

Monitoring Report: SV-2020-06-10

## Trans Mountain Expansion Project – Westridge Marine Terminal Monitoring

In light of the current COVID-19 pandemic, Fisheries and Oceans Canada (DFO) and Musqueam Indian Band's (Musqueam's) Indigenous Advisory and Monitoring Committee Indigenous Monitor (IAMC IM) are not conducting joint in-person monthly site inspections at the Westridge Marine Terminal (WMT), in Burrard Inlet, BC, in June 2020. Instead, DFO and several representatives from the IAMC (including the Musqueam IAMC IM) are having two conference-call meetings per month with representatives from Trans Mountain Pipeline ULC (Trans Mountain), the Project Indigenous Monitor (Project IM) from Kwikwetlem First Nation (KFN), and Kiewit Ledcor Trans Mountain Partnership (KLTP). This monitoring report provides a summary of the meeting on June 10, 2020. The report includes a description of current in-water and nearshore construction at the WMT, any issues Trans Mountain reported during the meeting regarding measures implemented to avoid or mitigate impacts on fish and fish habitat, and how these issues have been or will be resolved.

<b>Date</b>	June 10, 2020	<b>Time of Call (Start):</b>	1:00 pm	<b>Time of Call End:</b>	2:30 pm
<b>Format</b>	Web-based conference call with Trans Mountain presenting photographs, documents and/or videos relevant to the expansion of the Westridge Marine Terminal.				
<b>DFO participants</b>	DFO - TMX Review and Engagement Team, Fish and Fish Habitat Protection Program: W.B. (A/ Team Lead), K.J. (Biologist), and E.S.(Biologist).				
<b>IAMC participants</b>	Musqueam Indian Band: J.H. (IAMC IM), and R.K. (Environmental Stewardship Technician). IAMC – Monitoring Subcommittee: C.T. (IAMC representative – Burrard Inlet and Lower Fraser River, from Tsleil-Waututh Nation), and R.C. (IAMC representative – Alberta First Nations).				
<b>Other participants</b>	Trans Mountain: K.M. (Regulatory Lead), T.A (Construction Manager), L.B. (Field Regulatory Advisor), S.D. (Lead Environmental Inspector), and B.J. (Chief Environmental Inspector). Kwikwetlem First Nation (KFN): M.J. (Project IM) KLTP: A.A. (Environmental Manager)				
<b>Contractor/equipment on site at the time of the call</b>	<b>Role</b>				
DB Bremerton	Moored to the east of WMT beside junction platforms 1 and 2. Crews are working to set concrete girders into place between the two platforms via crane.				
Nearshore Barge	Moored along the shoreline and working to construct the sheet-pile walls of foreshore cells 1 and 2. Sheet-piles will be driven by a vibratory hammer, and underwater noise levels will be monitored during pile driving.  Water quality monitoring for turbidity was conducted in waters outside of the turbidity curtain and no exceedances of the <i>Canadian Council of Ministers of Environment [CCME] Canadian Water Quality Guidelines for the Protection of Aquatic Life</i> were recorded.				
Offshore barges (e.g., DB General)	Trestle piles for the junction platform and trestle span are being installed via impact pile driving. Both barge-based marine mammal monitoring of the marine mammal exclusion zones and underwater noise monitoring continue to be conducted for offshore impact pile driving.				



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	Access platforms have been constructed on the top of breasting and mooring dolphins, and dolphin jackets are being welded into place.
<b>IAMC Indigenous Monitor/IAMC Observations and Comments</b>	
<p>R.C. (IAMC representative for the Alberta First Nations) requested information on containments in place for the grout pits in the foreshore cells. TM explained that there is no membrane in place, but the sheet-piles themselves act as a barrier to the ocean and there is also a berm in place inside the cells.</p> <p>C.T. (IAMC representative for Burrard Inlet and Lower Fraser River) asked for information on the type of contamination that TM are looking for while they remove obsolete piles from the foreshore, and where the piles are taken for disposal. TM explained that the piles are being monitored for hydrocarbon (oil or fuel) contamination and that the piles are disposed of at an approved site in the lower mainland.</p>	



