CROSS FRASER PARTNERSHIP

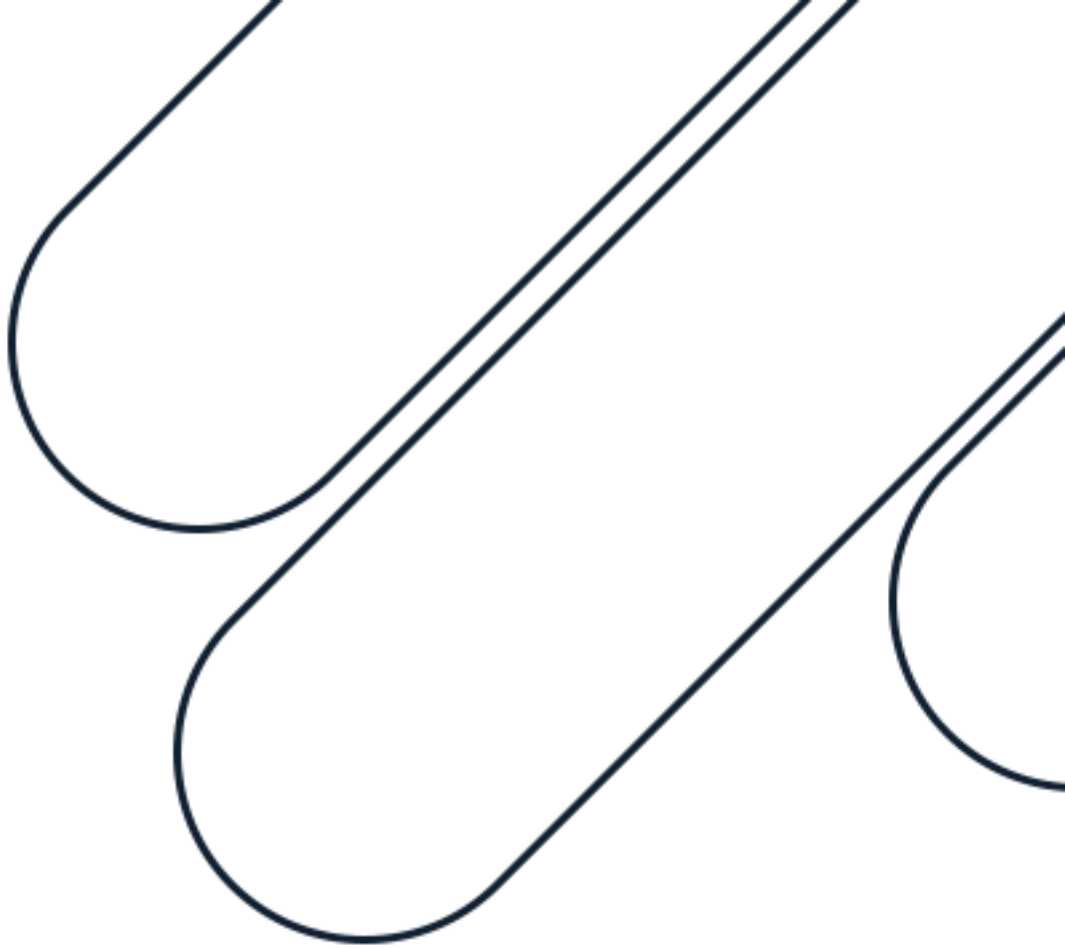
In-River Ground Improvement, Monitoring, Supplemental Test Dredge

Marine Construction Staging Plan and Marine Communication Plan

Date June 9th 2025

Agenda

1. In-River Test Program
   - In-River Investigations/Test Dredge
   - In-River Monitoring
2. Marine Construction Staging
   - Navigation Detours
   - Schedule
3. Marine Communication Plan
   - Communication Plan
   - Key contacts



Proposed Works and Plan Objectives

Cross Fraser Partnership (CFP) propose a Ground Improvement Program and Supplementary Test Dredge (the In-River Test Program) to support construction of the Fraser River Tunnel Project (FRTP). The works are:

