

Monitoring Report: SV-2020-04-30

## 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) did not conduct a joint in-person monthly site inspection at the Westridge Marine Terminal (WMT), in Burrard Inlet, BC, in April 2020. Instead, DFO had two conference-call meetings in the month of April with representatives from Trans Mountain Pipeline ULC (Trans Mountain), the Project Indigenous Monitor (Project IM) from Kwikwetlem First Nation (KFN), Kiewit Ledcor Trans Mountain Partnership (KLTP), and several representatives from the IAMC (including the Musqueam IAMC IM). This monitoring report provides a summary of the second meeting and includes a description of current in-water and nearshore works at the WMT, any issues Trans Mountain reported during the meeting regarding mitigation or monitoring measures implemented to reduce or avoid impacts on fish and fish habitat, and how these issues have been or will be resolved.

<b>Date</b>	April 30, 2020	<b>Time of Call (Start):</b>	2:00 pm	<b>Time of Call End:</b>	3:50 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: S.W. (A/ Senior Biologist), W.B. (A/ Team Lead), E.S.(Biologist), and R.L. (A/ Senior Biologist)				
<b>IAMC participants</b>	Musqueam Indian Band: Y.A. (Environmental Stewardship Manager), 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), R.C. (IAMC representative – Alberta First Nations), and K.R. (Technical advisor to IAMC)				
<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>				
Derrick Barge (DB) Bremerton	Moored along the western shoreline and working on the marine construction office. Pile installation for the marine construction office was completed on April 29 and piles were installed at low tide and in the dry using either a vibratory hammer or a combination of vibratory and impact hammer. The decking that sits on top of the piles has been constructed and the office building itself will be prefabricated off site. A turbidity curtain is in place around the work area to contain sediment-laden water released during works or from a nearby outfall pipe.				
Conveyor barge	Moored along the eastern shoreline and working to infill the individual sheet-pile cells, and the area behind the arc cells and sheet-pile cells, with gravel. Infilling started on March 23. A turbidity curtain is in place around the base of the cells being infilled. 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</i>				



Monitoring Report: SV-2020-04-30

	Life were recorded. Cells 3, 6, 6a, 7, 7a, 8, 8a, 9 and 10 have been infilled.
Nearshore barge	Moored along the eastern shoreline and working to consolidate newly placed infill material (i.e., to remove any spaces or voids). This is done by repeatedly stabbing the material within a pin pile attached to a vibratory hammer and vibrating the materials down.
Offshore barges (e.g., DB General)	<p>Trans Mountain have begun construction of a loading platform over offshore piles that will form part of the berth superstructure. Concrete is currently being poured over a rebar structure to provide a platform for the trestle, which will be mounted on top. Measures to avoid the release of concrete into the marine environment, and to contain any spills on the barge (e.g., where concrete is transferred from the cement truck to the pump truck), are in place and working effectively. No concrete has entered the marine environment during concrete capping works to date.</p> <p>Offshore breasting dolphin piles continue to be installed via impact hammer pile driving. Smaller trestle piles are also being driven. 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.</p> <p>Access platforms are currently being constructed on the top of breasting dolphin 6, ready for two dolphin jackets (large steel structures) to be welded into place next week.</p>

**IAMC Indigenous Monitor/IAMC Representative Observations and Comments**

R.C. requested that TM provide updates relating to construction activities at the Westridge Marine Terminal (WMT) to near-by Indigenous communities.

- K.M. added this item to the agenda for discussion.

C.T. requested that notes from the previous compliance monitoring meeting be shared with the IAMC.

- W.B explained that the notes from the March 24 monitoring meeting had recently been sent to Musqueam for their review and comments, and that they will be distributed once their comments are received and the report is finalized.

C.T. asked for clarification on the purpose of the call, in particular referring to the issue that there are currently no in-person site inspections occurring at WMT due to the Covid-19 pandemic, and whether this call, and future calls, were intended to substitute for these site visits.

- W.B. explained that this call is intended to verify TM's compliance at the WMT with their *Fisheries Act* Authorization. The call is an opportunity to ask the same questions DFO and the IAMC representatives would have asked during an in-person site visit.

