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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 May 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 May 14, 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.

Date	May 14, 2020	**Time of Call (Start):**	1:00 pm	**Time of Call End:**	2:30 pm
Format	Web-based conference call with Trans Mountain presenting photographs, documents and/or videos relevant to the expansion of the Westridge Marine Terminal.				
DFO participants	DFO - TMX Review and Engagement Team, Fish and Fish Habitat Protection Program: W.B. (A/ Team Lead), R.L. (A/ Senior Biologist) and E.S.(Biologist).				
IAMC participants	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)				
Other participants	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)				

Contractor/equipment on site at the time of the call	**Role**
Derrick Barge (DB) Bremerton	Moored along the western shoreline and working on the marine construction office. The first storey of the office building has been completed and the second storey will be constructed this week. A turbidity curtain remains in place around the work area, although there have been no observations or measurements of concern associated with water quality.
Nearshore Barge	Moored along the eastern shoreline and working to consolidate newly placed infill material (i.e., to remove any void spaces). This is done by using of a pin pile attached to a vibratory hammer to vibrate the materials down. A turbidity curtain is in place around the base of the cells which have been infilled. Water quality monitoring for turbidity was conducted in waters outside of the turbidity curtain and no exceedances of the *Canadian Council of Ministers of Environment [CCME] Canadian Water Quality Guidelines for the Protection of Aquatic Life* were recorded.
Offshore barges (e.g., DB General)	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. 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. Access platforms have been constructed on the top of breasting dolphin 6, and two dolphin jackets (large steel structures) are being welded into place.

IAMC Indigenous Monitor/IAMC Observations and Comments

Representatives from the IAMC requested that Trans Mountain provide a more detailed construction update for the WMT. Notes on this discussion are included in this report; however, further discussion on this topic will be continued between Trans Mountain and the IAMC separate to the DFO-IAMC compliance monitoring program.

The IAMC IM asked whether sonar is being used prior to impact pile driving, in order to know whether there were fish present. The IAMC IM also asked whether the secondary bubble curtain was being used while impact pile driving was being carried out. Trans Mountain's responses to these questions are provided in the notes below.

The IAMC IM noted that the timing for Pacific herring spawning was nearly over, and therefore the risk to fish from impact pile driving may decrease given lower abundance. DFO responded with their understanding that juvenile Pacific herring are likely to remain present in waters at the WMT throughout the year.

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Time	Summary of inspection discussions
1:00 – 1:05 pm	Introductions
1:05 – 1:10 pm	Purpose and scope of the meeting The purpose of the meeting was summarised by W.B, who stated that the meeting intended to verify TM's compliance at the WMT with the *Fisheries Act* Authorization.
1:10 – 1:15 pm	Review agenda K.M. gave an overview of the agenda for the meeting: • Follow-up to questions from the previous meeting, regarding representation of the least risk timing window to the construction schedule provided to CER and the distribution of the construction newsletter. • Update on construction activities at WMT since the April 30 meeting, with photos to be provided via the WebEx presentation • Time for questions. K.M added discussion of the underwater noise exceedance events in April to the agenda, at K.R.'s request.
1:15 – 1:30 pm	There was a discussion about information sharing between TM, the IAMC and nearby communities to WMT regarding: • reporting noise exceedances and non compliances publicly, • biweekly reporting of construction activities to nearby communities, • and the construction schedule submitted to CER including information of works being completed outside of the least risk timing window. K.M. followed up on two items that were brought up by IAMC representatives in the previous compliance verification meeting on April 30: (1) the distribution of the project-wide construction schedule to communities nearby WMT; and (2) the request to add details of the works being conducted outside of the extended least risk biological window (LRBW) to the publicly available construction schedule provided to the Canada Energy Regulator (CER) under Condition 62. • K.M. explained that the challenge with including the LRBW in the construction schedule sent to CER is that it is limited to only be one line item for the Westridge Marine Terminal, making it difficult to add this extra detail. • W.B. asked whether this information could be shared differently. W.B. suggested that the information could be shared by email, with a summary of the works that had been completed the week before, along with the WMT construction schedule for the week ahead. • K.M asked for clarification on whether the information being requested was to be shared publicly (i.e., through the Condition 62 update) or whether it was to be shared via a separate method to the IAMC. • W.B. suggested that it would be separate to Condition 62 update, and could be shared just to the IAMC via email to address the request for construction schedule details to be shared with nearby communities. • Y.A. said that an alternative format for WMT construction updates would be welcomed. Given that the Indigenous Monitors (IM) are currently unable to conduct

