Monitoring Report: SV-2020-10-29

Trans Mountain Expansion Project – Westridge Marine Terminal (WMT) Compliance Verification Activity Report

Date	October 29, 2020	**Site visit start time:**	11:00 AM	**Site visit end time:**	4:00 PM
Format	In-person site inspection.				
Fisheries and Oceans Canada (DFO) attendees	K.J. (Biologist)				
Indigenous Advisory Monitoring Committee (IAMC) attendees	J.L. (Indigenous Monitor, Seabird Island Band) and T.M. (Indigenous Monitor, Seven Generations Environmental Services)				
Other attendees	Trans Mountain: S.D. (Lead Environmental Inspector) and K.M. (Senior Regulatory Advisor)				

On-site contractor/equipment	**Role**
Trans Mountain Corporation (TMC)	Site Management
Kiewit Ledcor Trans Mountain Partnership (KLTP)	Prime construction contractor
JASCO Applied Sciences	Underwater noise monitoring during vibratory and impact pile driving.
Triton Environmental Consultants	Fish salvage in foreshore Cells and Arcs and marine mammal monitoring.
Keller	Deep soil mixing (DSM) and jet grouting works on the foreshore.
DB Columbia	Derrick barge (DB) Columbia is moored along the shoreline while vibratory pile driving sheet-piles for foreshore Arc 10A.
DB General	DB General is moored along the shoreline for vibratory and impact pile driving of Trestle Span 1 (TS1). TMC is using seal acoustic deterrent devices during impact pile driving.
DB Bremerton	Located offshore awaiting works on Mooring Dolphin 2 piles.
DB Patrick	DB Patrick is currently located offshore and is used to primarily drive smaller diameter piles.

IAMC Indigenous Monitor Observations and Comments

JL's General Notes:

- Number of seal sightings are decreasing and California sea lion has not been spotted in recent days
- Currently using 4 seal acoustic deterrents – effectiveness varies because of unpredictable seal volume and activity
- 'Seal stops' have been ordered to be installed on safety boom, floats, docks etc.
- Secondary bubble curtain test complete – waiting on results from JASCO report
- TMC has specific teams to monitor, maintain and adjust erosion and sediment control (ESC) measures at the WMT
- Trans Mountain IM away day of inspection due to emergency surgery (non-work related)

JL's Observations:

- Observed ongoing works of building derailment wall
- Observed ongoing pre drilling, deep soil mixing and jet grouting activity on foreshore
  - Areas fenced / safety signs posted
- Observed sediment fence and pumps around grout production area
- Observed water treatment plant

  - All foreshore contact water treated before discharging back to marine environment
  - Permit amendment in process for treating waste water
- Observed and informed of various recent fish salvage activities
  - Observed salvage equipment within Arc 3A
  - Cells 4 and 5 and Arc 3A salvage complete
  - Arc 10A invertebrate salvage underway
  - All salvaged marine life transported to Barnet Marine Park via water taxi
- Observed turbidity curtain around length of foreshore
  - Noticeable difference in colour of the water inside and outside of the curtain
- Observed conveyer barge backfilling Cell 4
  - Template set for Arc 5A
  - Once Arc 4A and Arc 5A are complete scaffolding will be removed and area will be backfilled
- Observed vibratory pile driving of sheet piles for Arc 10A
  - Sheets are vibed in simultaneously to prevent kick back
- Observed cured grout spoils being loaded into hopper and onto double conveyor into containment barge
  - Heavy duty tarps catch fallen grout within 2 meter gap from sheet piles to grout collecting on the barge
  - Operational for roughly 2 weeks prior to inspection
  - Conveyor gated off and warning/safety signs posted
- Observed jet grouting spoil pits
  - Jet grouting test pit in Cell 8
  - Areas gated with safety/warning signs posted
- Observed multiple spill kits around ongoing works on foreshore
- Observed plant nappies under equipment and parked vehicles on foreshore
- Observed preparations for temporary relocation of jet fuel line in order to build Cell 11
- Observed single boot brush on grated bridge to marine construction office
  - Inquired if its usage was mandatory to prevent grout from boots falling into marine environment – was ensured its usage is best practice
- Observed DB General resetting in attempt to impact pile through large obstruction
  - Resetting was unsuccessful on this day
  - No impact pile driving observed
- Observed first completed top deck pour on Loading Platform 1 offshore
  - All pre-cast deck panels are set
  - Rebar installation ongoing
  - Next concrete pour scheduled for beginning of November
  - Hazardous materials stored in drums inside secondary containment