C.T. asked whether the construction schedule included pile driving on the weekends, as there had been multiple comments from members of her community regarding loud noise experienced early in the morning, during the weekend previous to today's meeting. C.T. highlighted how culturally and spiritually important Burrard Inlet is to her community, and mentioned that communication from TM regarding the nature and timing of the works at WMT would be appreciated so that her community can be warned in advance of what to expect.



Monitoring Report: SV-2020-04-30

- K.R. added that ambient noise has dropped since the Covid-19 pandemic began, and as a result, construction noise levels from WMT could be perceived as being louder than before. K.R. added that there are health and emotional impacts associated with atmospheric noise.
- T.A. responded explaining that construction does take place at the WMT on Saturdays (but not Sundays) starting at 7 am, however, pile driving does not typically commence until 9 am as it takes some time to set up the equipment and conduct the various mitigation measures (e.g., running the acoustic deterrent system), prior to starting the ramp-up procedure. There are several other projects currently underway in Burrard Inlet, and it is possible that the noise experienced in C.T.'s community was from a different project.
- K.M. added that Trans Mountain issues a construction newsletter, which is distributed to communities near the WMT, and that she will follow up with the team responsible for this newsletter to ensure that it is distributed properly. K.M. also mentioned that this newsletter is available on TM's website and that it includes a platform where people can log issues or concerns such as these that C.T. has raised today.

K.R. pointed out that the previous fish mortality events that occurred during impact pile driving have occurred at approximately the same time (i.e., 1-2 pm). K.R. suggested that perhaps this is not a coincidence and could be something worth investigating by TM. K.R. also asked for TMs Project-wide construction schedule to be updated with the information that the least risk window is now closed and therefore in-water works can only occur offshore (i.e., beyond 50 m of the shoreline) as per the conditions of the *Fisheries Act* authorization.

- K.M. said she would follow-up internally to update the schedule.

Y.A. asked whether Musqueam could have a copy of TM's presentation given during the meeting.

- K.M. said she would check whether there were any security concerns surrounding sharing photographs of the WMT and that she will follow up.

Y.A. and K.R. both recommended that sonar be used to identify whether there are fish present prior impact pile driving to avoid further fish mortality events.



Monitoring Report: SV-2020-04-30

Time	Summary of inspection discussions (use initials of participants)
2:00-2:10	Introductions
2:10-2:15	<p>Purpose and Scope of the Meeting</p> <p>The purpose of the meeting was summarised by S.W., who stated that the meeting intended to verify TM's compliance at the WMT with their <i>Fisheries Act</i> Authorization. These biweekly meetings are being held in lieu of in-person site visits normally held on a monthly basis to verify compliance, in light of the Covid-19 pandemic.</p>
2:15-2:20	<p>Review agenda</p> <p>K.M. gave an overview of the agenda for the meeting:</p> <ul style="list-style-type: none"> <li>• Update on construction activities at WMT since the March 24 meeting, with photos to be provided via the WebEx presentation.</li> <li>• Update on the underwater noise monitoring program at WMT, to cover: TM's new underwater noise specialists, acoustic deterrent system update, update on the secondary bubble curtain, update on the hydroacoustic survey and sonar system and sequencing of impact pile driving mitigation measures.</li> <li>• Update on construction of the temporary marine construction office.</li> <li>• Time for questions.</li> </ul> <p>K.M added communication issues to the agenda, at R.C.'s request.</p>
2:15-2:30 pm	<p><b>Construction Update</b></p> <p>S.D. provided an overview of the works that have occurred at the WMT since the March 24 compliance verification conference call. S.D. scrolled through photographs of construction works and described the mitigation measures.</p> <p><u>Foreshore – sheet-pile cells and arc cells</u></p> <ul style="list-style-type: none"> <li>• S.D. explained that since the end of the least risk timing window on March 15, no nearshore in-water works are permitted (as per the <i>Fisheries Act</i> authorization), and as such in-water works are only taking place in offshore waters (over 50 m from the higher high water large tide). S.D. explained that the arcs and cells had been isolated from the marine environment prior to the end of the least risk window.</li> <li>• The arc cells and sheet-pile cells have been installed by threading steel sheet piles together, prior to the end of the least risk window. Fish were salvaged from behind the arc cells and within the sheet-pile cells, and there is no longer any water present in cells 6-10. TM have now begun to infill the individual cells as well as the areas behind the cells and arc cells with gravel, and spread out the material using a bulldozer (Photo X).</li> <li>• S.D. showed a photo of the physical barrier (i.e., a wall made of sheet-pile cells) that is located near sheet-pile cell 6 (and was installed following the March 23 fish mortality event) with gravel extending up to the barrier. TM has installed a row of concrete lock blocks behind the physical barrier as well as a silt fence extending up the foreshore slope, as a mitigation measure to help contain fill material and to reduce the likelihood of material entering the marine environment (Photo X).</li> </ul>
2:30-2:40 pm	<p>C.T. asked for clarification on what was shown in the photograph of the physical barrier located near sheet-pile cell 6.</p> <ul style="list-style-type: none"> <li>• S.D. provided a description of the physical barrier and used an aerial photograph to provide an overview of the foreshore works. W.B. provided a description of the series of events that led to the installation of the physical barrier for context as follows.</li> </ul>