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Time	Summary of inspection discussions
1:00 – 1:05 pm	<b>Introductions</b>
1:05 – 1:07 pm	<p><b>Review agenda</b></p> <p>K.M. gave an overview of the agenda for the meeting:</p> <ul style="list-style-type: none"> <li>• WMT site overview and status of construction</li> <li>• Update on construction activities and mitigation measures at WMT since the May 27<sup>th</sup> meeting, with photos and video to be provided via the WebEx presentation.</li> <li>• Time for questions.</li> <li>• Discussion of the time the acoustic deterrent is deployed for was added to the agenda at WB's request.</li> </ul>
1:07 – 1:15 pm	Delay due to technical issues.
1:15–1:30 pm	<p><b>Construction Update</b></p> <p>S.D. provided an overview of the site layout at WMT and the works that have occurred since the May 27<sup>th</sup> compliance verification conference call. S.D. scrolled through photographs of construction works and described the mitigation measures.</p> <p><b>Site Overview</b></p> <ul style="list-style-type: none"> <li>• S.D. showed a labelled aerial photo of the WMT construction site, which showed the numbered foreshore cells and arcs. S.D. explained that cells 6-10 have been completed and no works have been carried out on these cells since the previous compliance call.</li> <li>• S.D. stated that all works currently being carried out in the cells are outside of the least risk window (1st March -15th August), and are therefore being completed in the dry, at low tide. The extended LRW is August 16 to March 15.</li> <li>• S.D. explained that sheet-piles are being threaded into a template to construct cell 1. These sheet-piles will then be driven by a vibratory driver and, if needed, by an impact pile driver.</li> <li>• S.D said that ground improvements are being made along the foreshore and that excavation for the derailment wall is also being carried out.</li> <li>• S.D. showed another aerial photo of WMT which was taken more recently, which showed the foreshore cells and arcs. Templates for cells 1 and 2, the completed cells and the new turbidity curtain were visible.</li> <li>• S.D. mentioned that part of cell 2 is submerged at high tide, and that works are only taking place in the dry, at low tide.</li> <li>• T.A. pointed out pits being used to contain grout spoil material in two of the cells.</li> <li>• S.D. showed a schematic overview of the WMT site and a photo showing offshore works. S.D. then gave an overview of the offshore works that have been completed since the last compliance verification call and works that are currently underway: <ul style="list-style-type: none"> <li>○ Prefabricated concrete girders have been installed at the loading platform,</li> </ul> </li> </ul>



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	<ul style="list-style-type: none"> <li>○ Dolphin jackets are being welded onto breasting dolphins and mooring dolphins (mooring dolphins 4 and 6),</li> <li>○ Mooring dolphin 5 is being installed today</li> <li>○ Concrete will be poured onto rebar at trestle span 3 and</li> <li>○ All piles for the junction platform have now been driven and cut.</li> </ul>
<p><b>1:30pm-1:50pm</b></p>	<p><u>Foreshore – sheet-pile cells and arcs</u></p> <ul style="list-style-type: none"> <li>● S.D. showed a photograph of the foreshore sheet-pile cells, with cells 6-10 completed.</li> <li>● Two cells (Arcs 8A and 9A) are currently being used to cure grout spoils, once the grout has cured it is excavated and transported offsite for disposal.</li> </ul> <p>W.B. asked what the white structure to the west of the cells was.</p> <ul style="list-style-type: none"> <li>● S.D. explained that this is a lock-block, which provides a barrier to gravel and equipment, at a point where the sheet-pile wall is lower.</li> </ul> <p>W.B. asked what mitigation measures are in place to prevent sediment from the foreshore entering the inlet.</p> <ul style="list-style-type: none"> <li>● S.D. explained that there are berms, silt fences and ditches in place to prevent sediment or an on-land concrete spill from entering the ocean.</li> </ul> <p>R.C. asked whether the sheet-pile cells have a membrane to prevent material entering the ocean.</p> <ul style="list-style-type: none"> <li>● S.D. explained that there is no membrane, but the sheet-piles act as a barrier to the ocean and there is also a berm inside the cell.</li> <li>● S.D. mentioned that water quality monitoring is being carried out, to test for turbidity and changes in pH, which would result from grout being released into the ocean.</li> <li>● T.A. added that the new turbidity curtain covering the full foreshore is also in place to contain sediment.</li> </ul> <p>S.D. showed photos of sheet-pile cell 1, which showed the sheet-piles being threaded into the template .</p> <ul style="list-style-type: none"> <li>● S.D. explained that all works for the foreshore cells are being carried out in the dry, at low tide.</li> <li>● The remaining sheet-piles will be driven by a vibratory hammer and, if needed, an impact hammer. As these piles are onshore, underwater noise monitoring will be carried out during impact pile driving of the first three piles to ensure that underwater noise levels do not exceed the threshold set out in the <i>Fisheries Act</i> Authorization.</li> <li>● S.D. showed a photo of the new turbidity curtain, containing turbidity caused by wind.</li> </ul> <p>S.D. showed a photo of the crew installing jet grout columns underground at the eastern foreshore.</p> <ul style="list-style-type: none"> <li>● S.D. explained that grout spoil is produced during this process and showed a photo of the spoil being managed with an excavator.</li> <li>● S.D. explained that the spoil is removed by the excavator and a loader places the spoil in one of the two pits previously shown in the sheet-pile cells.</li> </ul>



