SECTION 4

Early Works

4.1 Temporary Workspaces

Figure 4-1 shows the temporary workspaces associated with construction of the Project. Temporary barge ramps or rail spur tracks during construction are not currently considered necessary.

4.2 Temporary Piles

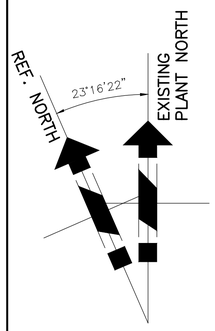
In total, the Project will add 373 temporary piles: six temporary piles for the marine construction safety boom, 235 temporary piles for templates, and 132 addition piles for other works (such as, foreshore and the temporary office trestle). Table 4-1 provides more details on these temporary piles. Figures 4-1 and 4-2 provide a sketch of the temporary piles.

Table 4-1. Temporary Piles

Type	Location	Quantity	Diameter (ft)	Diameter (m)	Pile Area (m^2)	Total Area (m^2)
Marine Construction Safety Boom	Along safety boom alignment – final location to be determined	6	2	0.610	0.29	1.8
Template Piles	Berth 1-2 Dolphins	56	3	0.914	0.66	36.7
	Loading Platform 1-2	8	3	0.914	0.66	5.2
	Berth 3 Dolphins	40	3	0.914	0.66	26.2
	Loading Platform 3	8	3	0.914	0.66	5.2
	Access Trestle	18	3	0.914	0.66	11.8
	Junction Platform 1	4	3	0.914	0.66	2.6
	Junction Platform 2	6	3	0.914	0.66	3.9
	Foreshore Circular Cells – Within Sheet Pile Cells, no additional area	55	3	0.914	0.66	0.0
	Foreshore Circular Cells – Within Sheet Pile Cells, no additional area	40	3	0.914	0.66	0.0
Temporary Working Piles	Foreshore Construction (along foreshore)	20	2	0.610	0.29	5.8
	Proposed Trestle (office laydown) – West of foreshore	12	2	0.610	0.29	3.5
Miscellaneous Piles	Miscellaneous anchor points, construction piling	50	3	0.914	0.66	32.8
	Miscellaneous anchor points, construction piling	50	2	0.610	0.29	14.6
	Total	**373**				**150.1**

Notes:

ft = foot
m = metre
m^2 = square metre



ch2m:
Jan 31 2016
ISSUED
FOR
PERMIT APPLICATION

ch2m:
PROJECT # 660356

0 20m 40m 60m

NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR
			0	2017/01/31	ISSUED FOR PERMIT APPLICATION AFE #01-13283 (CH2M PROJ. #660356)	YZ	RO	RB

TRANS MOUNTAIN

DRAWN BY RO	TMEP PERMIT DRAWING SITE PLAN FORESHORE AND EXISTING DOCK EXISTING AND PROPOSED BUILDING WESTRIDGE TERMINAL	SHEET SIZE A1
CHECKED BY RGS		SCALE 1:1000
APPROVED BY PH		DATE 16/04/29

PROJECT CODING	DRAWING NUMBER			
AFE	FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00 —	GA01031	01	0

FILE NAME: P:\KINDERMORGAN\660356TMPLPREDETAILEDDESIGN\GEN\PERMITTING\WESTRIDGE TERMINAL\PFA PERMITING\JAN 31 2017 PERMITING\GA01031.DWG PLOT DATE: 27 January 2017 PLOTSTYLE: KINDER-MORGAN-A1_FULL_MONO.ctb

Phase 2

Phase 1

Barge Gate

Small Gate

MARINE CONSTRUCTION SAFETY BOOM
6 EA Piles – 2' Ø

TEMPLATE PILES – MARINE CONSTRUCTION
140 EA Piles – 3' Ø

TEMPLATE PILES – FORESHORE CONSTRUCTION
95 EA Piles – 3' Ø

TEMPORARY CONSTRUCTION PILES
20 EA Piles – 2' Ø

PROPOSED TEMPORARY TRESTLE (OFFICE/LAYDOWN)
12 EA Piles – 2' Ø

TRANSMOUNTAIN

Kiewit

MARINE CONSTRUCTION SAFETY BOOM (PH 1)
MARINE CONSTRUCTION SAFETY BOOM (PH 2)
SAFETY BOOM TEMP PILES [6 EA, 2' dia.]
TEMPLATE TEMP PILES [235 EA, 3' dia.]
TEMP WORK/STRUCTURE PILES [32 EA, 2' dia.]

TRANS MOUNTAIN EXPANSION PROJECT
WESTRIDGE MARINE TERMINAL

TEMPORARY CONSTRUCTION PILES

04/18/2017	A	SKETCH

4.3 Diversion of Existing Outfalls

There are no natural watercourses located in the Project site. The current WMT drainage captures surface runoff and directs it to a number of catch basins, with direct discharge points into Burrard Inlet (Figure 4-3). From an erosion control perspective, the existing drains will be managed to reduce inputs of sediment. Trans Mountain has an understanding of the drainage paths and all sediment laden contact water will be treated prior to discharge.

The Erosion and Sediment Control Plan can be found in Appendix A.

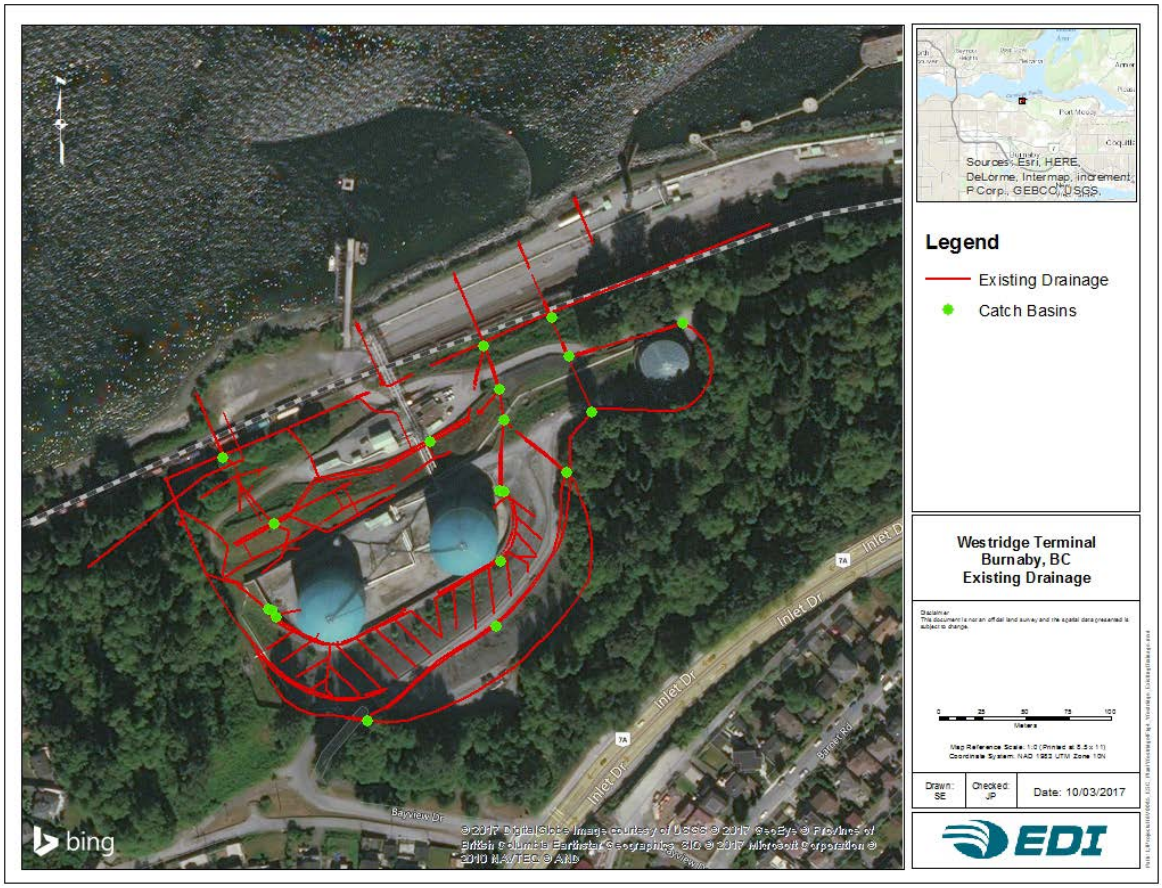


Figure 4-3. Existing drainage and catch basins
EDI Environmental Dynamics Inc., March 2017

4.3.1 Water Treatment Plant and Temporary Discharge

There will be three new temporary storm water retention/treatment areas created:

1. One will be located near the tunnel portal to capture construction water related to tunnel excavation activities.
2. A small weir tank to capture storm water and construction water on the west end of the foreshore construction area.
3. One will be located in the onshore northwest corner of the site (south of the railway) to capture the remainder of the site construction contact water.

All of these storm water retention areas will also be capable of capturing storm water events.

Figure 4-4 details the storm water retention/treatment areas and drainage paths in the foreshore area.