Monitoring Report: SV-2020-04-30

	<ul style="list-style-type: none"> <li>• W.B. provided background on the March 23 2020 fish mortality event, in which it is suspected that wood debris floated into the fish exclusion net, which lowered its height, and allowed juvenile salmon to enter the pools of water located behind the arc cells. TM salvaged the fish on March 23, but unfortunately, some of the salmon were killed in the process. The new physical barrier shown in the photograph was installed in response to the March 23 fish mortality event; it is made of solid steel and cannot be compromised by floating wood debris.</li> <li>• S.D. added that the cells and arcs are part of the works to extend the foreshore and construct the bulkhead wall, and that the cells are being backfilled towards the shore as part of the terminal expansion.</li> </ul> <p>K.R. asked whether steel physical barriers will be used going forward instead of fish exclusion nets.</p> <ul style="list-style-type: none"> <li>• S.D. replied that steel sheet-pile barriers are now being used to exclude fish instead of nets in areas located directly adjacent to the ocean, but nets are being used to isolate area between cells.</li> <li>• W.B. asked TM to clarify why nets are being used between cells.</li> <li>• S.D. explained that hard, physical barriers are being used in areas located directly adjacent to the open ocean due to the risk of floating debris coming in contact with and compromising the nets. Fish exclusion nets are still being used between cells because there is no risk of them coming into contact with floating debris and being compromised.</li> </ul> <p>K.R. asked whether the aerial photograph shown by S.D. was current.</p> <ul style="list-style-type: none"> <li>• S.D. replied that the photo was current, and that you could see from the photo that cells 3, 6, 6a, 7, 7a, 8, 8a, 9 and 10 have been infilled.</li> </ul> <p>C.T. requested clarification as to whether the physical barrier is permanent.</p> <ul style="list-style-type: none"> <li>• S.D. clarified that the physical barrier will be removed upon completion of works to infill the cells and arc cells, and also pointed out the turbidity curtain in place around the cells and arc cells, as shown in the photo (Photo X).</li> <li>• S.D. continued to explain that additional gravel will be added to the area behind the arc cells and individual sheet-pile cells and backfilled to the shore.</li> </ul> <p>S.W. asked whether the silt fence will remain in place and whether additional measures (e.g., lock blocks) will be placed up along the foreshore slope to further reduce the likelihood of gravel entering the marine environment.</p> <ul style="list-style-type: none"> <li>• S.D. confirmed that the silt fence will remain in place and a row of lock blocks will be placed along the foreshore slope.</li> </ul>
<p><b>2:40-3:00pm</b></p>	<ul style="list-style-type: none"> <li>• The first photo showed a pin pile being driven by a vibratory hammer located inside one of the fully-isolated sheet-pile cells shown earlier. S.D. explained that the purpose of this was not to drive the pile, but to use the pile to vibrate the gravel and eliminate voids and spaces.</li> </ul> <p>Given the proximity of the cells to the marine environment, W.B. asked whether TM had measured the underwater noise levels associated with this work.</p> <ul style="list-style-type: none"> <li>• S.D. explained that the noise levels were similar to those associated with other vibratory pile driving activities, and were well below the threshold specified in the <i>Fisheries Act</i> Authorization.</li> </ul>
<p><b>3:00 – 3:20pm</b></p>	<p><u>Superstructure</u></p> <ul style="list-style-type: none"> <li>• S.D. showed photos of the offshore works being conducted at the WMT. S.D. explained that work on the superstructure is underway including form work, rebar installation, and concrete capping.</li> </ul>