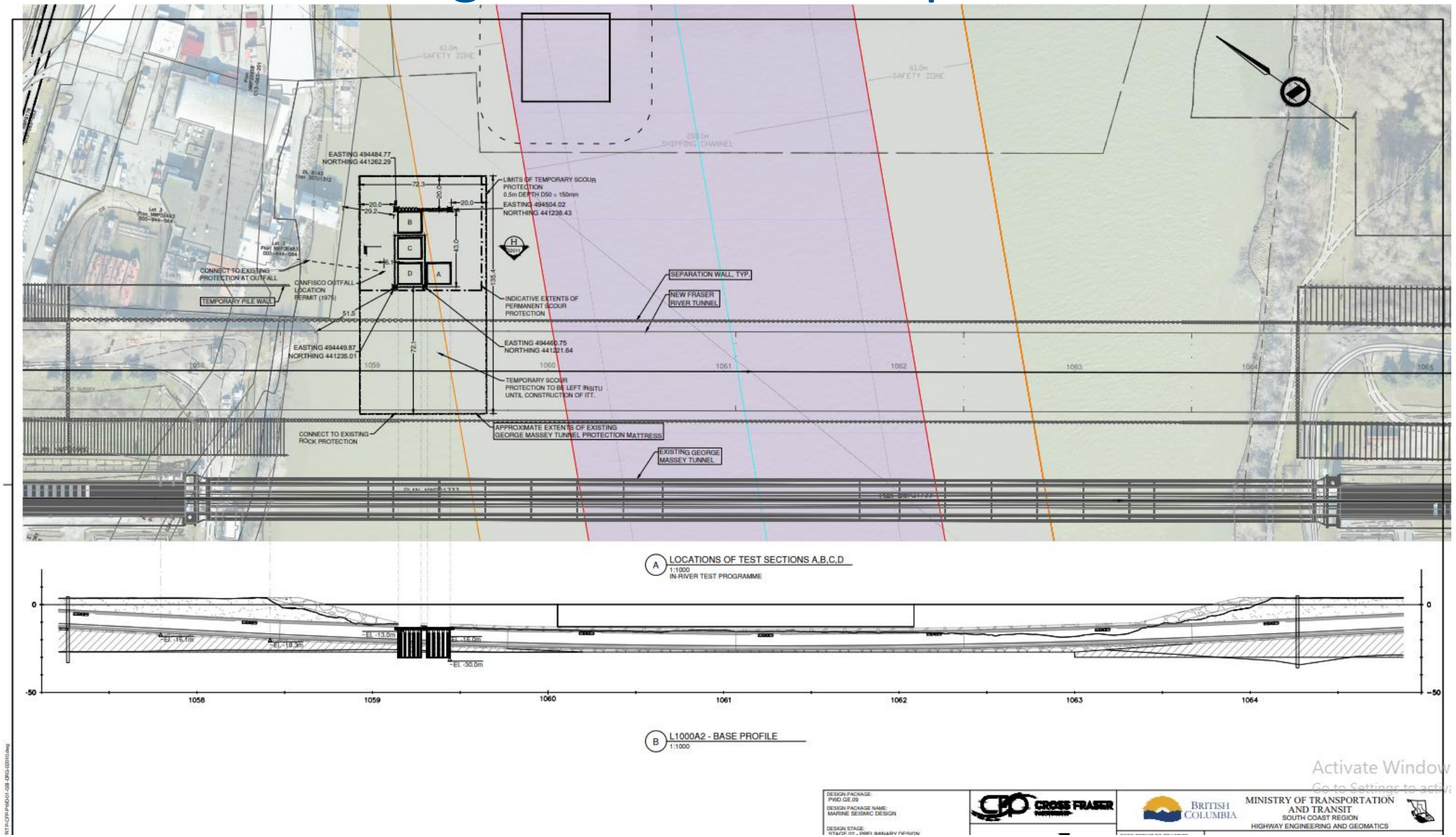
1. Critical to determine scheduling and limit "interferences" to navigation regarding overall FRTP construction requirements

2. Verify constructability and effectiveness of selected ground improvement methods for densification. Works consist of ground improvement trials, combi-wall prototype installation and sheet pile cofferdam (optional)

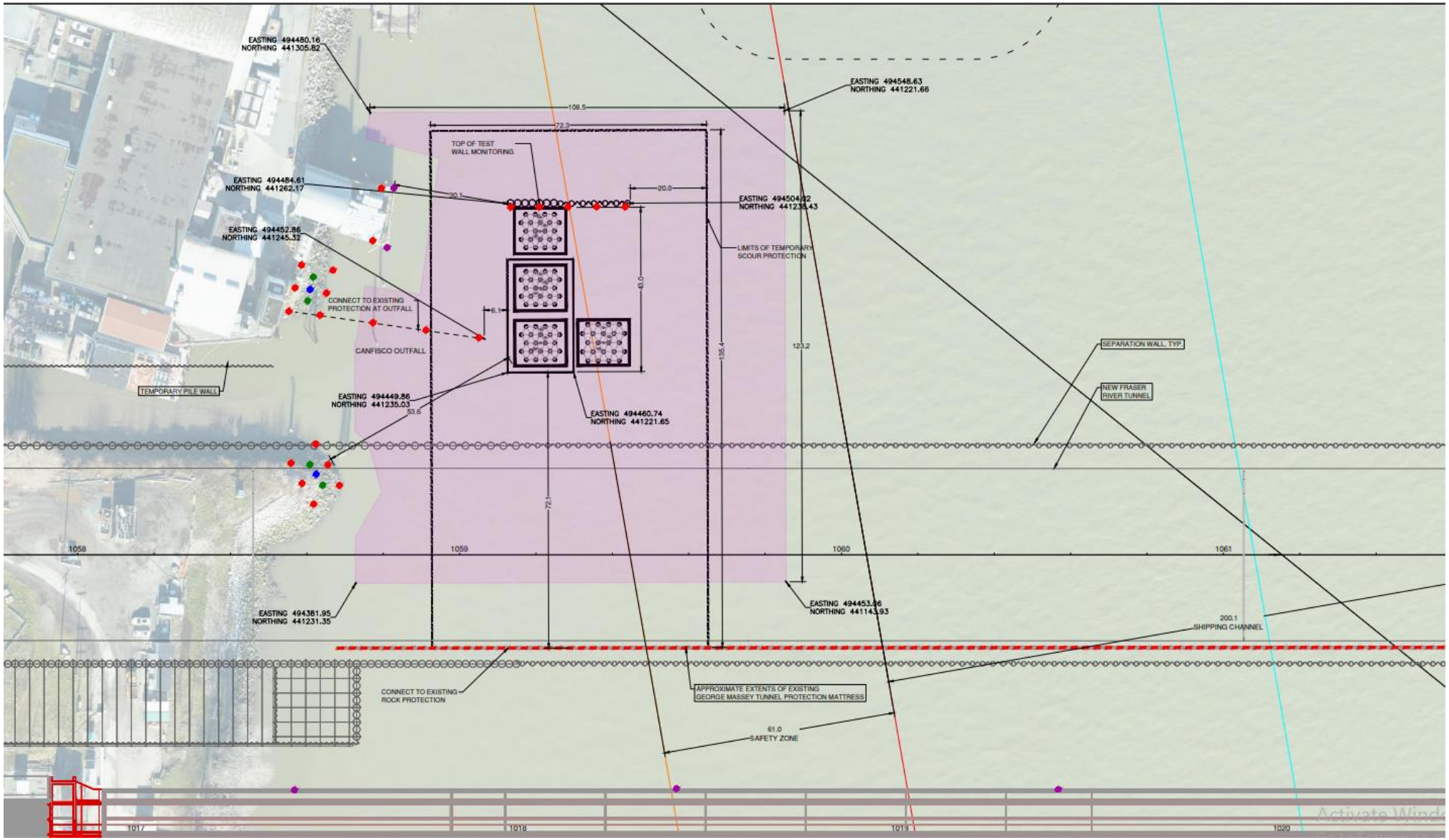
3. The Supplemental Test Dredge is found necessary for addressing the data gaps as identified in the 2022 test dredge and to acquire additional data for supporting the design assumptions and construction methodologies for the Tunnel.