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	<ul style="list-style-type: none"> <li>• S.D. showed a photo of one of the pits, and explained that the grout is left here to cure, and is then removed by excavator and taken offsite for disposal.</li> </ul> <p>S.D. showed a photo of the derailment wall excavation.</p> <p>S.D. showed a photo of old, obsolete piles being removed from the foreshore area. S.D. explained that these piles are part of the old foreshore and are being removed, transferred to a barge and transported offsite for disposal.</p> <ul style="list-style-type: none"> <li>• W.B. asked for clarification on where these piles were located.</li> <li>• S.D. explained that these piles are located south of sheet-pile cells 8-9.</li> <li>• W.B. asked whether there was any risk of material entering the sea while the piles are being transferred to the barge for disposal.</li> <li>• S.D. explained that the piles are checked for contamination and are pressure washed before being moved to the barge, so there is little risk of material entering the ocean.</li> <li>• C.T. asked what kind of contamination the crews would be looking for, and where the piles go for disposal.</li> <li>• S.D. explained that they would be looking for hydrocarbon contamination resulting from the previous use of the site as a fuel/oil loading facility. Darker soil, sheen and smell are used to determine whether there is any contamination.</li> <li>• S.D. explained that there are a number of approved sites which could be used for the disposal of the piles and that these piles are taken to an approved site in the lower mainland, although S.D. was not certain of the name.</li> </ul>
<p><b>1:50- 2:10pm</b></p>	<p><u>Offshore works</u></p> <p>S.D. showed a photo of the bubble curtain out of the water and pointed out the seven bubble curtain rings through which air is pumped. S.D. explained that air hoses connect to each of the seven rings.</p> <p>W.B. asked if S.D. could explain how divers verify that the bubble curtain is working properly before impact pile driving commences.</p> <ul style="list-style-type: none"> <li>• S.D. explained that following their revised Standard Operating Procedures divers check the bubble curtain is working correctly before impact pile driving starts. A diver will inspect each ring individually, checking that each ring is producing bubbles and that the final ring is on the seafloor.</li> </ul> <p>W.B. asked about how long the acoustic deterrents are used during the ramp up procedure. The time recommended by the manufacturer is at least 10 minutes, but TM have been using the acoustic deterrents for 30-60 minutes. W.B. asked why the deterrent was being used for longer than the recommended time, because it would be preferable not to deter fish from the area for longer than necessary.</p> <ul style="list-style-type: none"> <li>• S.D. and T.A. explained that the acoustic deterrent system had been used for longer than the minimum recommended time most often because of a marine mammal sighting delaying the start of impact pile driving. S.D. agreed that the deterrent should not be used for longer than necessary and that efforts will be made to find an appropriate balance for the time the deterrent is used for.</li> </ul>



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W.B asked whether the manufacturer had provided a recommended time for using the acoustic deterrent.