Monitoring Report: SV-2020-04-30

	<ul style="list-style-type: none"> <li>• S.D. showed photos of the cement trucks and the pump truck on a barge located next to the superstructure. This week, TM will be pouring cement for additional concrete pile caps.</li> <li>• S.D. showed photos of the pump truck and explained that the cement trucks load the pump truck, and then the pump truck pumps the cement through a hose attached to a boom (Photo X).</li> <li>• S.D. explained that there are measures in place to contain cement in the event of a spill. The hose used for pumping the cement is tied off after concrete pouring is complete and before being moved, to prevent cement from dripping into the water. Furthermore, the area in and around where the cement is being poured is sealed and 'water tight', such that no cement can leak into the marine environment.</li> </ul> <p>S.W. asked whether there were any other cement containment measures in place.</p> <ul style="list-style-type: none"> <li>• S.D. explained that there is secondary containment in place on the barge, where concrete is transferred from the cement truck to the pump truck, to collect any cement that may spill during loading.</li> <li>• S.D. confirmed that no cement has entered the marine environment since concrete works on the superstructure have begun.</li> </ul>
<p><b>3:20- 3:30 pm</b></p>	<p><u>Offshore Pile Installation</u></p> <ul style="list-style-type: none"> <li>• S.D. showed a photograph of two dolphin jackets, which will be placed over the top of mooring and breasting dolphins (which is a cluster of four piles) and welded into place. S.D. confirmed that access platforms are currently being constructed on the top of the dolphins and TM is getting ready to place the jackets on Breasting Dolphin (BD) 6 next week.</li> <li>• S.D. showed photographs of impact pile driving activities at BD 8 and BD6; the photo clearly showed wash from the primary bubble curtain (thereby confirming that the curtain is running) and the noise shroud in place to reduce atmospheric noise (Photo X).</li> </ul> <p>W.B. asked whether the secondary bubble curtain was in place as well, during impact pile driving activities at BD 8 and BD 6.</p> <ul style="list-style-type: none"> <li>• S.D. confirmed that the secondary bubble curtain was not in place, and that underwater noise levels were below the threshold specified in the authorization.</li> </ul> <p>C.T. asked about the schedule for pile driving activities at the WMT.</p> <ul style="list-style-type: none"> <li>• T.A. indicated that construction does take place at the WMT six days/week (not on Sundays), however, pile driving does not typically commence until 9 am as it takes some time to set up the equipment and conduct the various mitigation measures (e.g., running the acoustic deterrent system), prior to starting the ramp-up procedure.</li> </ul> <p>K.R. pointed out that the previous fish mortality events that occurred during impact pile driving have occurred at approximately the same time (i.e., 1-2 pm). K.R. suggested that perhaps this is not a coincidence and could be something worth investigating by TM. K.R. also asked for TMs Project-wide construction schedule to be updated with the information that the least risk window is now closed and therefore in-water works can only occur offshore (i.e., beyond 50 m of the shoreline) as per the conditions of the <i>Fisheries Act</i> authorization.</p> <ul style="list-style-type: none"> <li>• K.M. said she would follow-up internally to update the schedule.</li> <li>• S.D. showed a photograph showed a trestle-span pile, which is a smaller (1.5 m) diameter pile and therefore quieter when driven than the larger piles that have been driven as part of the superstructure. S.D. explained that it usually takes about 30</li> </ul>