<u>JL's Follow-up questions:</u>

- KJ relayed JL's follow-up questions to TMC during the November 26th CVA conference call:
  - Have the test results regarding the secondary bubble curtain been analyzed by JASCO yet and will these results be shared with the IAMC and DFO?
  - SD: TMC has received the draft report from JASCO on the secondary bubble curtain test today. TMC will review and finalized the report soon.
  - When on-site last month, SD mentioned a team of people who are involved in erosion and sediment control (ESC) measures. Are you able to elaborate on what this team does?
  - SD: The TMC team includes SD, MJ and another Environmental Inspector. This team monitors all ESC measures, identifies deficiencies and makes recommendations for improvements. KLTP has an environmental team and completes similar tasks as the TMC

team. A third ESC team includes a super intendent, a foreman and labourers who implement, maintain and adjust ESC measures.

TM's Notes and Observations:

1100hrs – Arrive at KASK with KJ and JL.
Meet with TMC representatives (Jake - KLTP safety coordinator, SD and KM). Completed project visitor orientation.
TMC summarized current activities.
1230hrs– Arrive Westridge Marine Terminal Site
Observed activity while walking the length of the shoreline – jet grouting, loading of conveyor barge, pile driving.
Observed turbidity current at West end of shore en route to water taxi – appeared effective.
1330hrs - Toured site by water taxi.
Boarded DB Olympia barge and observed rebar installation activities on Loading Platform 1/2.
1500hrs – Returned to shore and conducted debrief with SD, KM, JL and KJ.
1540hrs – Debrief with KJ and JL at KASK site. Mentioned that I observed some workers on DB Olympia barge not wearing PFD's in some areas and some were not wearing masks when less than 6 feet away from each other. Discussed possibility of grout coming off our boots and falling into the water while walking on the metal grating around the marine construction office and walkway to the water taxi.
1600hrs – Left KASK.

Note: Pictures taken. I reviewed KJ's draft report below and support its content.

Monitoring Report: SV-2020-10-29

Time	Inspection Activity
11:00 AM	Upon arrival at the KASK site, a KLTP representative gave JL, TM and KJ a Health and Safety Orientation. Prior to going out on site SD, KM, TM, JL and KJ had a pre-site meeting. SD provided an overview of the site layout at the WMT and described the construction works that have occurred since the September 28th compliance verification site visit: • Foreshore (ongoing deep soil mixing and jet grouting and works on the derailment wall); • Nearshore/in-water (completed fish salvages in foreshore Cells 4, 5 and Arc 3A, backfilling Cell 4, installing a template for Arc 5A, and conducting an invertebrate salvage and vibratory pile driving sheet-piles for Arc 10A); • Offshore (in the process of conducting top deck concrete pours on Loading Platform 1/2, welding and installing formwork on Junction Platform 1 and vibratory and impact pile driving Trestle Span 1 (TS1) piles). Other items discussed: • SealFence seal acoustic deterrent system: ○ SD confirmed that the sound source characterization report produced by JASCO should be ready soon and will be shared with DFO and the IAMC. ○ Mixed results were produced while using four seal acoustic deterrents when previously impacting TS0. SD explained the deterrents are not 100 % effective at deterring harbour seals within the 150 m harbour seal-specific exclusion zone. ○ SD confirmed the seal acoustic deterrents are run prior to and during impacting for a duration of approximately 30 minutes to 1 hour. Marine mammal monitors are present prior to and during operation of the devices to perform continuous visual monitoring of a 1,400 m exclusion zone for cetaceans and marine mammal species at risk. ○ SD confirmed TMC will limit the duration of the acoustic deterrents as much as possible in order to avoid habituation. • California sea lion using the marine construction safety boom as a haul-out site: ○ SD confirmed the sea lion is no longer present at the WMT. ○ Impact pile driving was completed while the sea lion was on-site, but out of the water. A marine mammal monitor continuously monitored the sea lion during impact pile driving and work was stopped as soon as the sea lion entered the water. ○ SD has ordered ‘seal stops’ that are designed to help deter seals and seal lions from hauling out on floats or docks. • Secondary bubble curtain: ○ Testing for the secondary bubble curtain is complete and JASCO is in the process of analyzing results. ○ The secondary bubble curtain may be used to attenuate underwater noise if hard substrate is encountered while impact pile driving.
12:30	Arrive at the Westridge Marine Terminal.
12:30 – 13:30	Works observed while walking along the foreshore: • Observed the wastewater treatment plant located on the western foreshore (the treatment plant will be moved once deep soil mixing and jet grouting works commence on the western foreshore). All surface water run-off from the foreshore