- S.D. explained that the manufacturer had only provided the minimum time of 10 minutes. S.D. stated they will try to target running the acoustic deterrents for 30 mins during ramp up.

W.B asked what the range of the acoustic deterrent is based on the source level of the noise relative to the hearing sensitivities of fish, and whether this had been studied by the manufacturer.

- S.D. said that the range given by the manufacturer was 150-200 ft. which has been used to guide how far the device can be placed away from the pile being driven. This range is based on the source noise levels and fish hearing, but S.D. did not think this had been studied by the manufacturer.
- B.J. added that the effectiveness range will depend on the conditions of the water and that they'd request information from the manufacturer on whether a study had been carried out.

S.D. showed a photo of the compressors that feed air into the bubble curtain. These were placed on top of Plant Nappies, which are used to contain any hydrocarbons that may leak or spill from the compressors.

S.D. showed a photo of the air manifold which directs air from the compressor to the seven hoses that connect to the bubble curtain rings. There are pressure gauges on each of the seven hoses, which are monitored while the bubble curtain is running, to ensure that air is being delivered to each ring.

S.D. showed a photo of the anchor barge from which the two acoustic deterrent devices are deployed from.

Impact pile driving

S.D. showed two photos of impact pile driving at junction platform 1. Wash from the bubble curtain was visible, as was the atmospheric noise shroud.

S.D. showed a video of impact pile driving at trestle span 6. S.D. stated that underwater noise monitoring had been conducted during impact pile driving activities and that all levels had been below the threshold permitted under the *Fisheries Act* Authorization.

W.B. asked whether the secondary bubble curtain had been used during impact pile driving.

- S.D. explained that the piles driven over the last two weeks are smaller piles, and the secondary bubble curtain is not needed as underwater noise levels are lower (197dB was the highest recorded) than the levels associated with the larger piles. The piles used for the mooring dolphins will be larger and so the secondary bubble curtain will be used during impact pile driving of these piles.



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	<p>S.D. showed a photo of a sea lion lying on the perimeter safety boom. S.D. explained that marine mammal monitoring is being carried out during impact pile driving and that pile driving had been delayed and stopped for the sea lion shown, as well as some harbour seals. The 30 minute re-sighting window had been observed before pile driving was re-started.</p> <p>W.B. asked whether there had been any fish observations made.</p> <ul style="list-style-type: none"> <li>S.D. said that there had been some juvenile salmon sightings but there were not many.</li> </ul>
<p><b>2:10 – 2:20 pm</b></p>	<p><u>Offshore works – superstructure</u></p> <p>S.D. showed a photo of concrete girders being set in place by cranes at loading platforms 1 and 2.</p> <ul style="list-style-type: none"> <li>The concrete girders have been prefabricated onshore, and have now all been set in place. Concrete will be poured over the girders in the coming weeks.</li> </ul> <p>S.D. showed an aerial photo of the offshore works, showing the concrete girders in place on the loading platforms and jackets being welded onto breasting dolphins 7 and 8.</p> <p>S.D. showed a photo of a dolphin jacket being set on mooring dolphin 6.</p> <p>S.D. showed two photos of the new turbidity curtain. Turbidity generated by wind waves was seen being contained by the curtain.</p> <p>W.B. mentioned that the design of the turbidity curtain was requested to be shared with the meeting participants in the previous meeting.</p> <ul style="list-style-type: none"> <li>K.M. confirmed that this had already been shared on the Firmex site following the last meeting.</li> </ul>
<p><b>2:20 – 2:30 pm</b></p>	<p>S.D. asked whether there were any questions.</p> <p>E.S. asked whether there had been any concrete pours over the last 2 weeks and whether all the same concrete mitigations were in place as discussed in the previous compliance meeting.</p> <ul style="list-style-type: none"> <li>S.D. said there had been one concrete pour, and that yes all the same mitigations were in place (i.e. spill trays, spill kits, concrete containments).</li> </ul> <p>K.M. asked whether a move from Webex to Microsoft Teams would be welcome. The majority of participants were in favour of using Microsoft Teams for the next meeting.</p>
<p><b>2:30 pm</b></p>	<p><b>Call ended</b></p>