4. Information and results will be incorporated in the design and construction of the FRTP to reduce risk to project schedule and costs and limit navigation interferences.

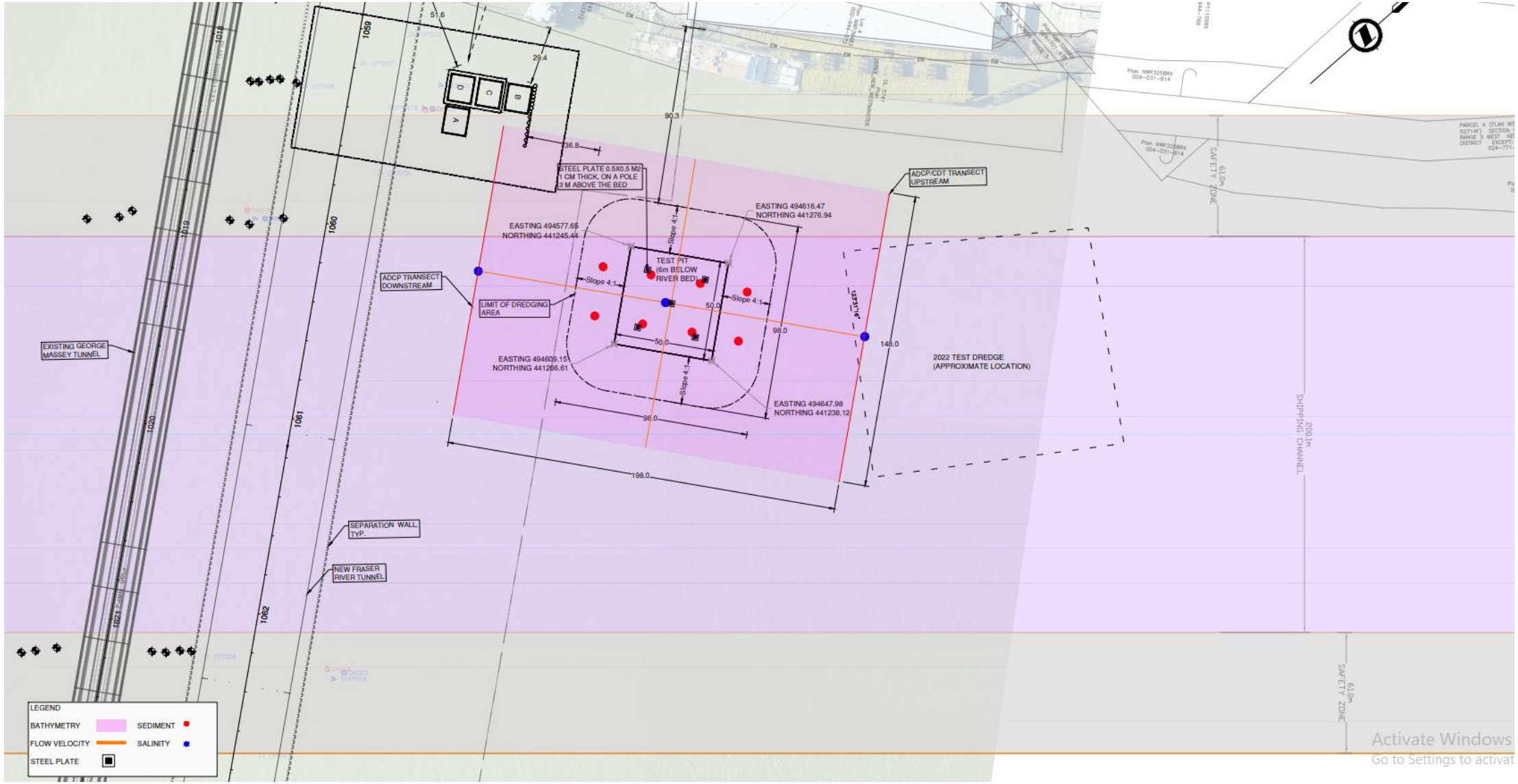
In-River Test Program – Ground Improvement



In-River Test Program – Scour Protection and Monitoring of Existing Infrastructure



Supplemental Test Dredge



In-water Monitoring for Data Collection

Up to two Acoustic Doppler Current Profilers (ADCP) will be installed for data collection.