Monitoring Report: SV-2020-04-30

	<p>minutes to drive each of the four piles. S.D. said that the underwater noise levels recorded while driving these smaller piles were below the noise threshold maximums specified in the <i>Fisheries Act</i> authorization and ranged from 196-202 dB.</p>
<p><b>3:30 – 3:35pm</b></p>	<p><u>Marine Construction Office</u></p> <ul style="list-style-type: none"> <li>S.D. explained that construction of the marine construction office has begun. Piles were installed in the intertidal zone at low tide and in the dry, as works are not permitted to take place in the water outside of the least risk timing window. S.D. confirmed that pile installation is stopped when the tide comes in.</li> <li>S.D. showed a photo of the platform structure that has been built to date (Photo X). Construction of the office building itself has not yet begun. Pile driving was completed the day before the meeting (April 29) and all piling works are now complete. S.D. also showed photographs of underwater noise monitoring being carried out in nearby waters during pile driving activities.</li> </ul> <p>S.W. asked about the levels of underwater noise during pile installation.</p> <ul style="list-style-type: none"> <li>S.D. said that the maximum noise recorded was 189 dB (back-calculated for 10 m from the pile).</li> </ul> <p>W.B. asked about the location of the hydrophone used to monitor underwater noise levels.</p> <ul style="list-style-type: none"> <li>S.D. explained that the hydrophone had been hung from a crane on DB Bremerton and that the closest the hydrophone could be placed to the active works was within 40-50 m of the pile. As a result, TM have back-calculated what the noise levels would have been at 10 m from the pile and have provided these noise measurements to DFO.</li> </ul> <p>W.B. asked whether there was any turbidity resulting from these works when the tide rises, as there was a turbidity curtain visible in the photograph shown.</p> <ul style="list-style-type: none"> <li>S.D. explained that the substrate is sandy and that there was little turbidity associated with pile installation. S.D. pointed to an outfall in the foreground of the photograph and explained that the turbidity curtain was in place primarily to contain sediment-laden water released from the outfall, which is a requirement of their waste discharge permit.</li> </ul>
<p><b>3:35pm</b></p>	<ul style="list-style-type: none"> <li>S.D. finished the presentation with an oblique-angle photograph which showed several of the construction activities at the WMT, which had been covered in the meeting.</li> </ul> <p>W.B. asked meeting attendees whether they were ok to stay on to the call for a bit longer, and asked whether Musqueam had any questions at this point.</p> <ul style="list-style-type: none"> <li>Y.A. asked whether Musqueam could have a copy of TM's presentation given during the meeting and K.M. said she would check whether there were any security concerns surrounding sharing photographs of the WMT.</li> <li>W.B. indicated that DFO is preparing a report for this compliance verification call and will send a copy to Musqueam for review and comment.</li> </ul>
<p><b>3:35-3:45pm</b></p>	<ul style="list-style-type: none"> <li>S.D. indicated that TM have changed their underwater noise consultant and are now working with JASCO Applied Sciences (JASCO), a well known specialist in the field. JASCO have been TM's noise consultant for a week, and have conducted two days of underwater noise monitoring during impact pile driving so far. In addition to underwater noise monitoring, TM have asked JASCO to investigate the source of variability in underwater noise levels that is sometimes experienced at the WMT during impact pile driving (e.g., when underwater noise levels suddenly spike unexpectedly).</li> </ul>