M□□□□□□□ □ 3□0□00 □□ □□□□□□□□ □□□ □□ □□□□□□ 1020 □□□□□ 2

PLANT NORTH

N

N 300.000
N 250.000
N 200.000
N 150.000
N 100.000
N 050.000
N 000.000
W 050.000
E 000.000
E 050.000
E 100.000
E 150.000
E 200.000
E 250.000
E 300.000
E 350.000

EXISTING WATERLOT
CP RAIL ROW
EXISTING 6"ø CITY FORCE MAIN LOCATION UNKNOWN
EXISTING 6"ø CITY FORCE MAIN
EXISTING SHORE LINE
EXISTING LAND LINE
EXISTING FENCE
EXISTING DOCK
TEMPORARY 24" DELIVERY LINE
HOLD
DOCK VEHICLE GATE
FUTURE PARKING
RELOCATED EXISTING VCU UNIT
RELOCATED EXISTING CL PROPANE BULLET
TEMPORARY
GATE AT EXISTING ROAD TO BE ABANDONED
NEW FENCE
SEWAGE TANK
CONTROL ROOM & OFFICE BLDG.
30" ESD VALVES AREA
FOAM BLDG.
FIRE-WATER PUMP BLDG.
TRANSFORMERS & BACKUP GENERATOR
VAPOUR COMBUSTION UNIT (VCU)
VAPOUR BLOWERS (TYP.3)
H_2S REMOVAL VESSEL (TYP.)
MERCAPTAN REMOVAL VESSEL (TYP.)
VRU STACK (TYP.)
VRU MANIFOLD (TYP.)
VOC ABSORBER VESSEL (TYP.)
2 VACUUM BOOSTER BLOWERS (TYP.)
6 VACUUM PUMPS (TYP.)
VRU AREA GLASS WALL
STORM-WATER TREATMENT (OIL/WATER SEPARATORS)
PROPANE VAPORIZER
CHILLER EXPANSION TANKS
CHILLERS (TYP.)
COMPRESSORS (TYP.)
VAPOUR RECOVERY UNIT
EMISSIONS CONTROL MANIFOLD
STORM-WATER TREATMENT (SPIs)
NITROGEN TANK
NITROGEN VAPORIZER
SAMPLE & LUBE STORAGE BLDG.
OIL SUMP TANK
HDPE FIREWATER/ POTABLE WATER & FOAM LINES
BULKHEAD WALL SECURITY FENCE/WALKWAY
PROPANE TANK
NEW ACCESS ROAD
EXISTING ACCESS ROAD (TO BE DISCONTINUED)
CPR PROPERTY LINE
HOLD FOR CROSSING LOCATION
OVERHEAD POWER LINE
NEW SUBSTATION 66/4.16 kV
2 WHEELED DRY CHEM UNITS (LOCATION TBA)
FUTURE SHORE TO SHIP POWER SUBSTATION
PROPERTY LINE
NEW AUXILIARY/EMERGENCY VEHICLE GATE
METERING AREA
SENDING PAP AREA
EXIST. GATE
EXISTING PIPERACK JET FUEL
EXISTING ACCESS ROAD
TANK 93 (JET)
EXIST. ABANDONED PIPES
ESB2
DERAILMENT PROTECTION BARRIER
MAIN FORESHORE/DOCK VEHICLE GATE
MAN GATE
EXISTING RACK
EXISTING CROSSING GATES
EXISTING GATE
36" SLEEVES X4 UNDER RAIL
30" BURNABY TO WESTRIDGE DELIVERY PIPELINES LINE 1 LINE 2 LINE 3
CH2M HMM
CL TUNNEL
TUNNEL PORTAL
NEW PIPE RACK
NEW VALVE MANIFOLD AREA
NEW OIL SUMP TANK
RETAINING WALL
STORM-WATER TREATMENT (SPIs)
IMPROVED ACCESS ROAD
EXISTING 6" JET LINE TO AIRPORT
ESB2A
LINE-2 RECEIVING TRAP
TANK 202 (JET)
TANK 01 JET FUEL WATER DRAW
EXISTING RETAINING WALL
TANK 201 (JET)
NEW SECANT PILE WALL
EXIST. NPS 12 FIRE WATER LINE
EXIST. NPS 24 PIPELINE (TO BE REMOVED FROM SERVICE)
86' HYDRO ROW (APPX)
NEW OVERHEAD POWER LINE
NPS 8 FIRE WATER LINE
NEW 8" HDPE FIREWATER/ POTABLE WATER
EXIST. ACCESS ROAD
EXIST. FENCE
EXISTING PLANT COORDINATE SYSTEM N = 000.000 E = 000.000
EXIST. SHELL LINE OUT OF SERVICE
EXISTING SURVEY MONUMENT #2 SITE COORD N -9,883 E 140,853 (UTM COORD) N 5459386.728 E 503358.704 ELEV = 57.705 (NOTE-1)

W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21

EXIST MAJOR FACILITIES

W1 – CONTROL BLDG.
W2 – MAIN ELECTRICAL BLDG.
W3 – JET FUEL PUMP SHELTER
W4 – WORKSHOP STORAGE BLDG.
W5 – HAZARDOUS MATERIALS BLDG.
W6 – MANIFOLD SHELTER
W7 – WEST SIPHON
W8 – EAST SIPHON
W9 – FIRE WATER VALVE CHAMBER
W10 – INCOMING SUBSTATION
W11 – GATE HOUSE
W12 – SWITCH RACK
W13 – FIRE WATER VALVE CHAMBER
W14 – ELECTRICAL BLDG.
W15 – WATER CONTROL BLDG.
W16 – 24" PIPELINE VALVE CHAMBER
W17 – EMERGENCY GENERATOR BLDG.
W18 – STORAGE BLDG.
W19 – FOAM TRAILER BLDG.
W20 – DOCK CONTROL ROOM
W21 – PROPANE VAPORIZER

ch2m: □□□□ 14 2016 □□□E□ □OR APPROVAL

□□□□

ch2m: 660356

NOTES

1. MONUMENT LOCATION IS ON HOLD FOR VERIFICATION OF PHYSICAL LOCATION VS. UTM COORDINATE ON EXISTING DRAWINGS.

NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR
1	GENERAL PLOT PLAN – OFFSHORE AREA	GA1020 SHEET 2	A	2016/10/14	ISSUED FOR APPROVAL	NY	WSS	AJL

TRANS MOUNTAIN

TRANS MOUNTAIN EXPANSION PROJECT
GENERAL PLOT PLAN
ONSHORE AREA
WESTRIDGE TERMINAL

DRAWN BY	CHECKED BY	APPROVED BY	SHEET SIZE	SCALE	DATE
NY	WSS	AJL	A1	1:750	SEP 2016

PROJECT CODING	DRAWING NUMBER			
AFE	FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00	SK-GA1020	1/2	A

HOLD

FILE NAME: P:\KINDERMORGAN\660356TMPLPREDETAILEDDESIGN\PVDWGS\PLOTPLANS\WESTRIDGE\WT00-SK-GA1020001.DWG PLOT DATE: 14 October 2016 PLOTSTYLE: KINDER-MORGAN-A1_FULL_MONO.ctb

4.3.2 Existing Outfalls around the Foreshore Expansion

To expand the foreshore, the existing drainage from the site (which directs upslope surface water from the site into Burrard Inlet under the railway) will require diversion during construction. The new diversion will run east-west on the north side of the railway, tying into the existing drainage and directing drainage around the construction area (east or west) into Burrard Inlet.

4.3.2.1 Storm water Outfalls

There are currently five storm water outfalls on site that service the drainage needs in the uplands areas south of the rail line draining into Burrard Inlet.

An interceptor pipe will be installed along the inner portion of the foreshore to collect water from these five storm outfalls and will drain east-west, around the extents of the bulkhead wall into Burrard Inlet. While the plan/profile details have not yet been developed, Figure 4-5 illustrates the proposed alignment and outfall locations. The existing outfalls will be used until the backside of the circular sheet pile walls are filled with granular fill. The new interceptor pipe will be installed concurrently with the circular sheet pile installation and completed prior to blocking of the existing outlets.

REF. NORTH

23°16'22"

EXISTING PLANT NORTH

□□□□□□□ □□□□□ □□□□ □□□□

□□□□□□□ □□ □□□

□□□□□□□

□□ □□□□ □□ □□□ □□□□□

60mm

60mm

60mm

2 0mm

62mm

□□□□□□□ □ 62mm □□□□□□□□ □□□□ □□ □□□□□□□□□□ □□ □□□□□ □ □□□□□M□□□□□□□□□□□□□□□□□□□□ □□□ □□□□□□□ □□ □□ □□□□□□M□□□

EXISTING 250mm PIPE INV EL ±5.10

□□ □□ □□□□□□□□□□ □□ □□□□□ □ □□□□□M□□□□□□□□□□□□□□□□□□□□ □□□ □□□□□□□ □□ □□ □□□□□□M□□□

EXISTING 600mm CSP INV EL = ±2.11m

□□ □□ □□□□□□□□□□ □□ □□□□□ □ □□□□□M□□□□□□□□□□□□□□□□□□□□ □□□ □□□□□□□ □□ □□ □□□□□□M□□□

EXISTING 600mm CSP INV EL = ±0.88m

□□ □□ □□□□□□□□□□ □□ □□□□□ □ □□□□□M□□□□□□□□□□□□□□□□□□□□ □□□ □□□□□□□ □□ □□ □□□□□□M□□□

EXISTING 250mm PIPE INV EL = ±5.10

□□ □□ □□□□□□□□□□ □□ □□□□□ □ □□□□□M□□□□□□□□□□□□□□□□□□□□ □□□ □□□□□□□ □□ □□ □□□□□□M□□□

INV OUT = ±4.68m

□□□□□□□ □□□□□ □□□□□ □□□□□□□ □□ □□□

W1

W2

W3

W4

W5

W6

W8

W10

□□□□□□

1□ □□□ □□□□□□□□□□ □□□ □□ M□□□□□□

□□□□□□

□□□□□□□ □□□□M □□□□

□□□ □□□□M □□□□

□□□□□□□ □□□□M □□□□□ □□□□□

□□□ M□□□□□□

0 □ 10 1□ 20 2□ □0

TRANS MOUNTAIN

			0	2017/04/18	ISSUED FOR PERMIT APPLICATION AFE#01-13283	WC	TD	D. VINISH
NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR

DRAWN BY W.CHENG	TMEP PERMIT DRAWING SITE PLAN SURFACE RUNOFF OUTFALL	SHEET SIZE A1
CHECKED BY T.DANIEL		SCALE 1:500
APPROVED BY –	WESTRIDGE TERMINAL	DATE 2017/04/12

PROJECT CODING	DRAWING NUMBER			
AFE	FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00	– GA01081	01	0

□□□□□□□□□□ □□□□ □□□□□201□□□r □1□□12:40:3□ □M

4.4 Removal of Existing Marine Structures

To facilitate the expansion of the WMT facilities, removal of existing marine structures is necessary. Existing berth infrastructure will not be demolished as part of the Project and the in-water training wall, adjacent to Barnet Marine Park, will also remain.

These marine structures (Figure 4-6) include legacy piles/wooden fenders, a spill barrier, and Pier 59.