	and above is redirected here via hoses and pumps for treatment prior to being discharged into the marine environment. ○ Sampling is conducted inside and outside of the foreshore turbidity curtain to ensure pH and turbidity levels meet the requirements of TMC's BC Ministry of Environment (MOE) discharge permit. • Viewed the conveyor barge backfilling foreshore Cell 4 with gravel. ○ Turbidity from backfilling was primarily contained within the gap between the southernmost foreshore sheet piles and the foreshore. The sheet-piles composing the foreshore cells are not water-tight. The turbidity curtain surrounding the foreshore cells functions as a barrier between the outside or northernmost foreshore sheet-piles and the marine environment. ○ Turbidity sampling is conducted inside and outside the turbidity curtain during backfilling. ○ The fish salvage in adjacent foreshore Arc 3A was completed prior to backfilling Cell 4. An exclusion net was visible between Cell 4 and Arc 5A. • Viewed the wastewater containment pit for grout works and appropriate erosion and sediment controls (ESC) surrounding the pit (silt fencing and a small trench with built up sides). SD ensured the silt fencing was keyed in properly. The silt fencing appeared to be maintained. TMC is waiting to receive a permit from the BC MOE to treat this wastewater on-site at the foreshore wastewater treatment plant. • Observed a few remaining creosote piles from Dock 59. ○ SD confirmed the piles are wrapped with sorbent pads to prevent leaching of hydrocarbons. • Observed the conveyor system transporting cured grout spoils from the foreshore to the moored barge. The contractor, KLTP, has fitted a metal frame lined with a thick tarp beneath the section of the belt (approximately 2 m in length) that extends over the marine environment, to prevent any grout or residue from entering the water below. The barge takes the cured offsite for disposal at Summit Earthworks in Mission, BC. • Observed plant nappies present beneath trucks and equipment parked on the foreshore. • Observed ongoing DSM and jet grouting works and the grout spoil pits. • Observed a 'test' grout pit on the foreshore. ○ Jet grout columns need to be installed closer to the foreshore sheet-pile walls that form a barrier between the marine environment and the foreshore. ○ The test pit, located on the foreshore away from the marine environment, includes part of one the foreshore cells that has been previously backfilled with piles cut to ground level. ○ As sheet-piles composing the foreshore cells are not water-tight, TMC is testing jet grouting works next to the sheet piles to see if the pressure forces any liquid or material outside the sheet-pile walls. • Observed vibratory pile driving sheet-piles for Arc 10A. ○ After the site visit, DFO asked TMC for clarification of the timing of vibratory pile driving and the fish/invertebrate salvage behind the Arc. ○ TMC confirmed the contractor, KLTP, closed the sheet-pile wall of Arc 10A during low tide when there was no water or fish behind the Arc. TMC's fish salvage contractor, Triton Environmental Consultants, completed the invertebrate salvage at low tide by hand over three days (October 27-29).

	• Observed the turbidity curtain that encompasses the foreshore cells to be working well (the curtain was keeping the more turbid water from entering the adjacent marine environment).

13:30 – 14:30	Works observed while on the water taxi offshore:
	• Viewed works on Loading Platform 1/2
	  ○ All pre-cast deck panels are set, rebar is being installed, and large top-deck pours are in progress (next pour on November 3).
	  ○ Spill containment bins were located on the barge next to the Loading Platform.
	• KJ asked how the concrete and grout pours were going offshore.
	  ○ SD confirmed no pours were occurring today and pours are going well with proper mitigation measures in place.
	• Viewed trestle spans between the Loading Platform and the Junction Platform.
	• Observed a TS1 pile being driven with the tandem APE-600 vibratory hammer.
	  ○ No impact pile driving was observed as the pile was hitting an obstruction and could not be driven any further during the site visit.
	  ○ Once TS0-TS2 piles are driven, the trestle span will eventually connect from the shore to Loading Platform 1/2.
	  ○ Mooring dolphin 1 and 3 piles will be driven following completion of trestle span piles.