An ADCP is a hydro-acoustic instrument used to measure the speed and direction of water currents.

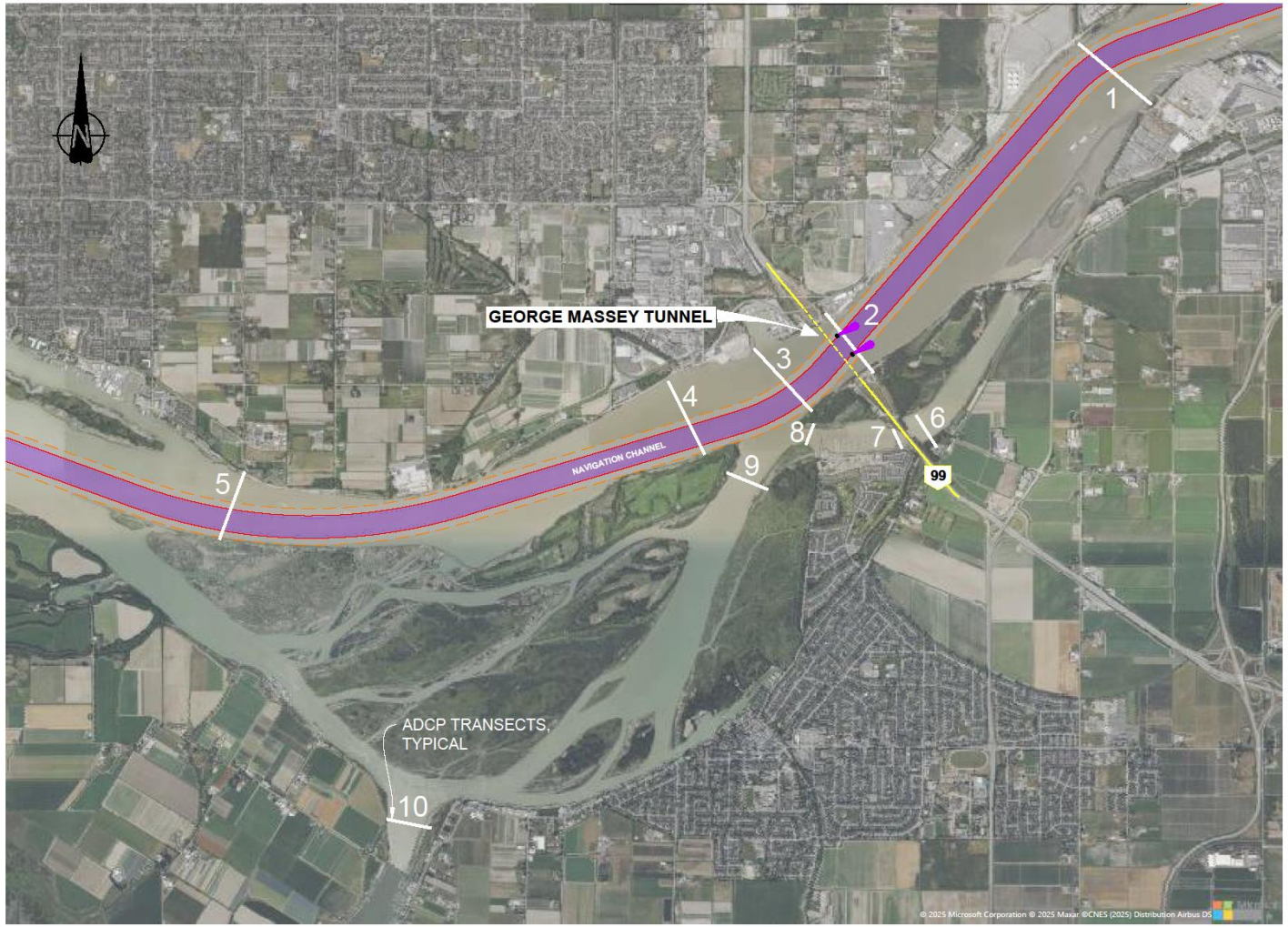
The locations will:

- Be representative for the general river flow.
- Provide a measured signal which is not affected by small scale irregularities. For this reason, measurements should not be performed too close to the riverbank, but in the deeper waters.

The locations are approximately at the new tunnel centerline and 5 m from the edge of the shipping channel (so inside the safety zone outside the navigation channel).