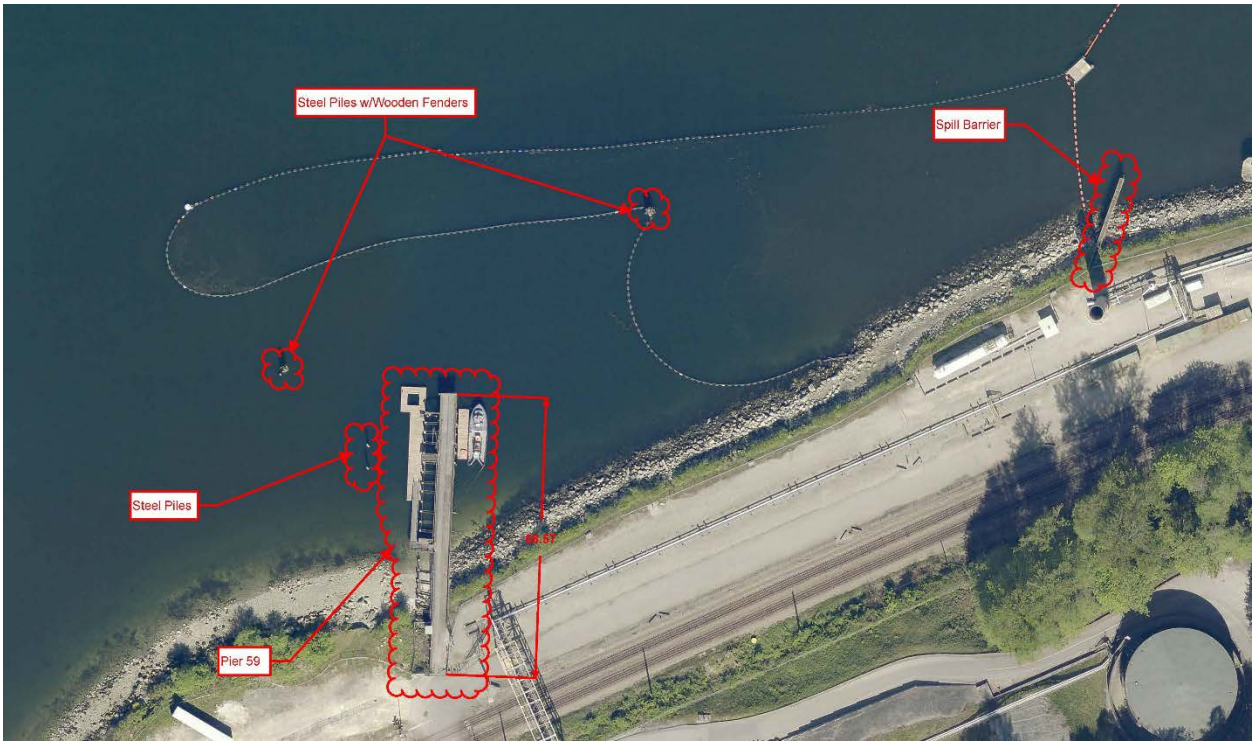


Figure 4-6. Existing Marine Structures
Kiewit Ledcor Trans Mountain Partnership (KLTP), 2017

Removal of existing marine structures will be performed using a derrick barge with a supporting materials barge and vibratory pile hammer. Prior to removal of the marine structures, a boom will be placed around the removal area to contain incidental debris.

4.4.1 Pier 59 Removal Methodology

The access to Pier 59 (Figures 4-7 and 4-8) is located in line with the WMT railway crossing. The pier is approximately 70 m in length and is constructed on wooden timber piles, with a wooden superstructure.

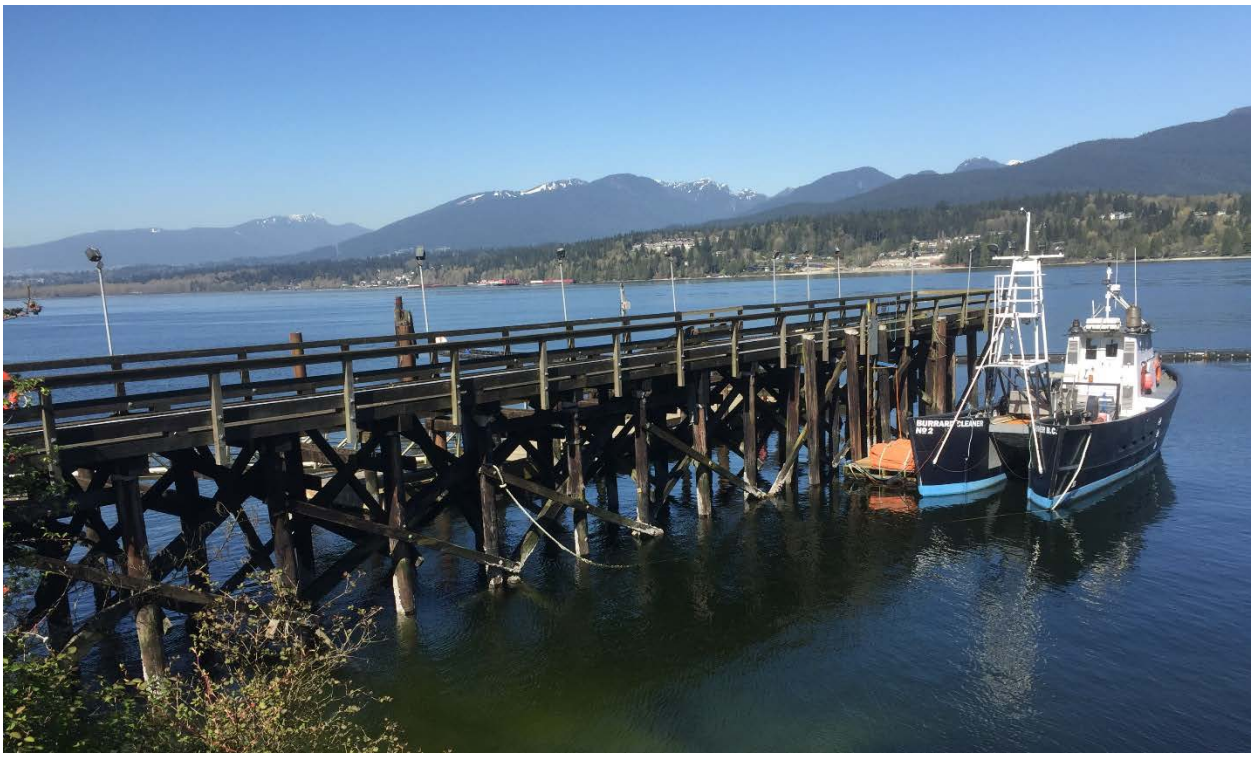


Figure 4-7. Pier 59

Figure 4-8. Access to Pier 59

The Pier 59 superstructure will be dismantled in large sections and placed on the material barge. Pier 59 piles will be removed by wrapping a choker around the pile and dead pulling the pile out of the water. In the event that this does not work, the vibratory hammer will be used to remove the piles.

4.4.2 Spill Barrier Removal Methodology

The spill barrier (Figure 4-9) is located approximately 23 m (Figure 4-10) west of the westernmost mooring dolphin (Dolphin 1 in Figure 4-10) of the existing berth. The spill barrier is approximately 20 m long. Its construction includes an access platform and vertical wooden planks supported from timber wales and 12 piles (Figure 4-11).