	in-person compliance verification visits due to COVID-19, it would be useful to have this information so that the IMs can keep track of the activities at the WMT. • C.T. mentioned that K.M. had initially been discussing the construction schedule sent to CER, and the addition of the LRBW works to this schedule. C.T. asked for background on this reporting requirement to CER. • K.M. explained that under Condition 62, Trans Mountain are required to submit a one line construction schedule to CER. Due to the challenges with adding detail to this schedule, K.M. said that she will consider how Trans Mountain can best provide the information on the LRW works and accommodate the request for a detailed construction schedule. • C.T. said that this would be appreciated, as nearby communities would like to have access to a construction schedule, so that they can be prepared for construction noise and be informed of the works taking place. • K.M. noted that the schedule tends to change last minute, but she will take this away a find a solution. • B.J. added that Trans Mountain might not be able to share the construction schedule in the level of detail being requested due to security constraints. • C.T. asked whether this information is provided to CER, in which case it would be publicly available. • B.J. explained that the full construction schedule is not provided to CER, it is just the one line schedule that is submitted to CER and shared publicly. • K.R. suggested that something short could be added to the section 62 schedule sent to CER, which could satisfy the request for information on the works being conducted outside of the LRBW. • K.R. addressed the second point, regarding the request for detailed construction schedules being shared with communities. K.R. suggested that this information be provided in the weekly construction newsletter Trans Mountain distribute, as well as information on non-compliance events that have occurred. The information would need to be accessible and high level. At the moment the only information that is publicly available are the CER fillings, which do not have the level of detail desired, or any information on non compliance. • K.M. said that she will consider how to address these requests. •
1:30–1:45 pm	**Construction Update** S.D. provided an overview of the works that have occurred at the WMT since the April 30th compliance verification conference call. S.D. scrolled through photographs of construction works and described the mitigation measures. <u>Foreshore – sheet-pile cells and arcs</u> • S.D. showed a photograph sheet-pile cells 6-10 that have been backfilled to increase land space for the new marine terminal. These cells have been filled with gravel and the photo showed a pin pile being driven by a vibratory hammer located inside one of the fully-isolated sheet-pile cells. 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. • The sheet-piles used to construct these cells have been cut, so that the structures are now level.

	• S.D. explained that the next stage will be ground improvements, and that the expansion of the foreshore on the east side of the site has mostly been completed. • S.D. showed a photo from 1st May, which showed cell 6 being filled with gravel/aggregate and the sheet-piles leveled. W.B. asked whether there was a turbidity curtain in place at the foreshore. • S.D. showed a photo where the turbidity curtain around the foreshore was visible and explained that the water quality is monitored regularly. W.B. asked whether the monitoring results had highlighted any issues with turbidity or water quality. • S.D. explained that the backfilling of the sheet-pile cells is occurring above the waterline and therefore no turbidity had occurred as a result of this activity. However the first round of filling did create turbidity, but there was no exceedance of water quality thresholds outside of the turbidity curtain. • T.A. added that in-filling is conducted slowly in order to reduce the turbidity created. S.D. then showed a photo of an excavator working to level the gravel within one of the sheet-pile cells. The photo also showed the lock-block in place, used to prevent the release of gravel into the water in the event of an accident. S.D. explained that infilling of all the cells was now complete, and that the gravel had been leveled and graded. S.D. showed a photo of sheet-pile 10a, which is to the east side of WMT. This cell had been filled with gravel and the sheet-piles had been leveled. The lock-block here was also visible. There was also a vibratory pile visible in the background of the photo, being used to eliminate spaces in the gravel within the sheet-pile cell. • W.B. asked whether the area shown at the bottom right of the photo was tidally flushed. • S.D. said that the whole are here was above the high tide. S.D. showed a photo of the crew cutting the sheet-piles to level the cells. S.D. pointed out the turbidity curtain in place to act as a barrier to soil and gravel. • T.A. explained that once the stabilisation of the gravel is complete, concrete will be poured, bringing the top of the sheet-piles to ground level. S.D. showed a photo of the manifold area, looking east from sheet-pile cell 7. S.D. showed another photo looking south over sheet-piles 8-10. The sheet-piles here had also been leveled and a turbidity curtain was visible. • S.D. mentioned that water quality monitoring was on-going, and that no elevation in turbidity had been observed here. S.D. showed a photo of the west foreshore, showing sheet-pile cell 3 and the beach. S.D. pointed out the turbidity curtain in water in front of the cells and the poly-sheeting in place on the beach.