Example: Xylem Buoys

The ADCP's will be in place in July 2025 and in February 2026 (one month duration per data collection campaign)



LOCATION PLAN
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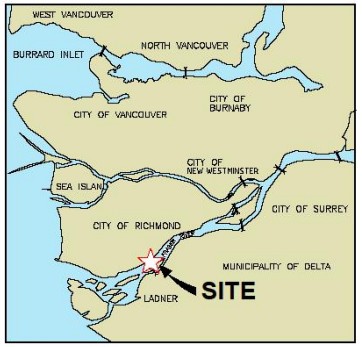
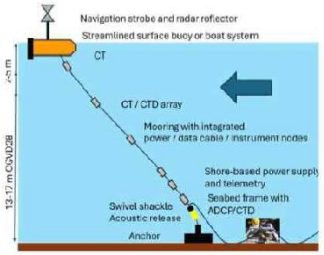


KEY PLAN
N.T.S.



BUOY SYSTEM

NOTES:

- SHORE-BASED H-ADCP SYSTEM WITH ~15m LONG INSTRUMENT CARRIER RAIL AND WINCH FOR H-ADCP WITH BED/BANK ANCHORING SYSTEM; DATA AND POWER INTEGRATED WITH MOORING.
- RIVERBED INSTRUMENT FRAME FOR UPLOOKING V-ADCP/CTD – INTEGRATED ARMOURED SUBMARINE CABLE RIVERBED ANCHORED TO SHORE AND INTEGRATED WITH SHORE-BASED SYSTEMS AND TAUTLINE MOORING.
- TAUTLINE SURFACE/SUBSURFACE MOORING (SUBS BUOY) / ARMOURED SUBMARINE CABLE (DATA AND POWER TRANSMISSION) WITH 9 UNDERWATER CONNECTOR NODES AND RIVERBED FRAME
- MOORING WITH STRAIN RELEASES AT SURFACE AND BED SWIVEL SYSTEM ABOVE BED.
- SHORE-BASED WATER-PROOF ENCLOSURE ON CATAMARAN DECK FOR POWER SUPPLY BATTERIES, CELLULAR TELEMETRY, SOLAR, DATA ACQUISITION SYSTTEM (CONTROLLER).
- SOLAR PANEL ARRAY.

LEGEND:

- PROJECT BOUNDARY: IDENTIFIED WORK PACKAGE FOR NPD SUBMISSION
- MAIN NAVIGATION CHANNEL
- CHANNEL SAFETY ZONE
- MAIN NAVIGATION CHANNEL
- ADMINISTRATIVE SAFETY ZONE
- CTD

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REVISION IN PROGRESS

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A	AUG22/22	ISSUED FOR REPORT	RM		RT		

ISSUE / REVISIONS

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ISSUE / REVISIONS

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Last Saved: May. 16/25 3:56pm

PERMITS AND STAMPS

CLIENT: CROSS FRASER PARTNERSHIP

PROJECT: FRASER RIVER TUNNEL PROJECT

TYPLAN Planning & management

TITLE: IN RIVER MONITORING SYSTEM PLAN

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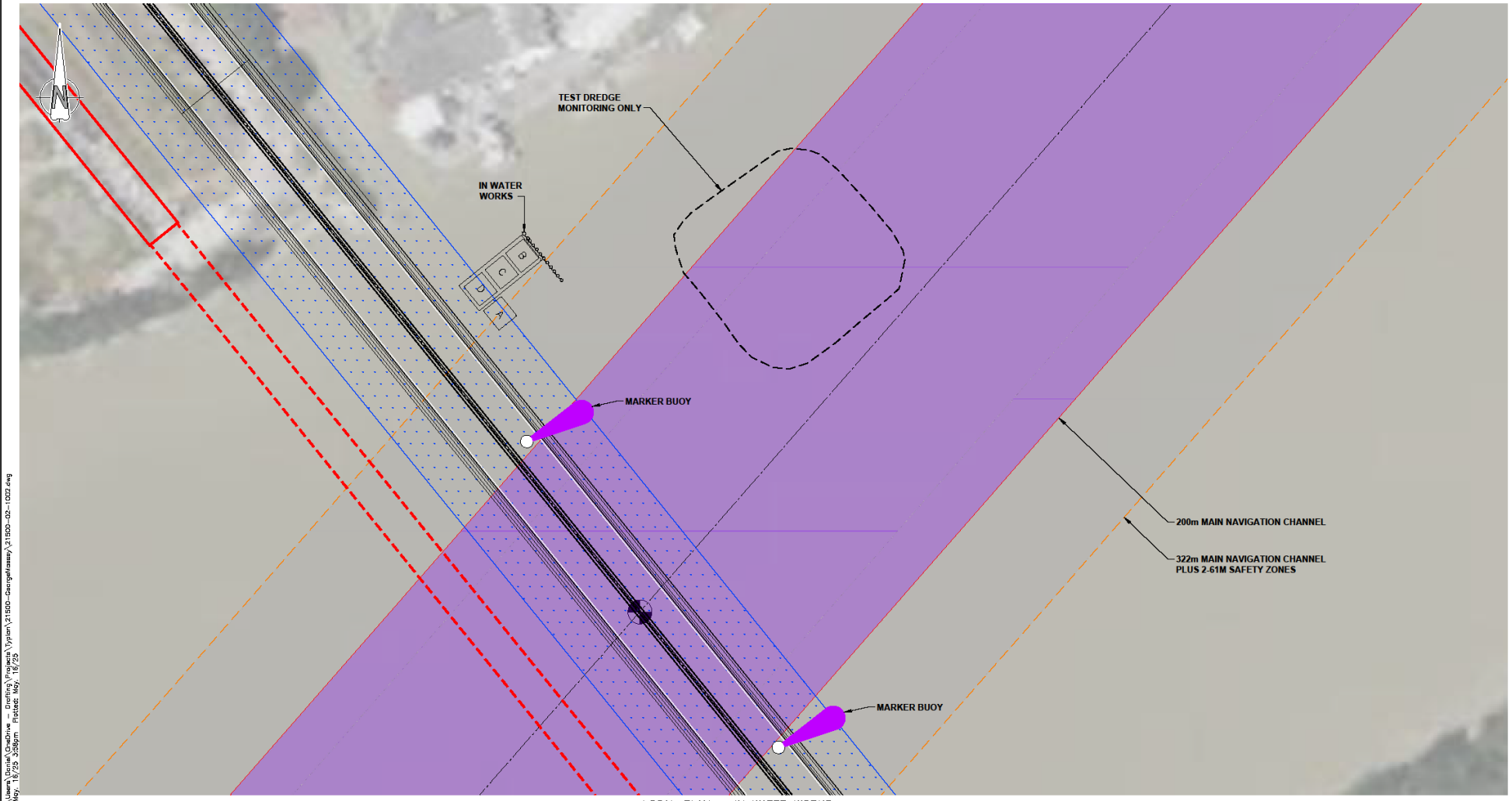