Figure 4-9. Spill Barrier

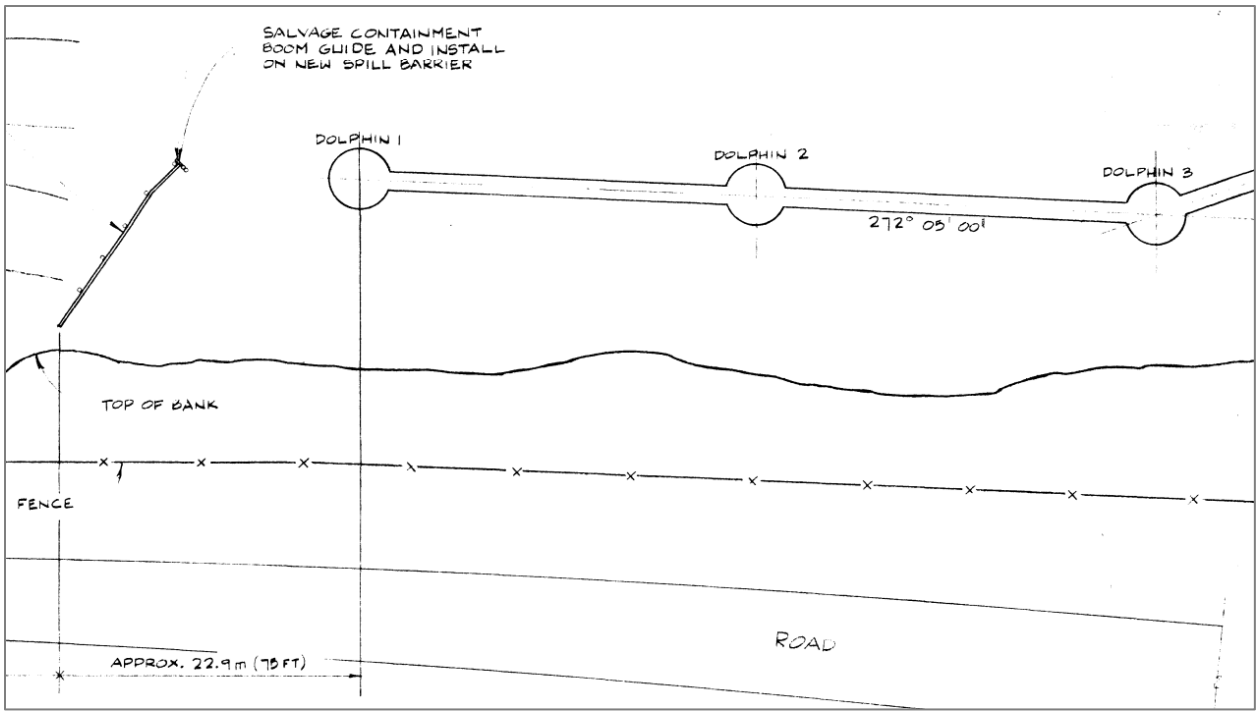


Figure 4-10. Spill Barrier Location

Kiewit Ledcor Trans Mountain Partnership (KLTP), 2017

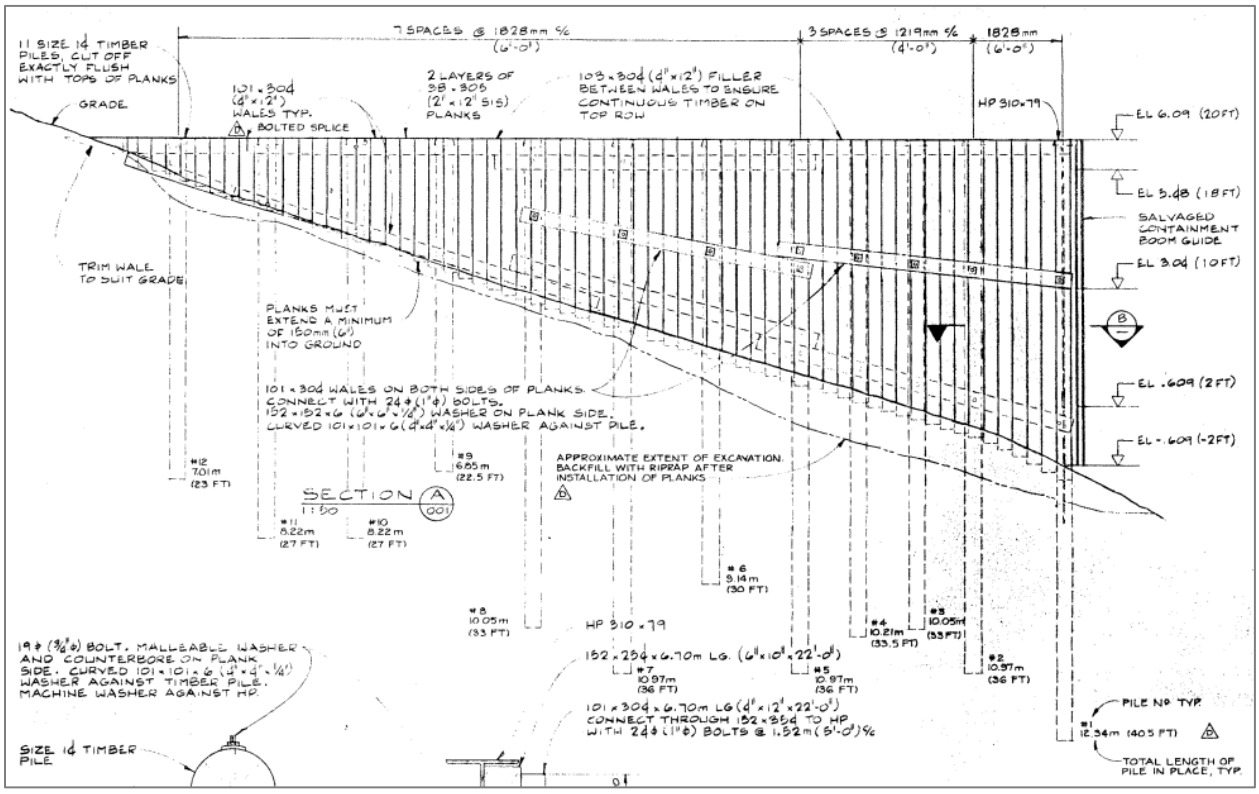


Figure 4-11. Spill Barrier Construction

Kiewit Ledcor Trans Mountain Partnership (KLTP), 2017

The above water sections of the spill barrier will be dismantled in large sections and placed on the material barge. The spill barrier piles will be removed by wrapping a choker around the pile and dead pulling the pile out of the water. In the event that this does not work, the vibratory hammer will be used to remove the piles.

4.4.3 Pile Group Removal Methodology

Two groups of steel piles with wooden fenders are located approximately 65 m northeast (Figure 4-12), and 35 m west (Figure 4-13) from the end of Pier 59. Two additional steel piles (Figure 4-14*)* are located approximately 10 m west from the midpoint of Pier 59.

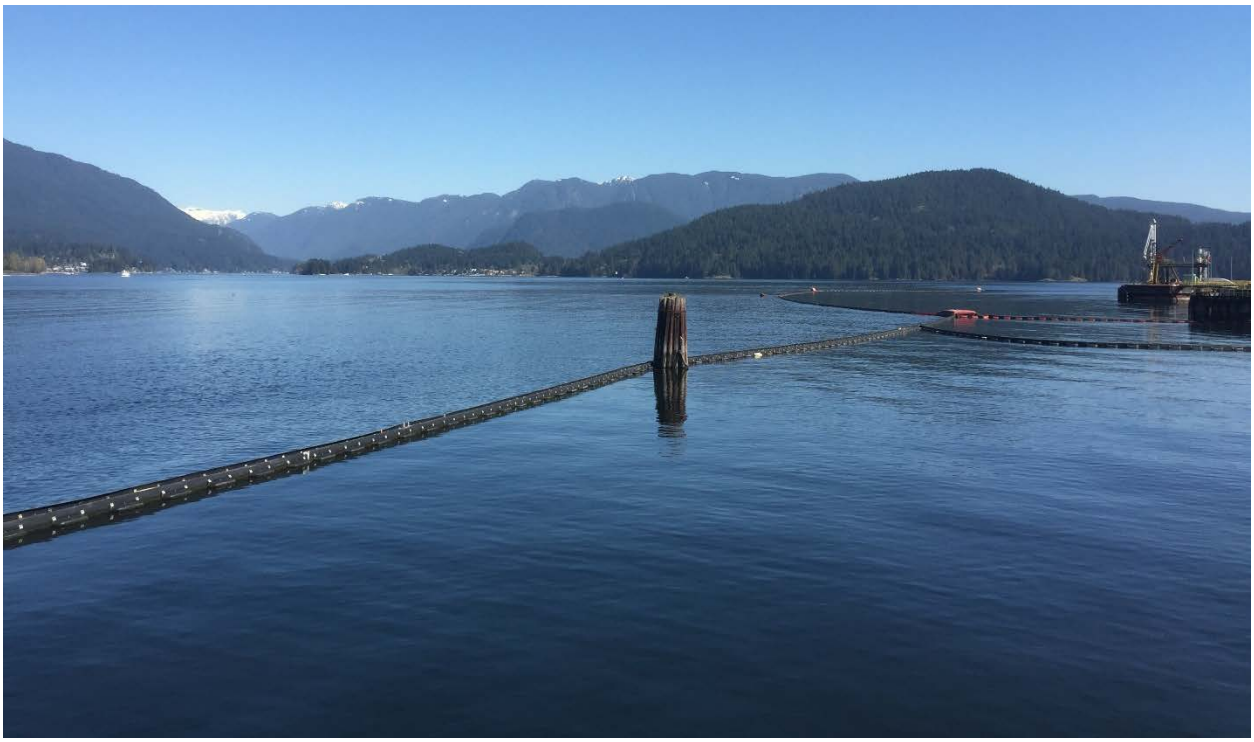


Figure 4-12. Existing Pile Group

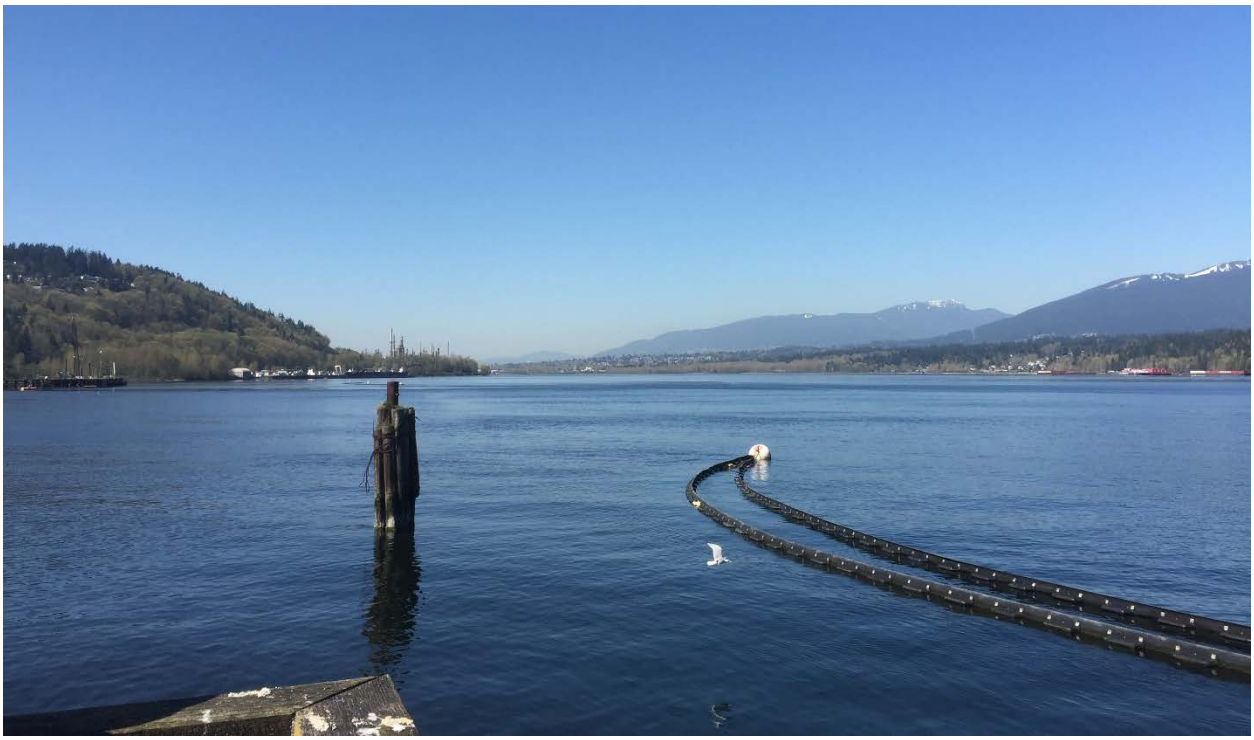


Figure 4-13. Existing Pile Group

Figure 4-14. Existing Steel Piles

The marine piles will be removed by wrapping a choker around the pile and dead pulling the pile out of the water. In the event that this does not work, the vibratory hammer will be used to remove the piles.

4.5 Marine Construction Safety Boom

A marine construction safety boom will be installed around the construction site and will be designed to protect 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 Phase 1 layout of the marine construction safety boom will be used when Berth 1 and Berth 2 are under construction. The Phase 2 layout of the marine construction safety boom will be used when the west side of Berth 3 is under construction.

The marine safety boom layout will be phased to align with the construction footprint. There is the potential that a third phase barrier footprint will be required when the east side of Berth 3 is under construction. However, this layout has not yet been finalized. The gate opening for when tankers enter the existing berth is shown on the safety boom layout figure. The marine construction safety boom will connect to the onshore fence on the beach with a block/riser post at the connection point. This will enable it to rise and fall with the tide. The marine construction safety boom will be anchored to the shore through the use of two concrete anchor blocks.