	• S.D. explained that riprap had been removed from the shore and that the ploy-sheeting was in place to prevent erosion from the now exposed beach. • Turbidity was visible in the photo, but was clearly being contained by the turbidity curtain. S.D. explained that the turbidity shown was a result of wind waves rather than works associated with WMT. W.B. asked whether there had been recent inspections and/or maintenance on the sediment and erosion control measures, such as the turbidity curtain. • S.D. explained that the poly-sheeting on the beach requires frequent monitoring and maintenance as it is sometimes blown out of the place by the wind. To address this, a second layer has been added to the existing sheeting, which covers the seams between the sheets. As a result, a smaller area of soil is exposed less frequently. • S.D. explained that the turbidity curtain usually requires little maintenance, usually lasts about 6 months and was last replaced just before the backfilling of the sheet-pile cells began. The turbidity curtain is being replaced next week with a new spill boom style curtain. This new turbidity curtain will be made of a fabric which contours to the seafloor.
1:45-1:50pm	<u>Offshore works – breasting dolphins</u> S.D. explained that each of the breasting dolphins are comprised of four piles (which have all now been driven) and a steel structure (dolphin jacket) which is placed over the top of the piles. • S.D. showed a photo of a dolphin jacket being placed onto the piles of one of the breasting dolphins. • The two dolphin jackets that were mentioned in the last compliance verification meeting have been placed over the piles and secured. • S.D. pointed out the shear lug holes on the sides of the dolphin jacket, used to secure the jacket to the piles. • S.D. showed photos of the access platforms (Derrick Barge Bremerton and Derrick Barge Patrick), where welders are fixing the shear lugs to secure the dolphin jackets. R.L. asked for clarification on the location of the breasting dolphins within the WMT site. • S.D. explained that they were offshore, and showed a photo taken from the shore which showed the location of the dolphins relative to the foreshore arcs and cells.
1:50 – 2:00 pm	<u>Offshore works – superstructure</u> S.D. showed a photo of the loading platform between berths 1 and 2 and explained that concrete pouring to cap the superstructure was still underway. The East side concrete pouring has now been completed, and this week work will start on the west side of the superstructure. W.B. asked whether S.D. would be able to summarise the safety measures in place to contain the cement. • S.D. explained that there are currently several cement trucks and a pump truck stationed on a barge. The cement is poured from the cement trucks into the

	pump truck and the cement is pumped through a hose attached to a boom, which is used to pour the cement onto the superstructure. • S.D. then gave an overview of the containment measures in place: • There are multiple spill kits sited on the barge, which contain absorbent materials which can be used to contain a cement spill onto the barge. The spill would be swept up immediately and there is a procedure in place for reporting the spill. • There are also drip trays underneath each cement truck which will collect any cement spilt or hydrocarbons emitted from the truck. • S.D. showed a photo of one of the cement trucks pouring cement into the pump truck. S.D. explained that a dip tray is in use here as well, underneath the chute used to pour concrete into the pump truck. The drip tray would collect and contain he cement if there were a spill. S.D. also pointed out one of the yellow spill kit containers on the barge, which was visible in the background of the photo. • The hose used to pour cement onto the superstructure is tided off before it is moved, so that no cement will drip from the hose into the water. • Once the cement has been poured from the cement truck to the pump truck, the cement truck shoot is cleaned. In the process, any excess cement is returned to the truck, and there is no waste or spill of cement onto the barge. • T.A. added that there are also Plant Nappies being used on the barge, which allow water to pass through but not hydrocarbons or cement; and that the drip trays are monitored closely to ensure they do not fill with water. S.D. then showed a photo of the west side of the superstructure where concrete is currently being poured. • S.D. explained that tarps are being placed over the top of the cement once it has been poured, to maintain the correct temperature.
2:00 – 2:10 pm	<u>Offshore works – impact pile driving</u> S.D. showed a photo of impact pile driving associated with the construction of a junction platform. • S.D. explained that there will be eight 1.5m piles driven in total and that four had been completed, leaving four more piles to be driven this week. • The photo showed the wash from bubble curtain, clearly showing that the curtain was in place and working at the time of impact pile driving. The atmospheric noise shroud was also visible in the photo. • S.D. stated that there had been no issues during this impact pile driving and that underwater noise levels had been monitored. The underwater noise had remained under 200 dB, which is within the allowable threshold under the *Fisheries Act* authorisation. • S.D. mentioned that the same ramp up procedure discussed in previous meetings, and shared with the meeting participants via email, is being followed. This ramp up procedure includes the use of the acoustic fish deterrent system, followed by sledge hammer strikes to the pile. The bubble curtain is then turned on and the main hammer begins to ramp up, striking the pile at low impact, before pile driving begins. The duration of the bubble curtain prior to impact hammer strike has been reduced to just one minute. • S.D. said that marine mammal monitoring is being carried out while impact pile driving is happening. There had been no observations of any mammals within the exclusion zone during impact pile driving over the past two weeks.