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## GENERAL AND MISCELLANEOUS MITIGATION MEASURES

*Measures specified within the Westridge Marine Terminal Fisheries Act Authorization Conditions:*

<b>Schedule</b>						
2.2.6 All nearshore in-water Project construction activities (within a 50-m horizontal distance seaward of the higher high water large tide level) at the Westridge Marine Terminal shall only be carried out during a work timing window from August 16 to March 15 each year.						
Discussed:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<b>Comments</b>						
TM acknowledged that the timing window has closed and that in-water works are only being conducted offshore (i.e., beyond 50 m of the higher high water large tide). Works on the foreshore cells are being completed at low tide in the dry.						
<b>Action Items</b>						
None						
<b>Monitoring</b>						
3.1 A qualified environmental professional must be on-site during the carrying on of in-water works, undertakings and activities, and shall monitor the works, undertakings or activities on a systematic and on-going basis to ensure that standards and avoidance measures to avoid impacts to fish and fish habitat are effective, and that unauthorized impacts to fish and fish habitat are avoided.						
Discussed:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<b>Comments</b>						
The Lead Environmental Inspector spoke throughout the meeting about their experiences over the last month at the WMT during construction. Qualified environmental professionals are conducting monitoring of construction activities at the WMT.						
<b>Action Items</b>						
None						
<b>Marine Mammal Observations</b>						
2.2.7 In-water construction activities must cease if any marine mammal is observed adjacent to or within the project area such that there is risk of direct physical harm to the marine mammal. Construction activities may only resume once the marine mammal has been confirmed to have left the immediate area or has not been sighted for 30 minutes.						
Discussed:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<b>Comments</b>						
Marine mammal monitoring is being conducted at WMT. Marine mammals have been observed prior to the start of impact pile driving and during pile driving. TM stated that works were stopped immediately when the mammals were sighted and were not restarted until the 30 minute re-sighting window had passed.						
<b>Action Items</b>						
None						
<b>Temporary Structures and Decommissioning of Existing Structures</b>						
The application for a <i>Fisheries Act</i> authorization states that a floating debris boom will be secured around the work area to collect drifting debris during demolition of the existing utility dock (page 3.1).						
Discussed:	<input type="checkbox"/> Yes	Issue(s) identified:	<input type="checkbox"/> Yes	Issue(s) unresolved:	<input type="checkbox"/> Yes	Not applicable <input checked="" type="checkbox"/>





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<input checked="" type="checkbox"/> No	identified: <input type="checkbox"/> No	unresolved: <input type="checkbox"/> No	
2.2.5 Temporary structures installed below the high-water mark shall be decommissioned and removed when they are no longer being used for construction purposes.			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>
<b>Comments</b>			
The utility dock has been removed and no structures are currently being decommissioned.			
<b>Action Items</b>			
None			
<b>Pump Intake Screening</b>			
2.2.2 Water intakes of any pumps shall be designed and screened in accordance with specifications outlined in the Addendum, Fisheries and Oceans Canada's <i>Freshwater Intake End-of-Pipe Fish Screen Guidelines</i> (Fisheries and Oceans Canada 1995), and Fisheries and Oceans Canada's <i>Guidelines for Minimizing Entrainment and Impingement of Aquatic Organisms at Marine Intakes in British Columbia</i> (Fisheries and Oceans Canada 1991).			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<b>Comments</b>			
Screens for known water intakes have been discussed during previous site inspections. No issues were reported.			
<b>Action Items</b>			
None			
<b>Fish Salvage</b>			
2.2.3 Fish salvage and relocation shall be conducted, as appropriate, prior to the start of construction activities so as to avoid and minimize adverse impacts to fish.			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>
<b>Comments</b>			
No fish salvage has taken place at WMT over the past two weeks and there is none planned, because pools along the foreshore have been isolated and infilled.			
<b>Action Items</b>			
None			
<b>Integrity of Habitat Offsets</b>			
4.7 The Proponent shall not carry on any works, undertakings or activities that will adversely disturb or impact the offsetting measures.			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>
<b>Comments</b>			
Offsetting measures have yet to be installed			
<b>Action Items</b>			
None			