Figure 4-15 shows the extent of the safety boom layout. A navigation study was completed to demonstrate that tankers can enter through the marine construction safety boom gate. The Navigation and Navigation Safety Plan is attached as Appendix B.

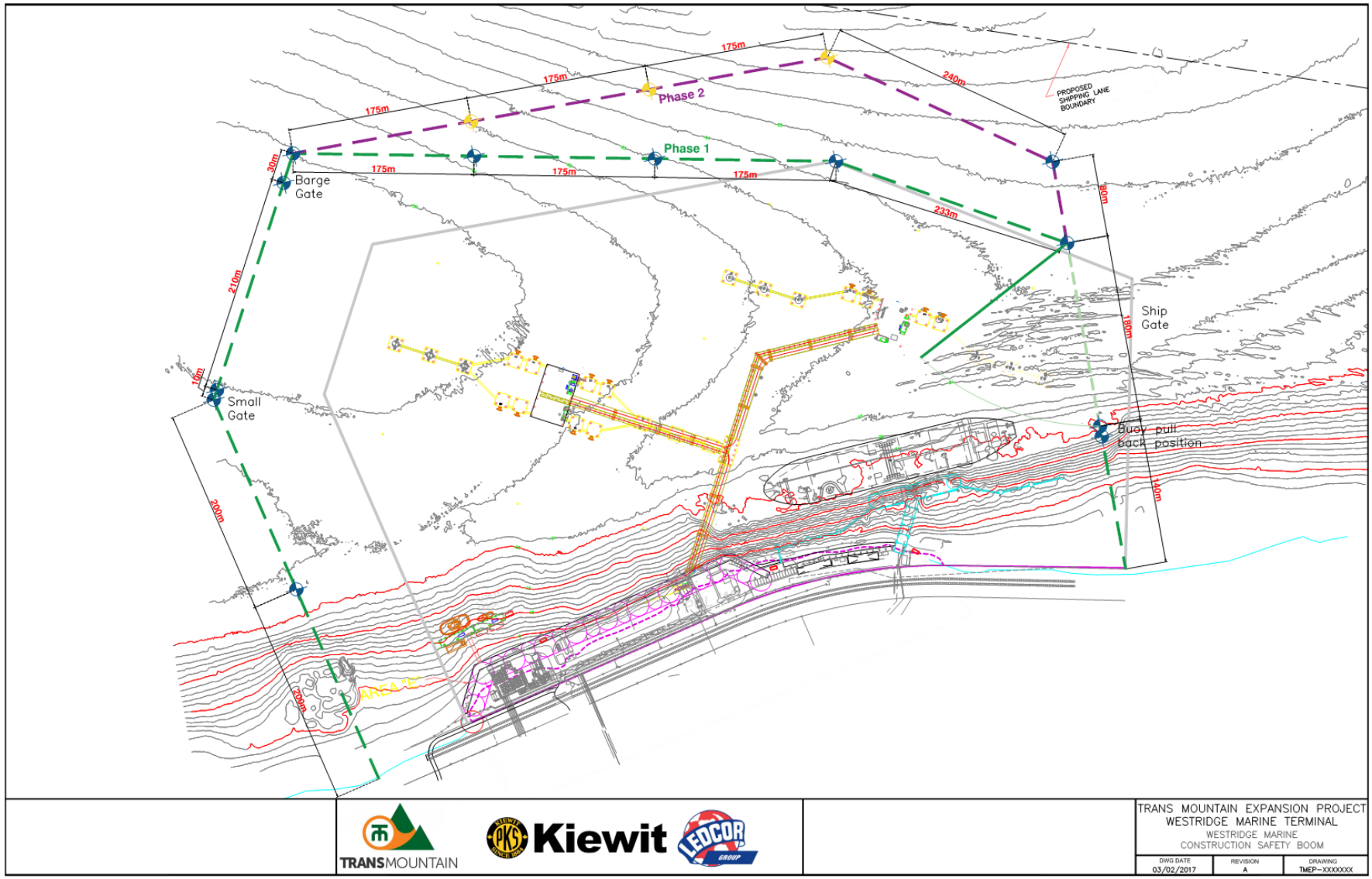


Figure 1: Proposed marine construction safety boom showing shipgate (concept only, actual layout might be different)

4.6 Modifications to Existing Fire Loop

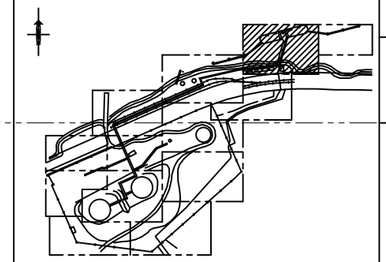
A short loop is required to tie the foreshore and dock fire mains together (Figure 4-16 and Figure 4-17). This loop will provide fire supply for the duration of the Project.

The work sequence for the modifications to the existing fire loop includes locating tie-in points 7 and 10 with tie-in 7 being located before the foam vault. Trans Mountain will install a temporary fence on Canadian Pacific (CP) Rail property to allow room to install the fire main beside the foam building. The pipe will be routed south of the foam building and then across the yard to near the above ground tee. The line is in a carrier pipe that travels along the underside of the railway. Trans Mountain will shut the foreshore down during the tie-in at tie-in point 10. This will be conducted during a period in which there are no ships scheduled at the dock. The line will then be drained and Trans Mountain will cut the pipe and install a tee.

Figure 4-16. Fire Loop Model

4.7 Sanitary Force Main

Trans Mountain currently assumes that the sanitary main will be supported in place when the carrier pipes are installed under the tracks. Figure 4-18 has been provided to show the sanitary support.



KEY PLAN

NOTES:

1. DIMENSIONS ARE IN MILLIMETERS, ELEVATIONS AND COORDINATES ARE IN METERS.

N 400.000

N 350.000

E 350.000

E 400.000

E 300.000

PIER 61
DOCK NO. 2

DETAIL 1 REF. 4

DETAIL 2 REF. 4

W24

W25

W22

W23

W18

W19

W20

'PIG RECEIVER BARREL'

NPS 12 MEDIA SCRUBBER LINE

NPS 6 FIRE WATER LINE

NUCLEAR DENSITOMETER

NPS 16, FLOW METER

NPS 2 PROPANE RECIRC. (ABANDONED)

NPS 20 BYPASS LINE SEE MI1101/01

NPS 12 FOAM FIRE WATER LINE

NPS 12 JET FUEL LINE

NPS 24 CRUDE LINE

HYDRAULIC POWER CONTROL UNITS

MCC BUIDING

DOCK #2 SUBSTATION

DOCK CONTROL BUILDING

TRANSFORMER

AIR HANDLING UNIT

AIRCON CONDENSING UNIT

SEPTIC TANK

VALVE BOX GATE

FOAM TRAILER ENCLOSURE

EXISTING NPS 6 FW LINE (DEMO)

6 NPS FW (NEW)

NPS 6 FIRE WATER LINE (ABANDON)

MONITOR/HYDRANT

NPS 1 INSTR. AIR

BLOWER SKID

STA. 05 BBP EL. 6281

STA. 04 BBP EL. 6251

STA. 03 BBP EL. 6221

STA. 02 BBP EL. 6191

STA. 01 BBP EL. 6177

PS

CP ROW

AREA LIMIT

CONTINUED ON DWG. MP1001 SHT.10

NO.	REFERENCE DRAWINGS	DRAWING NO.	NO.	DATE	REVISION	DR.	CHK.	APPR.
3	PLAN, ELEV. & SECT. ESD VENT VAPOR AND SCRUBBER SYSTEM	MP1010						
2	PLAN, ELEV., & DET. MAIN STACK VAPOR & SCRUBBER SYSTEM	MP1009						
1	PIPING LAYOUT, VAPOUR SCRUBBER SYSTEM	MP1006						
	AREA # 11							

NO.	DATE	REVISION	DR.	CHK.	APPR.
0	17/03/02	FOR INFORMATION ONLY	SHD		

5000 0 5000 10000 15000 20000

TRANS MOUNTAIN

DRAWN SHD	MECHANICAL/PIPING SKETCH AREA # 11	SHEET SIZE A1
CHECKED		SCALE 1:200
APPROVED	WESTRIDGE TERMINAL	DATE 17/03/02

DRAWING NUMBER					
AFE	WBS	FACILITY ID.	DOCUMENT No.	SHT.No.	REV.
—	—	MP100111	SK001	—	A

SAVE NAME: CAD\WTOD\WA\MP100111 10-JAN-01 12:55 PMPLOT SCALE:1:1

MP100111_SK001.dwg

NOTE: THE EXISTING OUTFALL PIPES SHALL BE COATED INTERNALLY AND EXTERNALLY TO BE SUITABLE FOR A MARINE ENVIRONMENT. TREATMENT OF THE ENDS OF THE PIPES SHALL BE EVALUATED RELATIVE TO THE SEA LEVEL FLUCTUATIONS AND THE APPROPRIATE DEVICE OR DEVICES SHALL BE INSTALLED AS NEEDED. UPON VERIFICATION OF THE EXISTING STORM PIPE TYPE HAS BEEN CONFIRMED, THE APPROPRIATE CONNECTION DEVICES BETWEEN THE DIFFERENT PIPE TYPES SHALL BE SELECTED.