Monitoring Report: SV-2020-04-30

	<p>S.W. asked whether JASCO were also taking over the marine mammal monitoring at the WMT.</p> <ul style="list-style-type: none"> <li>S.D. explained that Triton will be taking over as the consultant for marine mammal monitoring.</li> </ul> <p>J.H. said that monitoring underwater noise levels may not be enough on its own to avoid fish mortality events, because underwater noise levels associated with past fish mortality events have been below the maximum thresholds at 10 m from the pile. J.H suggested that sonar be used to assess whether there are fish in the area, prior to the start of impact pile driving.</p> <ul style="list-style-type: none"> <li>S.D. explained that using sonar to verify fish presence prior to impact pile driving is tricky because the bubble curtains interfere with the sonar (i.e., the waves bounce off the bubbles as well as the fish) and there are multiple obstructions at the WMT that make sonar scanning difficult.</li> <li>S.D. went on to explain that TM had commissioned a hydroacoustic survey to assess the presence and distribution of fish at the WMT. This involved running 6 transects over 2 days during different tidal conditions (i.e. ebb, flood and slack tides). The results showed that there were some small schools of fish present in waters around the WMT, which are likely to be herring. These schools consisted of approximately 10-50 fish, which were primarily located near the seafloor or lower half of the water column.</li> </ul> <p>S.W. asked whether the results from this hydroacoustic survey have led to a change in any of the procedures at WMT.</p> <ul style="list-style-type: none"> <li>S.D replied that there have been no changes to any procedures.</li> <li>W.B. suggested that, in the interest of time, if there were any questions regarding the hydroacoustic survey, meeting participants could send these to him and he will condense and forward them on to TM.</li> <li>S.D. mentioned that the new acoustic deterrent system is being used as specified during the April 16 meeting (i.e., it is being deployed for 30-60 minutes [recommended time is at least 10 minutes] before impact pile driving commences. However, there has been one change made to the protocol since the April 16 meeting: the bubble curtain is now being run for 1 minute instead of 3 minutes, in order to reduce the time lag between shutting off the acoustic fish deterrent system and commencement of the ramp-up procedure, as recommended by DFO to reduce the risk of fish swimming back into the work area during that time.</li> <li>S.D. said that the secondary bubble curtain test was interrupted by the noise exceedance event that occurred on April 13 (which was reported to DFO and the IAMC) and that JASCO will be conducting another test on the secondary bubble curtain. The data collected so far shows that the secondary curtain does further reduce underwater noise levels. Data collected by JASCO has been less variable than what had been recorded by the previous noise consultant.</li> <li>K.R asked whether JASCO's data was less variable due to the use of different equipment or whether S.D. thought it was coincidence.</li> <li>S.D. replied that JASCO are using different equipment and that their data processing system is also different.</li> </ul>
<p><b>3:45-3:50pm</b></p>	<ul style="list-style-type: none"> <li>K.M. asked whether there were any further questions and acknowledged that the request to discuss the need for clearer communication between TM and IAMC had been added to the agenda as a final point for today's meeting; however, the topic</li> </ul>



Monitoring Report: SV-2020-04-30

	<p>had been discussed during the course of the meeting. K.M. said that she will follow up with the communications team in order to address the points raised and improve communication with the surrounding communities.</p> <ul style="list-style-type: none"> <li>• R.K. said that the IAMC would appreciate receiving more information that is clear and accessible.</li> <li>• R.C. said that he wants to continue to discuss ways to communicate better to local Indigenous groups regarding construction activities at the WMT.</li> <li>• S.W. suggested that any further questions be sent to W.B. (in the interest of time), including any feedback on the format of the meeting.</li> <li>• W.B. reminded TM of DFO's previous request for a short summary of the revised ramp-up sequence for offshore impact pile driving. TM said this will be provided.</li> <li>• S.W. explained that she will be going on maternity leave, and that R.L. will start to transition into her role now.</li> <li>• Attendees wished S.W. all the best on her maternity leave and gave thanks for inclusion on the call.</li> </ul>
<b>3:50pm</b>	<b>Call Ended</b>



Monitoring Report: SV-2020-04-30

### GENERAL AND MISCELLANEOUS MITIGATION MEASURES

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

Schedule			
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"/>
Comments			
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). Backfilling of the foreshore at the sheet-pile cells and arc cells is occurring out of the water, as the cells have been isolated from the marine environment. Work on the marine construction office is being completed in the intertidal zone, at low tide and in the dry.			
Action Items			
None.			
Monitoring			
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"/>
Comments			
The Lead Environmental Inspector spoke throughout the meeting about his experiences over the last month at the WMT during construction. Photos were shown of several qualified environmental professionals conducting monitoring of construction activities at the WMT.			
Action Items			
None.			
Marine Mammal Observations			
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 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"/>
Comments			
N/A			
Action Items			
None.			