	J.H. asked whether sonar is being used prior to impact pile driving, in order to know whether there were fish present. • S.D. replied that a hydroacoustic survey had been carried out across the whole area of the WMT. Note: the Hydroacoustic Survey Report was shared with the IAMC participants on May 21, following the meeting. • S.D. summarised the results of the survey, explaining that small schools of fish had been observed, mostly at the bottom of the water column, and that it was likely that these fish are Pacific Herring. • S.D. explained that a sonar system has been purchased and that Trans Mountain intend to use this system at WMT in the coming weeks. The sonar system would be used as J.H. had suggested – to locate fish in the area before impact pile driving and to test whether the acoustic deterrent is effective in deterring fish from the area. J.H. asked whether the secondary bubble curtain was being used while impact pile driving was being carried out. • S.D. explained that only the primary bubble curtain was in use in the photo shown. The piles being driven there were smaller (1.5m) and the underwater noise associated with impact pile driving was lower for these piles than the larger piles previously driven. The underwater noise has been below 200dB; and so it is unlikely that the secondary bubble curtain will be needed for pile driving in that area. • However, Trans Mountain do plan to use the secondary bubble curtain during impact pile driving on the trestle span and mooring dolphins, starting on 6th of June, as these piles are larger. • JASCO (noise consultants) have developed a testing plan for the secondary bubble curtain. J.H. noted that the Pacific herring spawning season was now mostly over, and that the risk of harm to herring from underwater noise is therefore likely to now be lower. • S.D. and T.A. agreed, but stated that all precautions regarding harm to fish from underwater noise will remain the same, as it is still possible for juveniles to return to the area, and for fish to be present. • W.B. further added that DFO's understanding of Pacific herring Burrard Inlet was that juveniles are likely to remain present at depth throughout the year. S.D. showed a photo of the bubble curtain being lifted out of the water by a crane. S.D. explained how the bubble curtain works and pointed out the consecutive rings of the bubble curtain that are placed around the pile being driven.
2:10 – 2:20 pm	<u>Marine Construction Office</u> S.D. showed a photo of the office building trestle with the first level of the office buildings in place. • S.D. explained that the first level of the prefabricated modular office buildings had been finished, and that the construction of the second level will start this week. • The photo showed a turbidity curtain, which S.D. explained was in place to collect sediment that might be discharged from an outfall pipe located here. The

	work being carried out on the office building is not expected to increase turbidity in the surrounding water. W.B. asked whether it was possible for turbidity to come from the piles settling (noting that work on the office themselves don't increase turbidity). As the office is constructed above the piles, would the extra weight cause movement in the piles? • T.A. explained that the piles have been driven to the point of refusal, so there will be no further movement associated with added weight. • S.D. noted that water quality monitoring is carried out here and that there has been no increase in turbidity observed as a result of the works, due to the nature of the substrate.
2:20 –2:25 pm	K.M. asked whether K.R. would like to discuss the April noise exceedance events and opened up the floor for questions. K.R. stated that some of his questions had been answered during the presentation, but he would like to ask for clarification on the shortened pile driving ramp up procedure to be used following a test of the secondary bubble curtain mentioned briefly in the meeting. • S.D. explained that the standard ramp up procedure is 6 minutes long. The shortened ramp up procedure is only implemented when the impact hammer has been stopped for less than 5 minutes. K.R. asked whether the effectiveness of the acoustic deterrent was being tested. • S.D. replied that Trans Mountain intend to use the new sonar system to see whether the deterrent system is effective in deterring fish from the area. R.L. asked whether the sonar system is multi-beam and whether S.D. knew the field of view. • S.D. replied that he would find out and let R.L. know the answer. W.B. asked K.M. to comment on Trans Mountains discussion with the manufacturer of the acoustic deterrent regarding the possibility of the lighting system attracting fish. • K.M. answered that Trans Mountain had talked to the manufacturer of the acoustic deterrent about the different lighting options available and the likelihood of attracting fish. • S.D. said that Dr. Andy Turnpenny of Fish Guidance Systems had explained that from his research, he has found that strobe lighting is effective in deterring fish, but that steady light can attract fish. There is the option to turn the light off altogether, but the strobe system on the acoustic deterrent should be effective in deterring fish. W.B. asked whether there had been any marine mammal sightings while impact pile driving was being conducted. • S.D. explained that there had been sightings of killer whales, humpback and grey whales in Burrard Inlet over the past couple of weeks, but impact pile driving was not being conducted at the time of the sightings.
2:25 - 2:30 pm	W.B. mentioned to K.M. that planning for the eventual return to in-person site visits was underway. W.B. will send a table outlining the usual activities that would take place during an in person site inspection and would appreciate it if T.M. could provide details