REF. NORTH
23°16'22"
EXISTING PLANT NORTH

CLOSED CELL SHEET PILE WALL
BOOM REEL ENCLOSURE
EXENDED EX. OUTFALL No. 2
INV. EL.= 2.50
STORM MANHOLE No.2
NEW 300mm DISCHARGE PIPE
INV. OUT EL.= 2.50
STORM WATER SPI FILTER PACKAGE PK-2002
OIL/WATER SEPARATORS
ASPHALT PAVEMENT
STORM MANHOLE No. 1
CONCRETE CONTAINMENT CURBING
STORM WATER SPI FILTER PACKAGE PK-2001
SEP-2002
SEP-2001
CB No. 1
RIM EL.=5.20
INV. OUT=4.60
SUMP No. 2
RIM EL.=5.70
INV. OUT=4.26
(NO ISOLATION VALVE REQ'D)
CB No. 2
RIM EL.=5.50
INV. OUT=4.50
CB NO. 3
RIM EL.=5.50
INV. OUT=4.30
CB No. 4
RIM EL=5.50
INV. OUT=4.50
CB No. 5
RIM EL=5.50
INV. OUT=4.50
SUMP No. 4
RIM EL.=5.70
INV. OUT=4.80
SUMP No. 1
RIM EL.=5.70
INV. OUT=4.60
CLOSED ISOLATION VALVE MOUNTED INSIDE SUMP-TYPICAL FOR ALL SUMPS UNLESS NOTED OTHERWISE
SUMP No. 3
RIM EL.=5.70
INV. OUT=4.80
INV. OF EXISTING STORM OUT= ±2.74m
200mm STORM AND POTENTIALLY OILY/WATER AND STORM RUNOFF FROM RECEIVING TRAPS AREA
CONCRETE CONTAINMENT CURBING
INV.= ±3.33m
EXTENDED EX. OUTFALL No. 1
INV. OUT=1.80
INV. OF EXISTING STORM OUT= UKNOWN-TO BE VERIFIED
CRASH PROTECTION BARRIER WALL
EXISTING FIRE HYDRANTS (TYP) (TO BE REMOVED)
STORM MH No. 3/ RECEIVING VAULT FOR POTENTIALLY OILY/STORM WATER FORCEMAIN FROM DOCK BERTHS (CAPACITY TO BE CONFIRMED)
150mm POTENTIALLY OILY WATER/STORM RUNOFF FORCEMAIN FROM DOCK BERTHS ON PIPE RACK
EXISTING DISCHARGE POINT FOR SURFACE RUNOFF FROM A PORTION OF THE FORESHORE AREA AND THE CP RAIL RIGHT OF WAY INTO BURRARD INLET
CUT EXISTING CULVERT AND INSTALL NEW CSP CULVERT INVERT ELEVATION TO BE VERIFIED WHEN EXISTING PIPE IS UNEARTHED
CUT EXISTING CULVERT AND INSTALL NEW CULVERT (SIZE AND MATERIAL TO BE DETERMINED)
CP RAIL RIGHT OF WAY
EXISTING CP RAIL TRACKS
EXISTING 762mm CONCRETE PIPE TO BE REDIRECTED AS SHOWN (SIZE, MATERIAL, CONDITION AND INVERTS TO BE CONFIRMED)
250mm COATED CARBON STEEL PIPE IN 900mm CASING UNDER EXISTING RAIL TRACKS
EXISTING 250mm PIPE INV. EL. ±5.10 TO BE REDIRECTED AS SHOWN (SIZE, MATERIAL, CONDITION AND INVERTS TO BE CONFIRMED)
EXISTING CATCH BASIN INV. OUT = ±4.68m
EXISTING DRAINAGE SWALE
DISCHARGED WATER FROM SPI FILTER PACKAGE PK-2003 TO INTERCEPT EXISTING DRAINAGE SWALE
STORM WATER SPI FILTER PACKAGE PK-2003
NOTE: ONLY WHEN THE SPI FILTER PACKAGE PK-2003 IS UNDERGOING MAINTENANCE, THE CLEAN STORM RUNOFF FLOW FROM THE RECEIVING AREA SHALL BE RE-DIRECTED TO THE O/W SEPARATORS LOCATED AT THE FORESHORE AREA FOR THE DURATION OF MAINTENANCE.
NOTE: THE RECEIVING AREA IS UNDER CONSIDERATION FOR REDESIGN OF THE LAYOUT AND THE ELEVATION OF THIS RECEIVING AREA MAY BE LOWERED IN THE FUTURE.
CB No. 9
SUMP No. 7
CB No. 10
RECEIVING TRAPS AREA
SUMP No. 8
CB No. 11
SUMP No. 11
W1
W2
W3
W4
W5

NOTE:
1. ALL ELEVATIONS ARE IN METRES

LEGEND
- EXISTING STORM PIPE
- NEW STORM PIPE
- GATE VALVE-NORMALLY CLOSED
- GATE VALVE-NORMALLY OPENED
- CO CLEAN OUT
- STORM CATCH BASIN
- STORM MANHOLE
- SUMP

0 2M 4M 6M 8M 10M 15M 20M

PLAN

FOR CONTINUATION SEE DWG. GA01043

ch2m: Jan.31 2016 ISSUED FOR PERMIT APPLICATION

ch2m: PROJECT # 660356

TRANS MOUNTAIN

			0	2017/01/31	ISSUED FOR PERMIT APPLICATION AFE #01-13283 (CH2M PROJ. #660356)	YZ	RO	RB
NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR

DRAWN BY JTM	TMEP PERMIT DRAWING STORM DRAINAGE DESIGN FORESHORE AREA WESTSIDE WESTRIDGE TERMINAL		SHEET SIZE A1
CHECKED BY RGS			SCALE 1:250
APPROVED BY PH			DATE 16/04/25

PROJECT CODING	DRAWING NUMBER		
AFE	FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00 —	GA01042	01	0

4.8 Railway Interactions

Construction traffic will use the existing railway crossings to access the foreshore area. These include the primary crossing through the WMT as well as the secondary crossing accessed through North Cliff Avenue.

While it is planned to maximize bulk material deliveries via marine equipment (barge shipments), there will be an increase in equipment crossing the railway to perform the work as not all materials can be logistically or feasibly transported to the site via marine equipment.

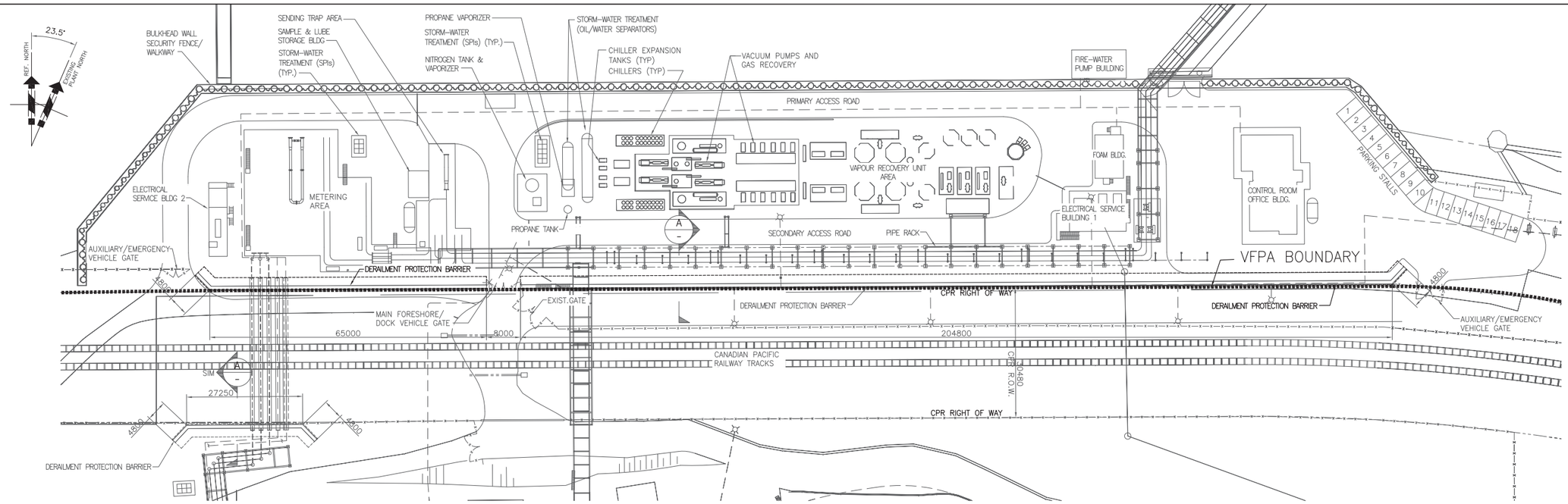
Sections of three new 762 millimetre (mm) diameter crude oil delivery pipelines will be constructed under the existing CP Rail tracks via horizontal directional drilling. Figure 4-18 provides a drawing of the Project site plan with receiving and launch pit details on Canadian National (CN) Rail right-of-way (ROW).

Trans Mountain has reviewed the trenchless concept with CP Rail on March 3 and April 5, 2017 during site visit meetings. Trans Mountain is in the process of drafting crossing drawings with the geotechnical report that will be sent to CP Rail for Crossing Agreement execution. Trans Mountain can confirm that aerial and underground crossings of the existing rail tracks, which connect to VFPA jurisdiction, meet railway requirements.

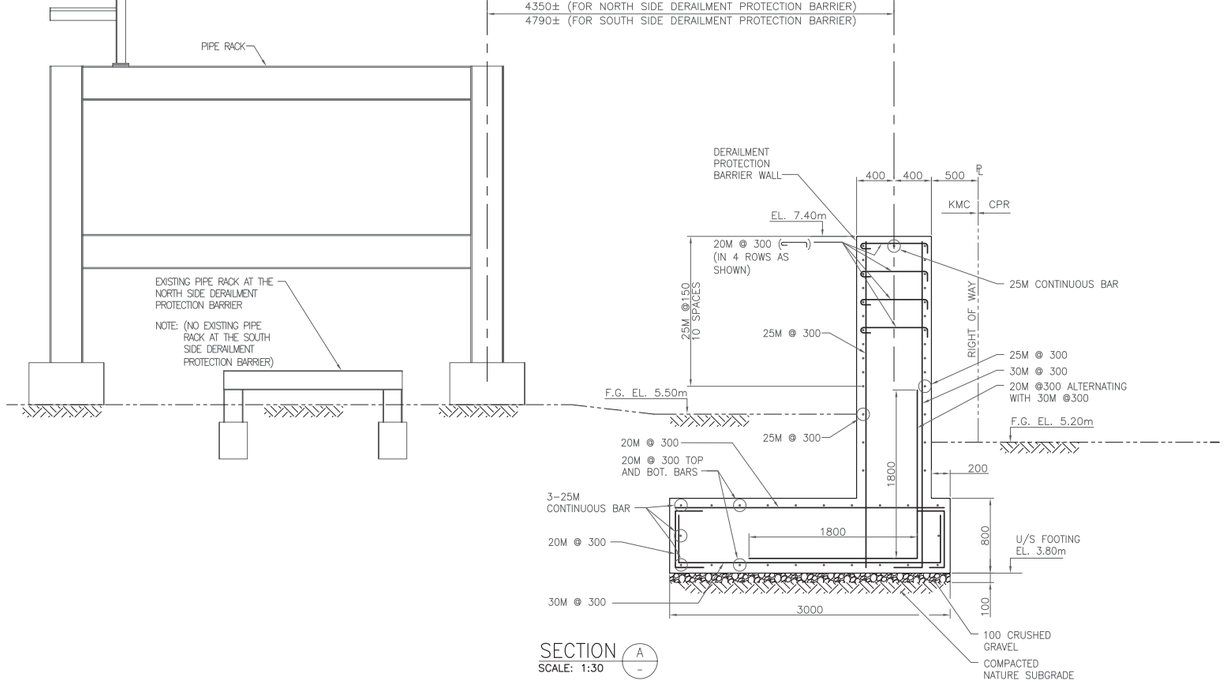
Trans Mountain does not have any information regarding buried rail tracks. If unknown subsurface items are discovered during construction, they will be dealt with at that time according to the terms of agreement.