15:00 – 15:20	Post-site inspection meeting:
	• KJ asked if the SealFence acoustic deterrents are run at the same time as the fish acoustic deterrents.
	  ○ SD explained the acoustic deterrents do overlap during operation. SD confirmed the acoustic deterrents operate on different frequencies.
	• JL asked where the jet grouting ‘test’ pit is located on the foreshore.
	  ○ SD confirmed it is located in foreshore Cell 8.

15:20-15:40	Shuttle back to KASK site.

15:40 – 16:00	Post-site visit discussion between IAMC IM’s and DFO:
	• JL raised the issue of sediment and mud from boots being potentially tracked onto and falling through the metal grating of the walkway surrounding the marine construction office into the marine environment below (especially after walking or working in the foreshore area).
	  ○ After the site visit DFO reached out to TMC via email regrading this concern. TMC confirmed that a boot brush near the marine construction office was available during the site visit. Following the feedback received during the site visit, TMC installed an additional boot cleaner by the entrance to the trestle deck and has added signage directing workers and guests to clean their boots prior to entering the trestle. Photos of the boot cleaning station and the signage were provided to DFO.
	• Discussed potential safety concerns on-site:
	  ○ TM noted that some of the workers working on the trestle span appeared to not be wearing Personal Flotation Devices and mask requirements may not have been appropriately followed by all (e.g. some workers at times appeared to be within six feet of each other, but were not wearing a face covering).
	  ○ After the site visit, DFO informed the Canadian Energy Regulator (CER) of these observations via email, given the CER’s regulatory oversight of health and safety and COVID-19 protocols at the WMT.

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/ observed:	☒ Yes ☐ No	Issue(s) identified:	☐ Yes ☒ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☐	
Comments							
Nearshore works were taking place within the work timing window.							
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/ observed:	☒ Yes ☐ No	Issue(s) identified:	☐ Yes ☒ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☐	
Comments							
TMC's EI was on-site at the time of the inspection. The TMC's Indigenous Monitor (TMC IM) was not on-site during the site inspection. The TMC IM, representing Kwikwetlem First Nation, was unavailable due to a medical emergency unrelated to works at the WMT. The TMC IM is expected to return to monitoring at the WMT within the next week.							
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/ observed:	☒ Yes ☐ No	Issue(s) identified:	☐ Yes ☒ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☐	
Comments							
TMC noted that there had been multiple delays to pile driving recently due to the presence of one or more harbour seals in the seal-specific 150 m exclusion zone prior to the commencement of impact pile driving. Work stoppage of impact pile driving was also due to the presence of a California sea lion within the marine mammal 1 km exclusion zone. The sea lion has been using the marine construction safety boom at the WMT as a haul-out site for the past few weeks. Impact pile driving was only conducted when the sea lion was located out of the water on the marine construction safety boom. A marine mammal monitor was required to continuously watch the sea lion to ensure works could be stopped if it looked like it was about to enter the water during impact pile driving.							
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 ☒ No	Issue(s) identified:	☐ Yes ☐ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☒	

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/ observed:	☐ Yes ☒ No	Issue(s) identified:	☐ Yes ☐ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☒	

Comments

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/ observed:	☐ 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/ observed:	☒ Yes ☐ No	Issue(s) identified:	☐ Yes ☒ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☐	

Comments

Fish salvages within Cell 4, 5 and Arc 3A have been completed since the last site visit on September 28, 2020. An invertebrate salvage was underway in Arc 10A on the day of the site visit. Fish salvages are conducted prior to impacting any sheet-piles. Minnow and crab traps are used. Captured fish and invertebrates are released at Barnet Marine park. No issues were reported.

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/ observed:	☐ Yes ☒ No	Issue(s) identified:	☐ Yes ☐ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☒	

Comments

Offsetting measures have yet to be installed.

Monitoring Report: SV-2020-10-29

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/ observed: ☒ 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/ observed: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
Vibratory pile driving was occurring on a TS1 pile and Arc 10A sheet-piles during the site inspection. The Tandem APE-600 vibratory hammer reduces time spent impact pile driving and is being used to drive trestle span piles prior to impacting. Hydrophones are being used to monitor and record underwater noise produced from all pile driving activities. No impact pile driving was occurring at the time of the site inspection. TMC reviewed the impact pile driving ramp-up sequence (running the fish acoustic and light deterrent and seal acoustic deterrent, strikes to the pile with a sledgehammer, running the bubble curtain, and lower strike force hammer ramp-up).			
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/ observed: ☒ 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/ observed: ☐ 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	Issue(s) ☐ Yes	Issue(s) ☐ Yes	Not applicable ☐