LOCAL PLAN – IN WATER WORKS
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m 0 10 20 30 40 50 m
1:1000

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ISSUE / REVISIONS

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ISSUE / REVISIONS

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PERMITS AND STAMPS

CLIENT: BRITISH COLUMBIA transportation investment corporation

PROJECT: FRASER RIVER TUNNEL PROJECT
IN WATER TEST PROGRAM

TYPLAN Planning & management

TITLE: IN-RIVER MONITORING PROGRAM
IN-RIVER GROUND IMPROVEMENTS AND
SUPPLEMENTAL TEST DREDGE

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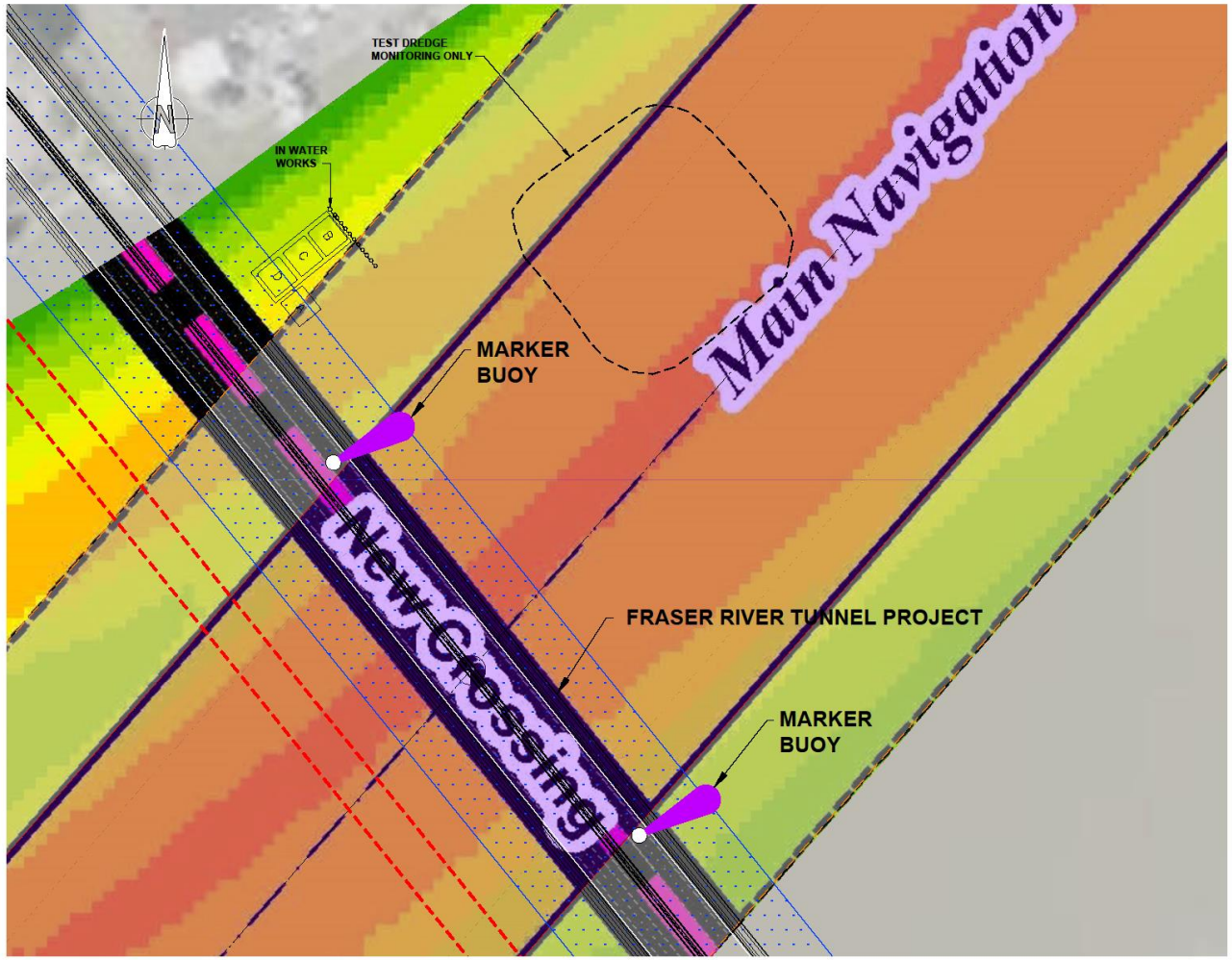