Figure 4-19 provides the derailment protection barrier plan and cross sections. Note that only the North barrier resides on VFPA land, and although the South barrier is not on VFPA land, it has been included to provide context.

See Appendix C for Canadian Pacific Rail License of Entry document.



PLAN
SCALE 1:500



SECTION A
SCALE: 1:30

0 10M 20M 30M 50M

NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR
			0	17/04/18	ISSUED FOR PERMIT APPLICATION, AFE #01-13283	MBK	BD	B.DANIEL

TRANSMOUNTAIN

DRAWN BY RO	TMEP PERMIT DRAWING DERAILMENT PROTECTION BARRIER PLAN AND SECTION		SHEET SIZE A1
CHECKED BY MA			SCALE 1:500
APPROVED BY PH	WESTRIDGE TERMINAL		DATE 16/10/27

PROJECT CODING	DRAWING NUMBER			
AFE	FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00 —	GA01080	01	0

SECTION 5

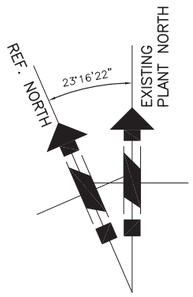
Engineering Clarifications

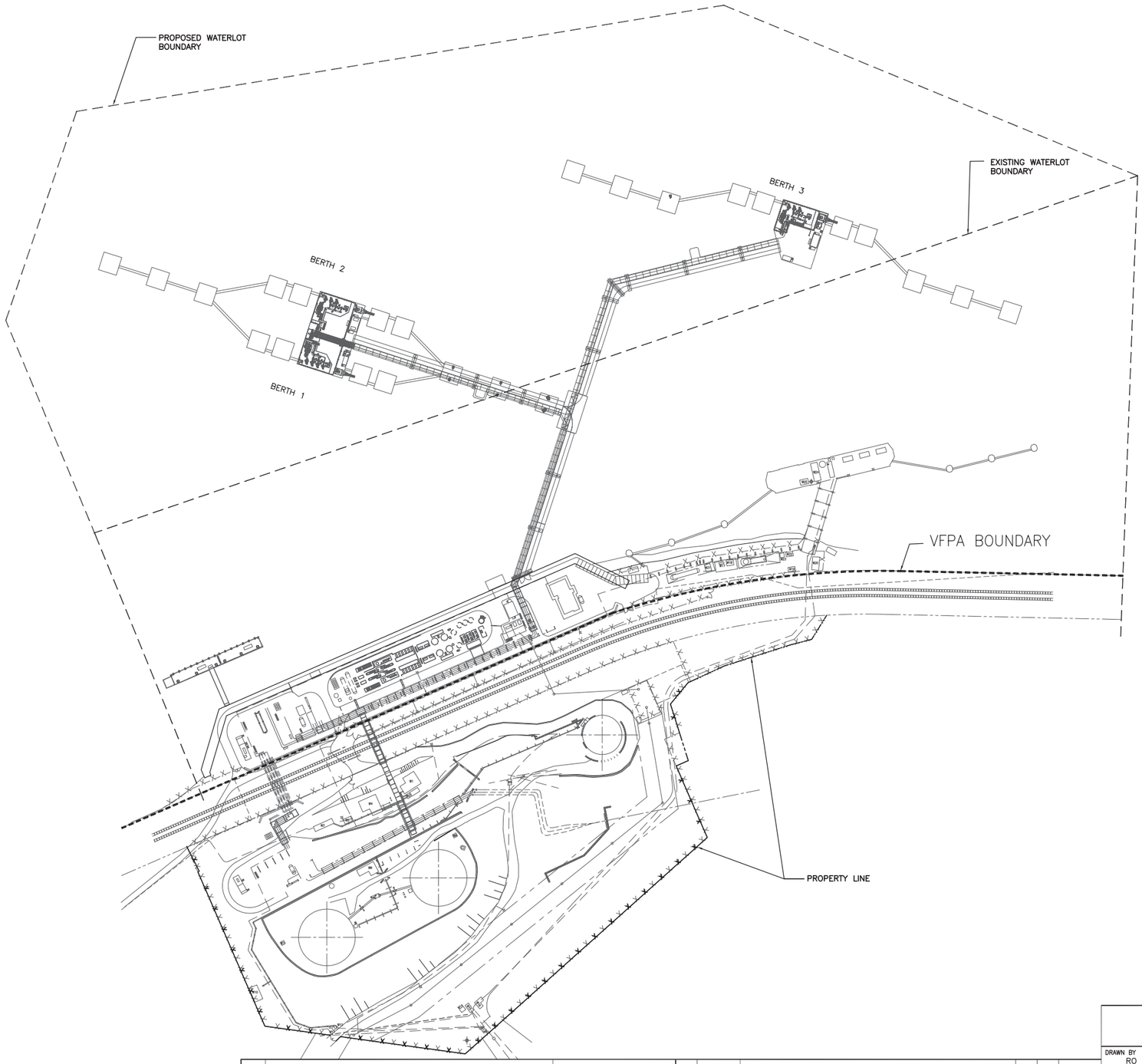
5.1 Property Boundary

Figures 5-1 to 5-3 have been provided to show the VFPA property line on the land side adjacent to the railway ROW (southern boundary) shown in bold and labelled on the site plan drawing and other engineering drawings. The CP Rail property line will be established by legal survey prior to start of construction.

5.2 Renderings

Updated renderings of the WMT have been provided in Figures 5-4 to 5-11.





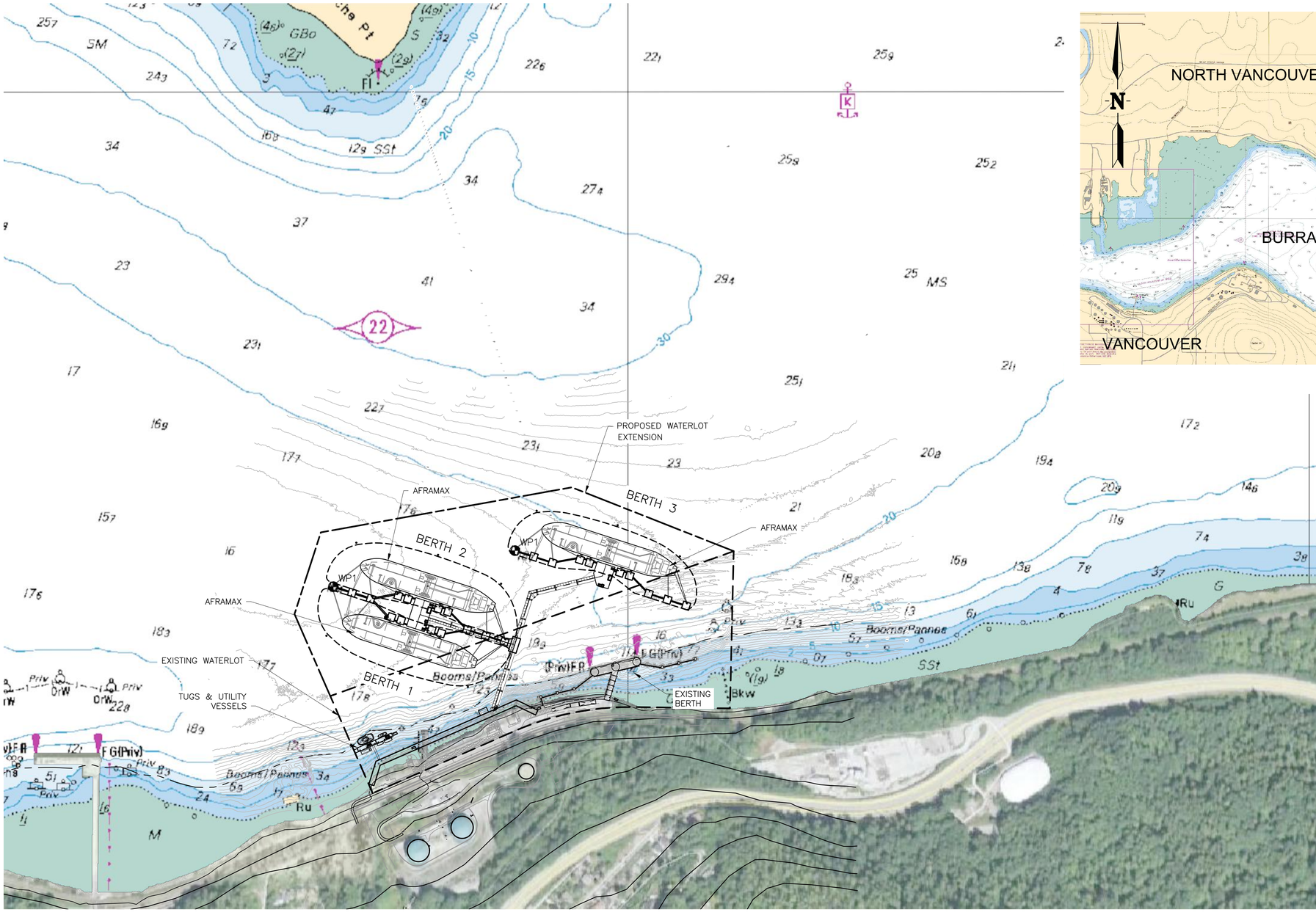
0 50m 100m 150m

NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR
			1	2017/04/18	ISSUED FOR PERMIT APPLICATION, AFE #01-13283	MBK	BD	B.DANIEL
			0	2017/01/31	ISSUED FOR PERMIT APPLICATION AFE #01-13283 (CH2M PROJ. #660356)	YZ	RO	RB