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### MITIGATION MEASURES SPECIFIC TO PILE DRIVING

*Measures specified within the Westridge Marine Terminal Fisheries Act Authorization Conditions:*

<b>Underwater Sound Pressure Level Reduction</b>				
2.2.8 A vibratory hammer will be used for pile driving where practical and feasible, and all in-water pile driving activities will be monitored via hydrophone to ensure underwater peak pressures do not result in adverse impacts to fish.				
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>	
2.2.9.1 To avoid death of fish, mitigation measures (e.g., bubble curtain around the full wetted length of the pile, fish exclusion, etc.) must be implemented.				
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>	
Comments				
<p>Trans Mountain showed the use of the primary bubble curtain during installation of piles by impact hammer. Trans Mountain will be testing the use of a secondary bubble curtain to further reduce underwater noise levels during impact pile driving in the coming weeks. TM gave a detailed account of how the bubble curtain is checked by divers and by monitoring pressure gauges to ensure the bubble curtain is working correctly.</p> <p>TM demonstrated that underwater noise levels are being monitored during both vibratory and impact pile driving activities and that underwater noise thresholds are not being exceeded.</p>				
Action Items				
None.				
<b>Underwater Sound Pressure Level Monitoring</b>				
2.2.9.2 Monitoring via underwater noise recordings must be conducted continuously and within 10 meters of the pile being driven to verify that underwater sounds do not exceed the 30 kPa (209.5 dB re: 1 µPa) threshold for injury to finfish.				
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>	
2.2.9.3. Outside of the least risk window for Burrard Inlet (August 16 – February 28), a more conservative underwater sound threshold of 22.5 kPa (207 dB re: 1 µPa) will be adhered to, and monitored, to prevent injury to finfish. If sound levels exceed this threshold, or a fish kill is observed despite mitigation measures being in place, pile driving activities are to cease immediately and mitigation methods are to be reviewed and modified in consultation with DFO.				
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>	
2.2.9.4 If underwater noise recordings indicate that sound levels are likely to exceed the applicable threshold defined in conditions 2.2.9.2 or 2.2.9.3, the Proponent will take appropriate action with the goal of preventing the exceedance from occurring. These actions may include adjusting the force of the hammer, adjusting the mitigation measures already in place to increase their effectiveness, or implementing additional mitigation measures.				
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>	
2.2.9.5 Upon commencement of pile driving, or recommencement after a delay of 30 minutes or more, pile installation shall ramp-up by starting with less frequent impact strikes of lower force. This ramp-up period is designed to enable any fish that may be in the area time to leave the area prior to the generation of peak pressure and noise levels for pile installation.				



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Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<b>Comments</b>			
TM demonstrated that they are monitoring underwater noise during vibratory and impact pile driving and that levels have remained below the threshold specified in the authorization.			
TM discussed the suite of mitigation measures being implemented to help reduce effects to marine fish during offshore impact pile driving (e.g., acoustic deterrent system, bubble curtain).			
<b>Action Items</b>			
None			
<b>Marine Mammal Monitoring</b>			
2.2.9.6 Prior to commencement of pile driving, or recommencement after a delay of 30 minutes or more, visual monitoring must be conducted to determine if marine mammals are present within an exclusion zone of 1 km (except for harbor seals, which will have an exclusion zone of 150 m).			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
2.2.9.7 Work may only commence if marine mammals and harbor seals are not observed in their respective exclusion zones for 30 minutes.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
2.2.9.8 Exclusion zones must be monitored continuously during impact pile driving. If a marine mammal or marine mammals are observed within their respective exclusion zone, pile driving activities must cease until all marine mammals leave their respective exclusion zone or they have not been sighted for 30 minutes within their respective exclusion zone.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
2.2.9.9 If underwater noise recordings reveal that the threshold of 160 dB is exceeded at the 1 km exclusion zone boundary, the exclusion zone radius must be widened to a new outer limit, where sound recordings demonstrate that the 160 dB threshold is not exceeded. Conditions 2.2.9.6 to 2.2.9.8 will need to be complied with within this new exclusion zone.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
2.2.9.10 Pile driving may only be carried out during daylight hours to enable effective visual monitoring of marine mammal exclusion zones.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<b>Comments</b>			
TM are carrying out marine mammal monitoring. When mammals have been observed within the exclusion zone, works have been stopped immediately. TM have not commenced work until the 30 minute window has passed and during which no further mammal sightings had occurred.			
<b>Action Items</b>			
None			

