

Appendix B  
Westridge Marine Construction  
Safety Boom



**Kiewit**



# WESTRIDGE MARINE CONSTRUCTION SAFETY BOOM

## A. Background

As required by the National Energy Board a Navigation and Navigation Safety Plan (NNSP)<sup>3</sup> has been prepared. The NNSP notes that there is potential of Project construction affecting navigation and navigation safety. This includes disruptions to users during construction or maintenance activities and safety of users entering the construction zone. Therefore, in anticipation of construction pile driving for the Westridge Terminal commencing in the fall of 2017, plans are in hand to install a floating marine construction safety boom around the entire Westridge working zone. The marine construction safety boom, a key element of the NNSP, will be designed to ensure the safety of commercial and recreational users of the local marine area, and the safety of workers working within a clearly demarcated working zone. The overall Westridge area working zone is shown in Figure 1 and is expected to encompass waters covering the future Westridge water lot lease area plus an additional temporary working space.

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<sup>3</sup> <https://www.transmountain.com/navigation-safety-plan>

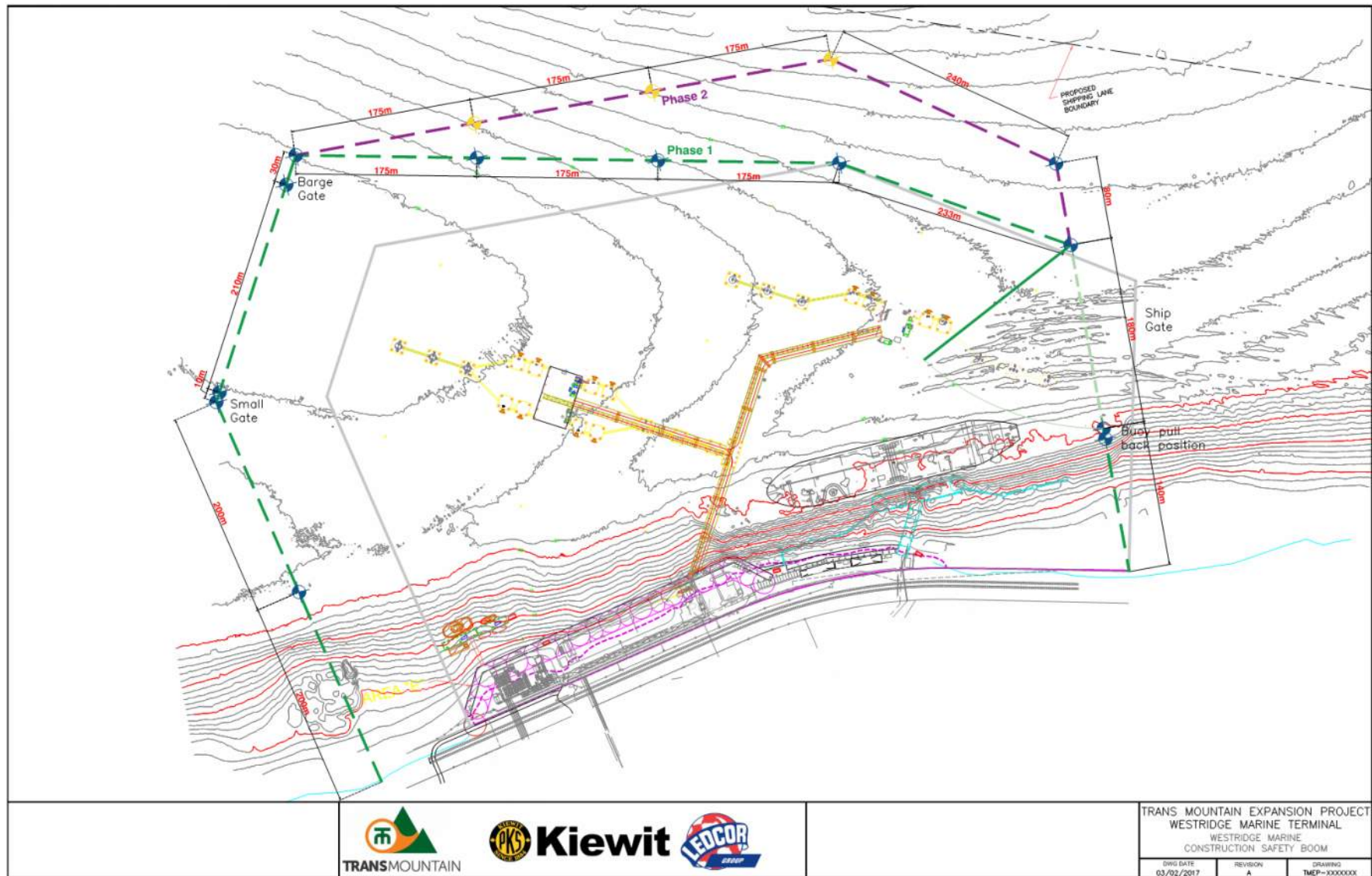


Figure 1: Proposed marine construction safety boom showing shipgate



## **1. Westridge Marine Construction Safety Boom**

The marine construction safety boom will consist of floats and suitable vertical panels. Once deployed it will extend from the high water mark west of the facility, out and around the entire construction footprint including the existing ship berth and tying back into the shore on the east side of the facility. The layout of the floating safety boom will be configured according to the construction operations and schedule and its layout during the first and second years of construction are shown as Phase 1 and Phase 2 respectively.

This boom will be moored using suitable anchors to withstand typical and worst case environmental conditions found in this area. It will be fitted with several access points or gates to accommodate the passage of construction vessels and vessels coming to and from the existing Westridge dock. The existing terminal will remain in operation for the majority of the construction period.