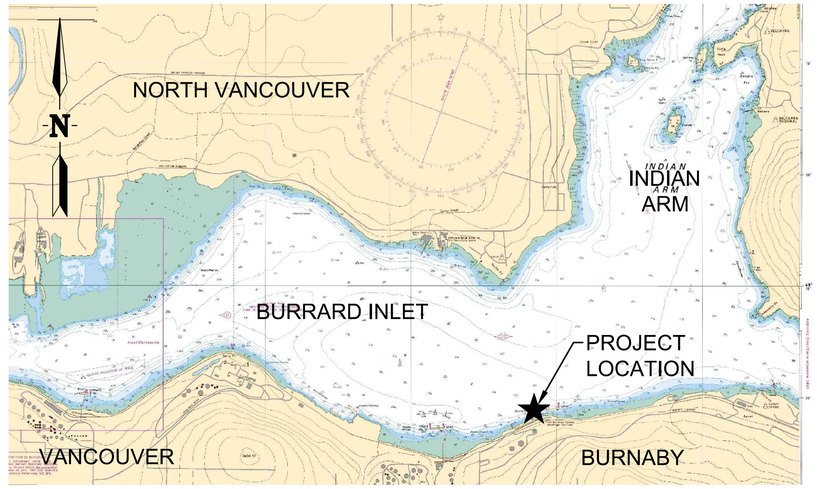
TRANS MOUNTAIN

DRAWN BY: RO	TMEP PERMIT DRAWING SITE PLAN LEASE AND PROPERTY BOUNDARIES WESTRIDGE TERMINAL	SHEET SIZE: A1
CHECKED BY: RGS		SCALE: 1:1500
APPROVED BY: PH		DATE: 16/04/29

PROJECT CODING	DRAWING NUMBER			
AFE	FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00 —	GA01030	01	1



SITE PLAN
SCALE 1:4000



KEY PLAN
SCALE NTS

REFERENCES:

1. CANADIAN HYDROGRAPHIC SERVICES CHART No. 3494.
2. WESTRIDGE TERMINAL SITE PLAN WT00-GA1001.

0 200000 400000
1:4000mm

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

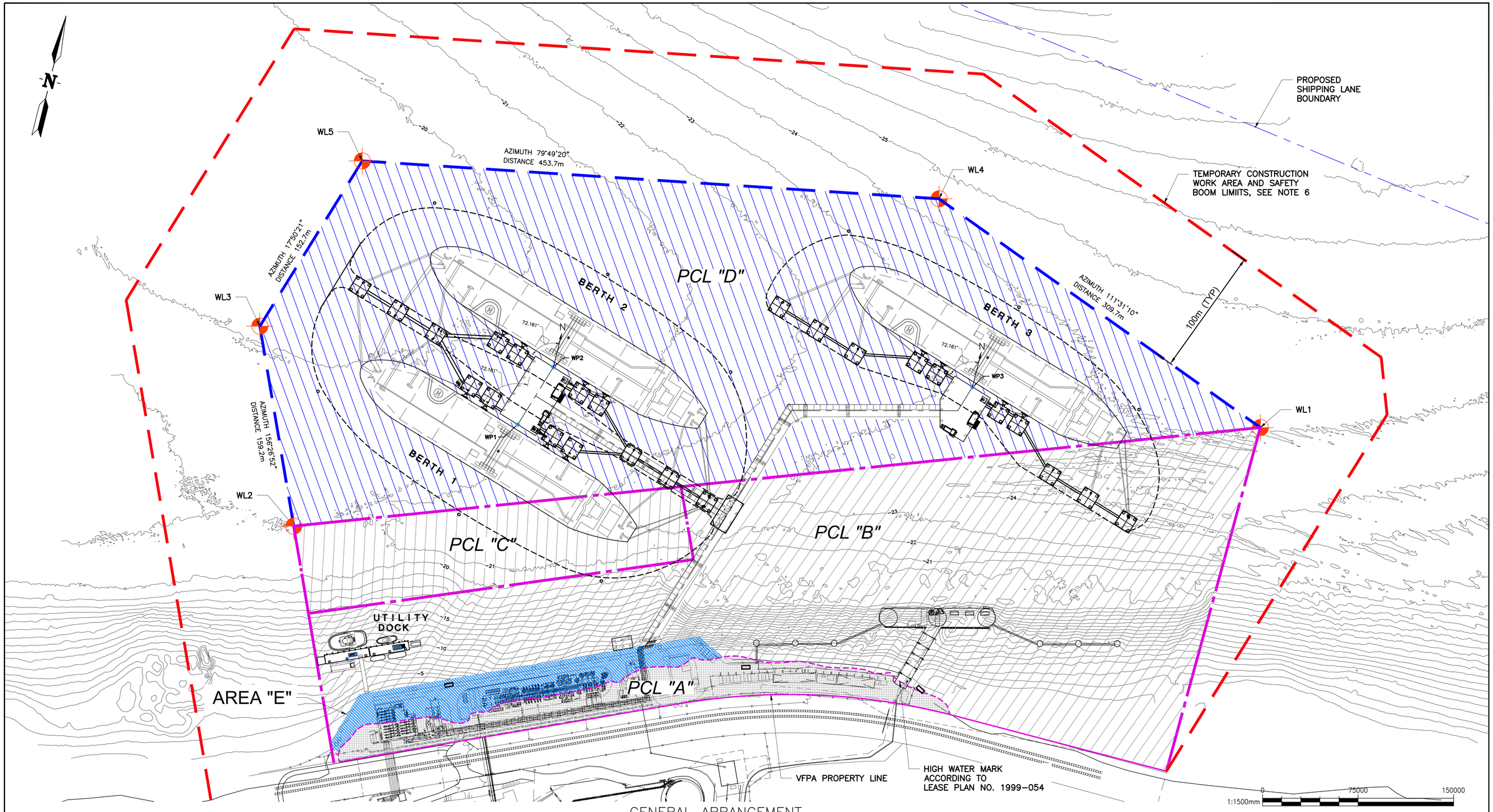
NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR
			D	17/04/13	RE-ISSUED FOR PERMIT APPLICATION	AVM		RB
			C	17/02/02	ISSUED FOR PERMIT APPLICATION	AVM		RB
			B	17/01/05	WATERLOT BOUNDARIES UPDATED - ISSUED FOR REVIEW	AVM	JT	RB
			A	16/11/14	ISSUED FOR REVIEW	AVM	JT	RB

moffatt & nichol
777 WEST BROADWAY, SUITE 301
VANCOUVER, BC, CANADA, V5Z 4J7
604-707-9004

DRAWN BY AVM	KEY PLAN & SITE PLAN	SHEET SIZE A1
CHECKED BY JT		SCALE AS NOTED
APPROVED BY RB	WESTRIDGE TERMINAL	DATE 16/11/14

PROJECT CODING AFE	DRAWING NUMBER FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00	GA01409	01	D

File: P:\9665 VC17 TMEP Detailed Design\CADD_Active\002_Moth_dwg_set\GA0140901; Plotted: 4/13/2017 11:52 AM by MANUZON, ALLEN; Saved: 4/13/2017 11:50 AM by AMANUZON



GENERAL ARRANGEMENT

SCALE 1:1500

LEGEND:

- EXISTING WATERLOT BOUNDARY
- PROPOSED WATERLOT BOUNDARY
- PROPOSED CONSTRUCTION BOUNDARY

SCHEDULE 3 – WATER LOT COORDINATES

WP	EASTING (m)	NORTHING (m)
WL1	503822.1280	5459991.3300
WL2	503104.3660	5459733.5260
WL3	503040.7676	5459879.4286
WL4	503534.0726	5460104.9112
WL5	503087.5329	5460024.7441

PARCEL AREAS

PCL "A" (LAND) = 11,237m² (REF. 1)

PCL "B" (WATER) = 107,505m² (REF. 1)

PCL "C" (WATER) = 19,473m² (REF. 1)

PROPOSED DEVELOPMENT

PCL "D" (PROPOSED WATERLOT EXPANSION) = 151,621m²

AREA "E" = RECLAIMED LAND AREA CURRENTLY PART OF PCL "B" = 7,392m²

NOTES:

1. SOUNDINGS ARE FROM GOLDER ASSOCIATES HYDROGRAPHIC SURVEY, DATED MARCH 2014.
2. CONTOURS IN METRES TO GEODETIC DATUM (GD).
3. THE LOCATION AND CONFIGURATION OF ALL PROPOSED FACILITIES IS FOR CONCEPTUAL PURPOSES ONLY AND SUBJECT TO CHANGE.
4. COORDINATES BASED ON NAD83, UTM ZONE 10.
5. EXISTING WATERLOT BOUNDARIES BASED ON VANCOUVER PORT AUTHORITY LEASE PLAN NO. 1999-054, DATED JUNE 24, 1999.
6. A SAFETY BOOM WILL BE USED TO ISOLATE THE CONSTRUCTION WORK AREA (DETAILS TO BE DEVELOPED)

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

NO.	REFERENCE DRAWING TITLE	REFERENCE DRAWING NO.	NO	DATE	REVISION	DRN	CHK	APPR
			C	17/04/13	RE-ISSUED FOR PERMIT APPLICATION	AVM		RB
			B	17/02/02	ISSUED FOR PERMIT APPLICATION	AVM		RB
1	VPA LEASE PLAN	NO. 1999-054	A	17/01/17	ISSUED FOR DISCUSSION	AVM		RB

moffatt & nichol
777 WEST BROADWAY, SUITE 301
VANCOUVER, BC, CANADA, V5Z 4J7
604-707-9004

TRANS MOUNTAIN

DRAWN BY AVM	EXISTING AND PROPOSED WATERLOT BOUNDARIES AND PROPOSED WORK AREAS	SHEET SIZE A1
CHECKED BY CHKR		SCALE AS NOTED
APPROVED BY RB	WESTRIDGE TERMINAL	DATE 17/03/10

PROJECT CODING	DRAWING NUMBER			
AFE	FACILITY ID	DOCUMENT NO	SHT NO	REV
01-13283	WT00	GA01409	02	C

File: P:\9665 VC17 TMEP Detailed Design\CADD_Active\002_Main_dwg_set\GA0140902; Plotted: 4/13/2017 11:57 AM by MANUZON, ALLEN; Saved: 4/12/2017 5:05 PM by AMANUZON