*Measures specified within the Westridge Marine Terminal Environmental Protection Plan:*



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<b>Fish Salvage</b>			
35. Immediately following the installation of each sheet pile cell, and prior to excavation and infilling of that cell, conduct a salvage of commercial, recreational and Aboriginal (CRA) fishery species via crab and fish trapping/netting and seines (where appropriate). Release captured CRA fishery species in a suitable habitat at least 500 m away from marine construction activities.			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>
Comments			
No fish salvage is currently occurring at WMT.			
Action Items			
None			
<b>Turbidity Monitoring</b>			
43. Should visual monitoring during in-water pile installation indicate concern regarding turbidity levels, the Environmental Inspector will arrange for in situ sampling of turbidity (nephelometric turbidity units). Should turbidity levels exceed specified thresholds, pile driving will temporarily be halted.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
Comments			
Turbidity curtains are in place and water quality monitoring has recorded no exceedance in water quality guidelines for turbidity outside of the turbidity curtain. TM have installed a new custom made turbidity curtain, which is more durable than the previous curtain, and is contoured to the seafloor.			
Action Items			
None			



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### MITIGATION MEASURES SPECIFIC TO FORESHORE CONSTRUCTION

<b>Riparian Planting and Material Handling</b>			
<i>Westridge Marine Terminal Fisheries Act Authorization Conditions</i>			
2.2.4 Disturbed riparian areas shall be replanted as appropriate, with native non-invasive species of vegetation.			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>
<i>Westridge Marine Terminal Environmental Protection Plan Commitments</i>			
30. Unless otherwise approved by DFO, retain all excavated [marine] material and dispose at a land-based facility in accordance with applicable regulations.			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>
<b>Comments</b>			
Not applicable.			
<b>Action Items</b>			
None			

<b>Water Quality Maintenance and Monitoring</b>			
<i>Westridge Marine Terminal Fisheries Act Authorization Conditions</i>			
2.2.1 Effective sediment and erosion control measures (e.g., a turbidity curtain, etc.) shall be implemented before starting construction and shall be maintained during construction activities, as appropriate, to avoid the deposit and dispersion of sediment into the marine environment.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
2.2.10 A turbidity curtain must be used to isolate the work area during the excavation of riprap in order to contain marine sediment suspended in the water column and limit the extent of sediment dispersion. During severe weather conditions that may reduce the effectiveness of, or impede the visual monitoring of, the turbidity curtain (e.g., > 70 km/h winds, or dense fog), works, undertakings or activities that may increase suspended sediment concentrations within the turbidity curtain or adversely affect the integrity of the turbidity curtain, must be suspended.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<i>Westridge Marine Terminal Environmental Protection Plan Commitments</i>			
29. During in-water excavation or rip rap, conduct water quality monitoring (WQM) as per the Water Quality Management Plan during Rip Rap Removal (Appendix H of this EPP). Conduct WQM to assess the effectiveness of the turbidity curtain and modify turbidity curtain deployment, if required.			
Discussed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>
<i>Westridge Marine Terminal Sediment and Erosion Control Plan Commitments</i>			
The in-water sediment curtain will remain intact during Foreshore construction activities to ensure sediment laden water is not discharged into Burrard inlet.			
Discussed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue(s) identified: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input type="checkbox"/>
<b>Comments</b>			



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The new turbidity curtain was visible and shown to be effective in containing turbidity.
<b>Action Items</b>
None

<b>Additional comments or action items</b>
None.