The marine construction safety boom will be staged at a nearby yard in the Burrard Inlet. From here it will be assembled and launched.

## **2. Navigation marks**

The marine construction safety boom will be highly visible during the day. The structure will be equipped with reflective placards on both the inside and outside so the marine construction safety boom remains visible between the buoys. At night, in accordance with general Canadian Coast Guard requirements, the boom will be marked by navigation lights (Flashing yellow one nautical mile range) on all offshore corners. Additional lights will be mounted on the ship gate buoys. Radar reflectors will be installed strategically to assist approaching traffic identify the boom on radar during night time and periods of reduced visibility.

## **3. Phased implementation**

*Phase 1: Late summer 2017 to August 1, 2018* | Construction activities planned for this period include driving pipe piles for the Berth 1 & 2 dolphins, and driving sheet piles for the foreshore. During this period oil cargo vessels will access the existing dock through a ship gate placed at the eastern side of the marine construction safety boom. The actual layout and deployed extent of the boom may vary from the preliminary working layout shown in Figure 1; however, the minimum distance of the Phase 1 deployed boom from the centerline of the normal shipping route taken by passing vessels will be approximately 313 m (see Figure 2).

*Phase 2: August 1, 2018 to December 31, 2019* | Berth 3 construction and the completion of Berths 1 & 2 will be undertaken during this period. During this phase the minimum distance of the deployed boom from the centerline of the normal route taken by passing vessels will be about 217 m (see Figure 2).

During the latter part of this period, cargo oil transfer operations will be shifted to the new Berth 1. Depending on requirements at that time, the ship gate for oil cargo vessels to access the dock will be shifted to the western side of the marine construction safety boom in order to allow access of those vessels to Berth 1. Such a Phase 3 iteration of the marine construction safety boom will be developed based on working experience with the use of the Phase 1 marine construction safety boom.



