. 17).

Preamble:

The report states that the field investigation assessed 10 offshore locations, of which: 2 were assessed with an “unsuitable tool” (dynamic cone penetration testing (“DCPT”)), 1 was completed 180-200m away from proposed new terminal footprint, none encountered bedrock, 7 had refusal in or near till, and only 1 advanced into till.

The report states “the presence of a thick deposit of very weak, fine-grained soils at the project site is considered to be one of the most prominent site condition which has a major impact on almost all key aspects of the geotechnical foundation design”.

The report states “Unit 1 and Unit 4 are inferred to be the predominant soil units underlying the project site”. Only one investigation location borehole was advanced into till.

The report states “The presence of Unit 4 [till] appeared to be also relatively consistent across the site within the test holes that were advanced into it”, though only one test hole (BH14-09) was advanced into the till; “most of the boreholes were terminated above or a short distance into this unit”.

The report states “All additional boreholes should be advanced a sufficient depth into Unit 4, a minimum of 3m to 5m beyond the maximum depth of the design pile tip, depending on the diameter of the foundation pile. Drilling using a suitable Sonic rig is recommended to obtain continuous or nearly continuous soil core samples, especially within Units 3 and 4. The information obtained from the new boreholes, together with the currently available geotechnical information, will be provided as input into the geotechnical foundation design, and more importantly, as input to the assessment on the feasibility of pile installation into the dense/hard soil Units 3 and 4. Special attention should be paid to the presence of large-size boulders, which could potentially affect the constructability of the piled foundation.”

The report states “A combination of the very weak soils and significant water depths in the proposed new berth area further increases the degree of challenges to the marine structural design. The foundation piles will need to be designed taking into consideration the increased effective freestanding length due to the low lateral support the weak soils can offer to the foundation piles. In addition to the challenges associated with the weak soil and deep water, the site of the proposed new terminal is located within a zone of high seismic hazards, and the anticipated high demands from seismic loading needs to be taken into consideration also.”

The report states “In addition to the anticipated low lateral support, the contribution of the weak fine-grained soils to the vertical load-carrying capacities of the foundation piles will be very limited also, and the foundation piles will need to be installed at sufficient depths into the underlying competent soil units, such as the Glacial Till or Till-like deposit.”

The report states “Due to the very weak nature of the soft fine-grained soils present at the project site, the soils will likely undergo large strain and behave in a highly nonlinear manner when subjected to loads applied by the foundation piles or seismic shaking”.

Request:

- n) Provide documentation of the engineering analysis results referenced in section 5.0 of the Golder Associates' report, at page 12.

Response:

- n) The engineering analysis results referenced in section 5.0 of the preliminary geotechnical report are for the purpose of preliminary engineering only.

Intervenor's Explanation for Claiming IR Response to be Inadequate

- n) The response to City of Vancouver IR No. 2(c).2.2n is inadequate. Regardless of whether or not the engineering analysis results referenced in section 5.0 of the preliminary geotechnical report are for the purpose of preliminary engineering only, the request is for the production of those results, not an explanation as to their nature.

Trans Mountain's Response to Motion

- n) In accordance with Board Ruling No. 33 (Filing ID [A63066](#)), Trans Mountain's response provided sufficient information and detail for the Board in its consideration of the application and no further response is required. In addition, Trans Mountain does not believe the provision of preliminary engineering analysis will assist the Board in its review of the Application.

Intervenor's Reply

- n) The response to City of Vancouver IR No. 2(c).2.2n is inadequate.

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

- n) Please refer to City of Vancouver F-IR No. 2(c).2.2n - Attachment 1 and Attachment 2, which is a memo from Moffatt and Nichol to Kinder Morgan Canada Inc. and copies of emails, summarizing the preliminary geotechnical input provided by Golder and Associates Ltd. Please note that the personal contact information of those contributing to the attached memo has been removed to protect the privacy of the authors.