LOCAL PLAN – IN WATER WORKS
1:1000

m 0 10 20 30 40 50 m
1:1000

Local Traffic: 2017 - 2019

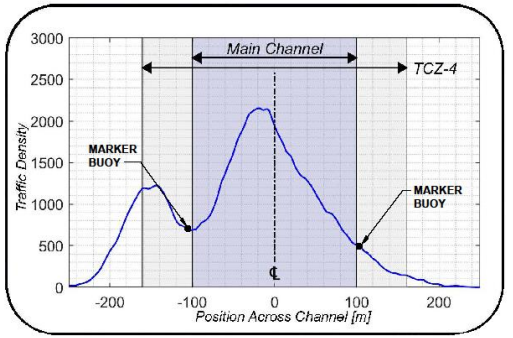
Vessel Traffic (number of vessel passes)

26 - 50	251 - 500	2,001 - 3,000
51 - 75	501 - 750	3,001 - 4,000
76 - 100	751 - 1,000	4,001 - 5,000
101 - 250	1,001 - 2,000	>5,000

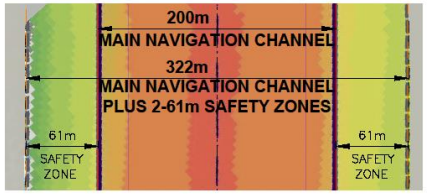
0 150 300 Meters

1 cm = 75 m (when printed 8.5" x 11")

Notes:
1. Traffic is shown based on AIS data and is subject to the accuracy of the information broadcast by each individual vessel.
2. "Local Traffic" includes tug boats, fishing vessels, and all other vessels not classified as "Ferries" or "Deep Draft".
3. Chart Source: CHS 3490 "Fraser River, Sands Heads to Douglas Island".



SECTION A-A



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ISSUE / REVISIONS

No.	DATE	DESCRIPTION	DRAWN	CHK'D	DESIGN	CHK'D	APP'D

ISSUE / REVISIONS

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Last Saved: May. 16/25 3:56pm