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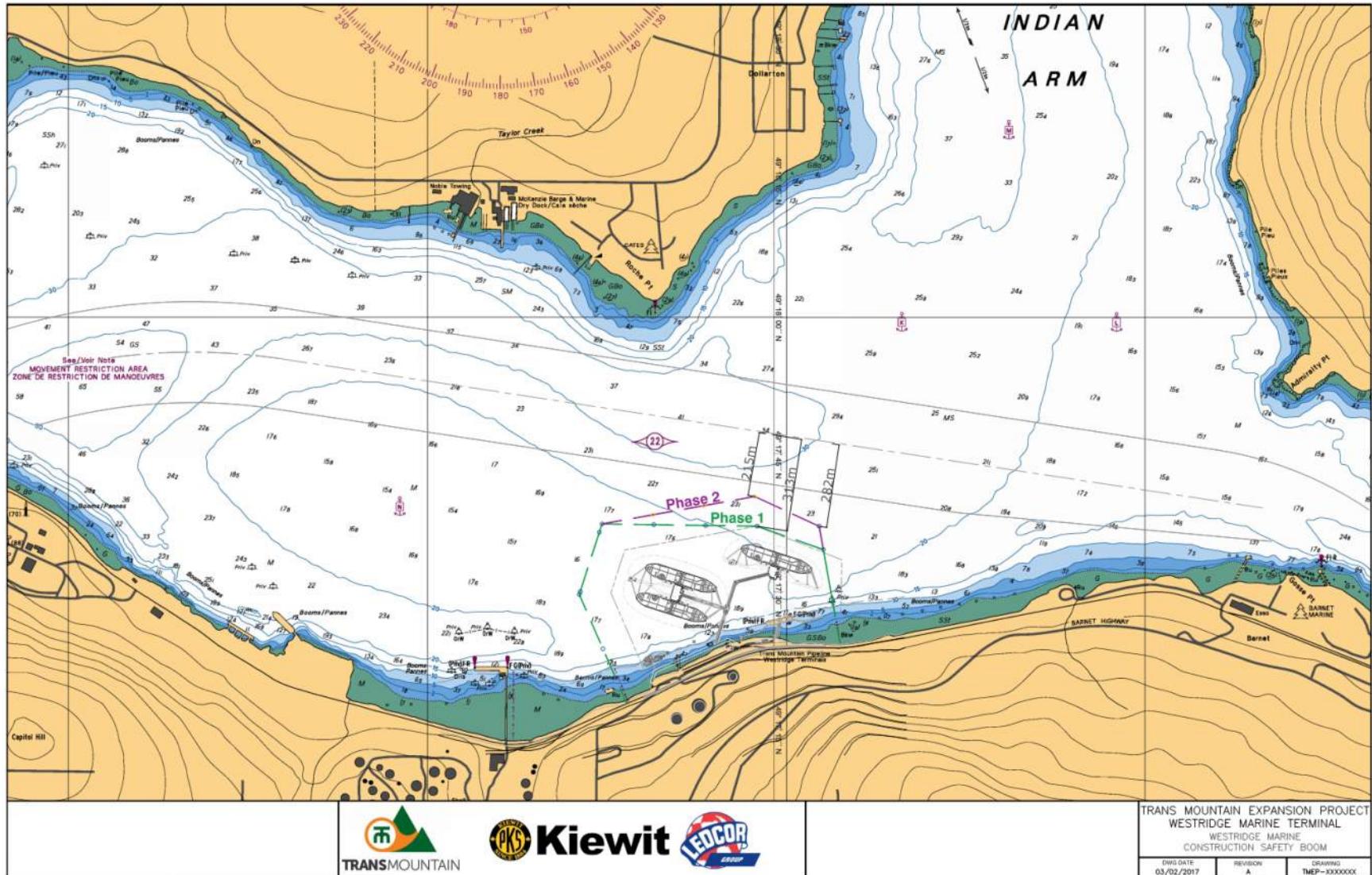


Figure 2: Eastern Burrard Inlet showing current and proposed Westridge dock area with the marine construction safety boom



## 4. Operations

During Phase 1, the ship gate will swing inward toward an anchor buoy located by the future Berth 3. The opening will be approximately 180 m wide and if necessary it is anticipated that the opening could be further expanded by about 10 m on its southern side by installing mechanism to pull the inshore ship gate buoy toward shore.

A ship gate size of 180 m is proposed which is expected to be compatible with the results of the desk top navigation simulations previously undertaken by Lantec<sup>4,5</sup> and submitted to the TMEP TERMPOL Review Committee and the NEB. Lantec carried out the simulations on a Kongsberg desktop simulator using Aframax vessels with typical worst case environmental conditions by applying wind from the northeast at 25 knots and tidal stream values as per spring tide conditions. Early verification of gate size compatibility and adequacy of maneuvering room has been made by Lantec by carrying out replays of two of the runs after having marked the Phase 1 and Phase 2 marine construction safety boom layout with ship gate coordinates to the simulation, see Figure 3 and Figure 4. Please note that Berth 3 will remain partially built while the existing dock is in operation with construction of the eastern dolphins deferred till after cargo operations have been transferred to new Berth 1 in 2019.