	for how these activities might be adapted due to COVID-19, to maintain physical distancing and safety. Trans Mountain Trans Mountain
2:30 pm	**Call ended**

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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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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).			
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
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.			
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
Marine mammal monitoring is being conducted at WMT. Although marine mammals were observed over the last two weeks, no marine mammals were observed during pile driving activities during that time.			
Action Items			
None			

Temporary Structures and Decommissioning of Existing Structures			
The application for a *Fisheries Act* 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: ☐ Yes	Issue(s) ☐ Yes	Issue(s) ☐ Yes	Not applicable ☒

☒ No	identified: ☐ No	unresolved: ☐ 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: ☐ Yes ☒ No	Issue(s) identified: ☐ Yes ☐ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☒
Comments			
The utility dock has been removed and no structures are currently being decommissioned.			
Action Items			
None			
Pump Intake Screening			
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 *Freshwater Intake End-of-Pipe Fish Screen Guidelines* (Fisheries and Oceans Canada 1995), and Fisheries and Oceans Canada's *Guidelines for Minimizing Entrainment and Impingement of Aquatic Organisms at Marine Intakes in British Columbia* (Fisheries and Oceans Canada 1991).			
Discussed: ☐ Yes ☒ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
Screens for known water intakes have been discussed during previous site inspections. No issues were reported.			
Action Items			
None			
Fish Salvage			
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: ☐ Yes ☒ No	Issue(s) identified: ☐ Yes ☐ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☒
Comments			
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.			
Action Items			
None			
Integrity of Habitat Offsets			
4.7 The Proponent shall not carry on any works, undertakings or activities that will adversely disturb or impact the offsetting measures.			
Discussed: ☐ Yes ☒ No	Issue(s) identified: ☐ Yes ☐ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☒
Comments			
Offsetting measures have yet to be installed			
Action Items			
None			

MITIGATION MEASURES SPECIFIC TO PILE DRIVING

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

Underwater Sound Pressure Level Reduction			
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
Trans Mountain showed the use of the primary bubble curtain during installation of larger piles by impact hammer. Trans Mountain 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 and that underwater noise thresholds are not being exceeded.			
Action Items			
None.			
Underwater Sound Pressure Level Monitoring			
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
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).			
Action Items			
None			
Marine Mammal Monitoring			
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
TM are carrying out marine mammal monitoring, no sightings occurred within the exclusion zone during impact pile driving over the last 2 weeks.			
Action Items			
None			

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Measures specified within the Westridge Marine Terminal Environmental Protection Plan:

Fish Salvage			
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: ☐ Yes ☒ No	Issue(s) identified: ☐ Yes ☐ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☒
Comments			
No fish salvage is occurring at WMT.			
Action Items			
None			

Turbidity Monitoring			
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
Turbidity curtains are in place and water quality monitoring has recorded no exceedance in water quality guidelines for turbidity have been recorded outside of the turbidity curtain.			
Action Items			
None			

MITIGATION MEASURES SPECIFIC TO FORESHORE CONSTRUCTION

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

Water Quality Maintenance and Monitoring			
Westridge Marine Terminal Fisheries Act Authorization Conditions			
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
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: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Westridge Marine Terminal Environmental Protection Plan Commitments			
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: ☐ Yes ☒ No	Issue(s) identified: ☐ Yes ☐ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☒
Westridge Marine Terminal Sediment and Erosion Control Plan Commitments			
The in-water sediment curtain will remain intact during Foreshore construction activities to ensure sediment laden water is not discharged into Burrard inlet.			
Discussed: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			

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Turbidity curtains were visible at the works sites, in the photographs shown.
Action Items
None

Additional comments or action items
Following the compliance verification call, DFO shared the hydroacoustic survey report sent by Trans Mountain to IAMC participants, and a sent a summary of follow-up items raised during the meeting to Trans Mountain.