observed: ☐ No	identified: ☒ No	unresolved: ☐ No	
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/ observed: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
Impact pile driving was not occurring at the time of the site inspection. TMC stated that during recent impact pile driving they recorded underwater noise levels below 200 dB re: 1 µPa at 10 m from the pile for trestle span piles and below 206.2 dB re: 1 µPa for mooring dolphin piles.			
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/ observed: ☒ 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/ observed: ☒ 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/ observed: ☒ 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/ observed: ☒ 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/ observed: ☒ Yes ☐ No	Issue(s) identified: ☐ Yes ☒ No	Issue(s) unresolved: ☐ Yes ☐ No	Not applicable ☐
Comments			
The observed presence of harbour seals within the harbour seal-specific 150 m exclusion zone prior to and during impact pile driving has resulted in multiple work stoppages. TMC is using four seal acoustic deterrents within the 150 m seal-specific exclusion zone as a mitigation measure to avoid adverse impacts (e.g., auditory injury) to 'fish' (which includes marine mammals such as seal) during impact pile driving (Condition 2.2.8 of the *Fisheries Act* Authorization). Currently, prior to and during operation of the four seal deterrents, five marine mammal monitors perform continuous visual monitoring of a 1,400 m exclusion zone for cetaceans and marine mammal species at risk. The radius of this exclusion area may be adjusted			

following the results of the sound characterization study conducted by JASCO for the seal acoustic deterrent devices.

Recent work stoppages to impact pile driving were also due to the presence of a California sea lion within the marine mammal exclusion zone. The sea lion has been using the marine construction safety boom at the WMT as a haul-out site for the past few weeks. Impact pile driving was only conducted when the sea lion was located out of the water on the marine construction safety boom, and not exposed to underwater noise. A marine mammal monitor was required to continuously watch the sea lion to ensure works could be stopped if it looked like the animal was about to enter the water during impact pile driving. The sea lion had not been spotted by monitors for the last few days prior to the site visit.

Action Items

None.

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/ observed:	☒ Yes ☐ No	Issue(s) identified:	☐ Yes ☒ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☐

Comments

Fish salvages have been completed within Cells 4 and 5, and behind Arc 3A since the last site visit on September 28, 2020. An invertebrate salvage was underway in Arc 10A on the day of the site visit. Fish salvages are conducted prior to impacting any sheet-piles. Minnow and crab traps are used. Captured fish and invertebrates are released at Barnet Marine park. No issues were reported.

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/ observed:	☒ Yes ☐ No	Issue(s) identified:	☐ Yes ☒ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☐

Comments

Vibratory pile driving was occurring on a TS1 pile and Arc 10A sheet-piles during the site inspection. No concerns were raised regarding turbidity levels. The water surrounding the TS1 pile being driven did not appear to be more turbid than surrounding offshore water. Potential turbidity generated from driving Arc 10A sheet-piles was not viewable during the site inspection; however, Arc 10A is encompassed by the foreshore turbidity curtain.

TMC noted that water is sampled on an ad hoc basis (i.e., when turbidity is observed).

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/ observed:	☐ 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/ observed:	☐ 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/ observed:	☒ 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/ observed:	☐ 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/ observed:	☐ 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/ observed:	☒ Yes ☐ No	Issue(s) identified:	☐ Yes ☒ No	Issue(s) unresolved:	☐ Yes ☐ No	Not applicable ☐	
Comments							

Monitoring Report: SV-2020-10-29

A turbidity curtain remains in place around the sheet-pile cells and attaches to the foreshore. Visual monitoring indicated that the turbidity curtain was working to effectively separate the more turbid water generated from foreshore construction activities from the adjacent marine environment. Another turbidity curtain is in place around a water outfall located on the westernmost foreshore area that drains water from residential storm grates and water from a treated wastewater containment tank at WMT. Silt fencing surrounding the grout wastewater containment area on the foreshore appeared to be maintained (upright, intact and confirmed to be keyed in). Polysheeting lined the pit where the grout waste is contained. Polysheeting is used to prevent erosion of the foreshore banks located behind foreshore cells in areas that have yet to be backfilled and have exposed earth (e.g. behind foreshore Cells 4, 5 and part of 6). Berms built up around the grout curing pits on the foreshore appeared to easily contain the liquid grout spoils as they harden.
Action Items
None.

Additional comments or action items
None.