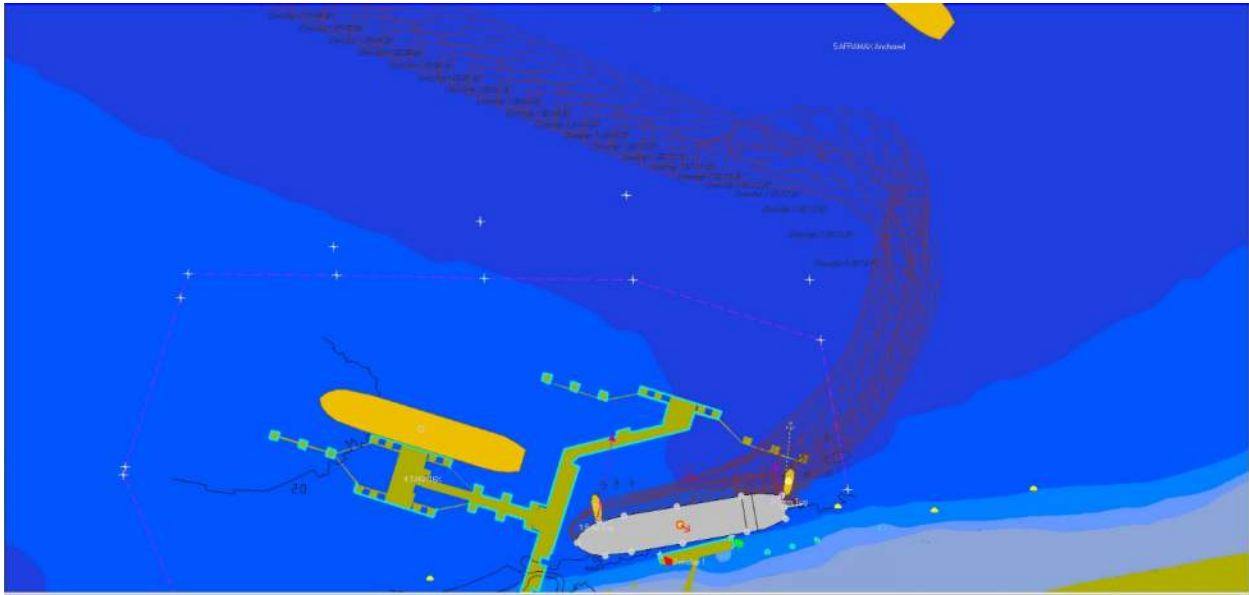


Figure 3: Arriving Aframax - Approaching existing berth through the marine construction safety boom shipgate (new berth 3 eastern dolphins will be constructed after existing berth operations have been transferred to new Berth 1)

<sup>4</sup> Summary Report of Manoeuvring Assessment, Westridge Terminals Vancouver Expansion, 4 October 2013

<sup>5</sup> Summary Report of Manoeuvring Assessment, Westridge Terminals Vancouver Expansion, 13 August 2014



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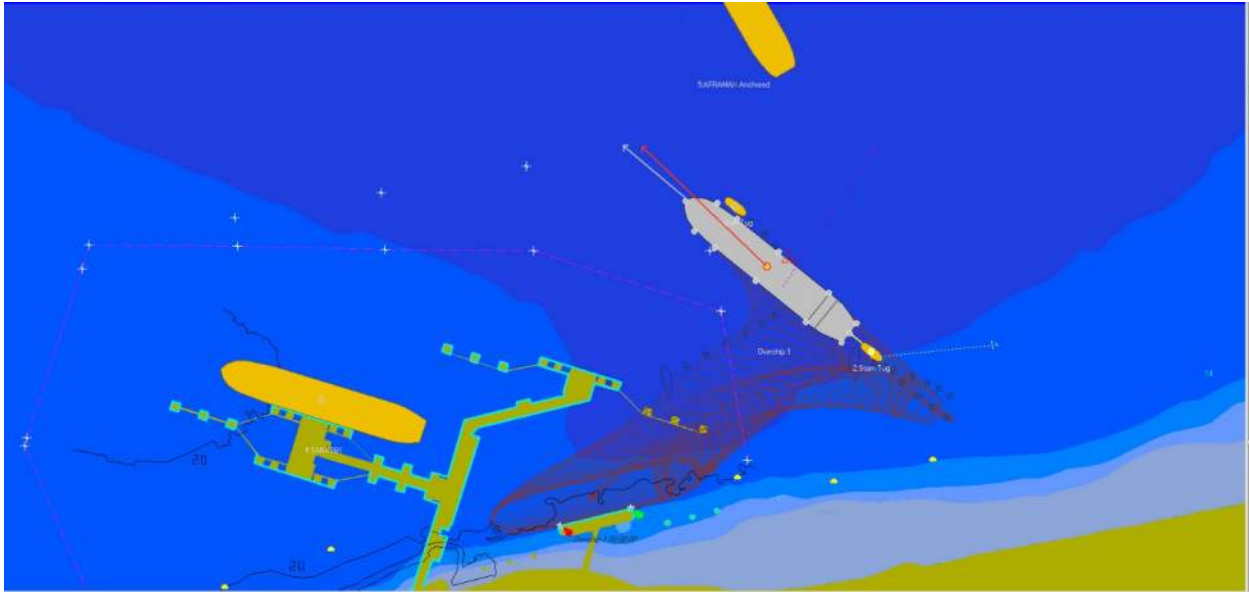


Figure 4: Departing Aframax – Departure from existing berth through the marine construction safety boom shipgate