Monitoring Report: SV-2020-04-30

<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 <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"/>	
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"/>	
Comments				
N/A				
Action Items				
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"/>	
Comments				
Screens for known water intakes have been discussed during previous site inspections. No issues were reported.				
Action Items				
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 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				
Mention of fish salvage was made in reference to the March 23 fish mortality event. No current fish salvage is occurring or anticipated to occur at WMT in the coming two weeks, because pools along the foreshore have been isolated and infilled. The March 23 fish mortality event was also discussed in detail during the previous compliance monitoring meeting on March 24.				
Action Items				
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 type="checkbox"/> No	Issue(s) unresolved: <input type="checkbox"/> Yes <input type="checkbox"/> No	Not applicable <input checked="" type="checkbox"/>	
Comments				



Monitoring Report: SV-2020-04-30

Offsetting measures have yet to be installed.
<b>Action Items</b>
None.

### 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"/>	
<b>Comments</b>				
<p>TM showed a photo of smaller piles being driven in offshore waters using a vibratory hammer and TM showed the use of the primary bubble curtain during installation of larger piles. TM are testing a secondary bubble curtain to further reduce underwater noise levels during impact pile driving and a new acoustic fish deterrent system is being deployed as an additional mitigation measure to encourage fish to move away from the area and reduce the likelihood of future fish mortality events. TM demonstrated that underwater noise levels are being monitored during both vibratory and impact pile driving activities. TM have employed a new consultant (JASCO) to monitor underwater noise and to investigate the cause of variability in underwater noise levels during pile driving activities at the WMT (e.g., cause of sudden spikes in noise levels).</p> <p>TM have also received the results of a hydroacoustic survey, which provided insight into the location and relative abundance of fish in the water column in areas in and around the WMT.</p>				
<b>Action Items</b>				
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 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"/>	
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	Issue(s) identified: <input type="checkbox"/> Yes	Issue(s) unresolved: <input type="checkbox"/> Yes	Not applicable <input type="checkbox"/>	



Monitoring Report: SV-2020-04-30

<input type="checkbox"/> No	identified: <input checked="" type="checkbox"/> No	unresolved: <input type="checkbox"/> No	
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 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 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.			
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>			
<p>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, with the exception of a single noise exceedance on April 13 while testing the secondary bubble curtain. The April 13 exceedance was reported to DFO and the IAMC (Non-Conformance Report # 12).</p> <p>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) . These are conducted prior to the start of the ramp-up procedure. TM agreed to provide DFO in writing with a summary of the revised sequence of the mitigation measures being used.</p>			
<b>Action Items</b>			
TM to send DFO a summary of the revised sequence of mitigation measures.			
<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 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 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 type="checkbox"/> Yes	Issue(s) identified: <input type="checkbox"/> Yes	Issue(s) unresolved: <input type="checkbox"/> Yes	Not applicable <input type="checkbox"/>



Monitoring Report: SV-2020-04-30

<input checked="" type="checkbox"/> No	identified: <input type="checkbox"/> No	unresolved: <input type="checkbox"/> No	
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 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 type="checkbox"/>
<b>Comments</b>			
TM spoke about marine mammal monitoring that is being carried out at WMT during pile driving and noted that they have recently contracted Triton as their marine mammal monitoring consultant.			
<b>Action Items</b>			
None.			

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

<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 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>			
Mention of fish salvage behind the arc cells was made in reference to the March 23 fish mortality event. No current fish salvage is occurring or anticipated to occur at the WMT in the next two weeks, because pools along the foreshore have been isolated and infilled. This mortality event was discussed in detail during today's meeting as well as during the previous compliance monitoring meeting on March 24.			
<b>Action Items</b>			
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 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>			
TM stated that as per conditions of authorization, no in-water pile installation has occurred within 50 m of the higher high water large tide level at the WMT since March 15.			
<b>Action Items</b>			
None.			

**MITIGATION MEASURES SPECIFIC TO FORESHORE CONSTRUCTION**



Monitoring Report: SV-2020-04-30

<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"/>
Comments			
N/A			
Action Items			
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 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>			
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 checked="" 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"/>
Comments			
Turbidity curtains were clearly visible at the works sites, in the photographs shown.			



Monitoring Report: SV-2020-04-30

Action Items
None.

Additional comments or action items
None.