PERMITS AND STAMPS

CLIENT: British Columbia | transportation investment corporation

PROJECT: FRASER RIVER TUNNEL PROJECT
IN WATER TEST PROGRAM

TYPLAN Planning & management

TITLE: IN–RIVER MONITORING PROGRAM
IN–RIVER GROUND IMPROVEMENTS AND SUPPLEMENTAL TEST DREDGE

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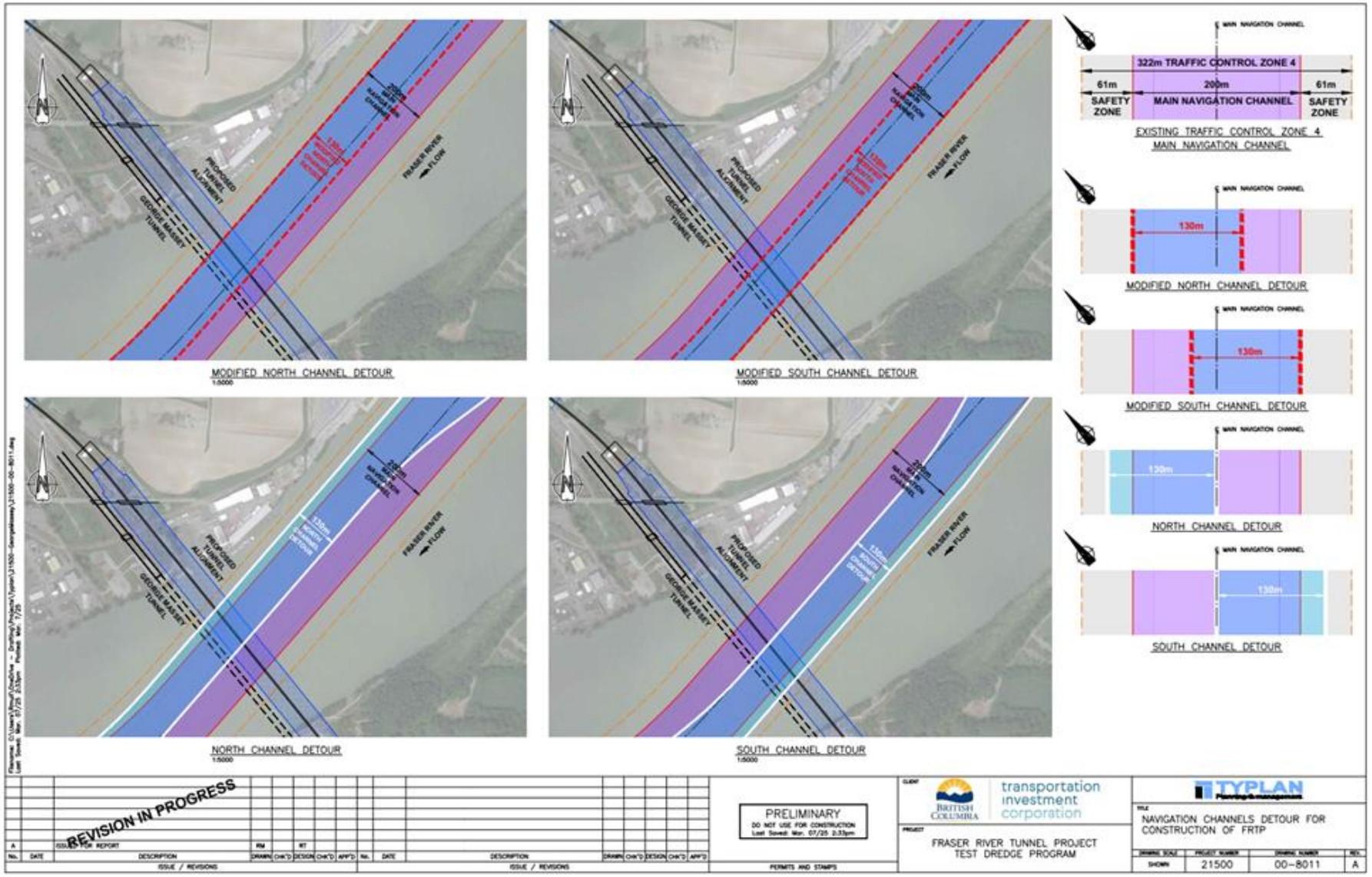
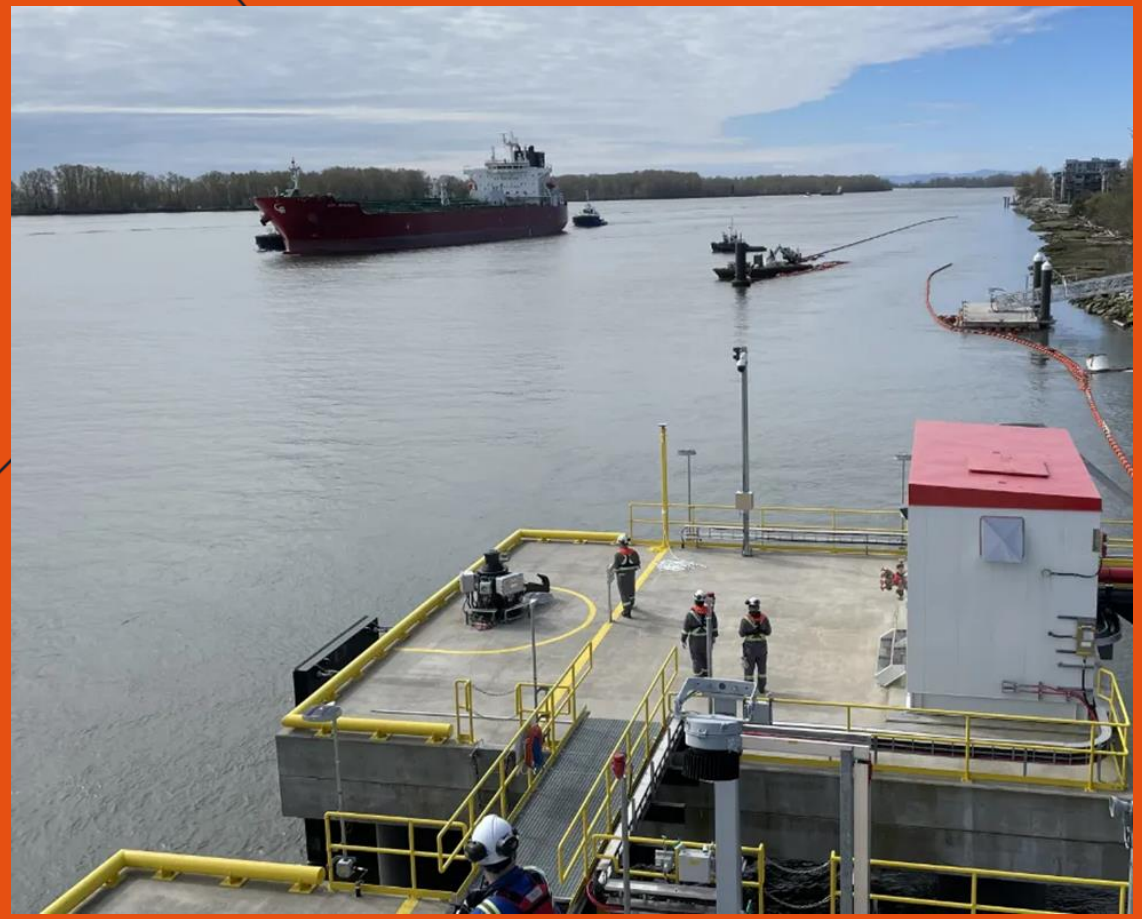
Fraser River Tunnel Navigation Channel Detours Overview

FRTP Marine Navigation Detours
(e.g., implementation of four detours during construction)

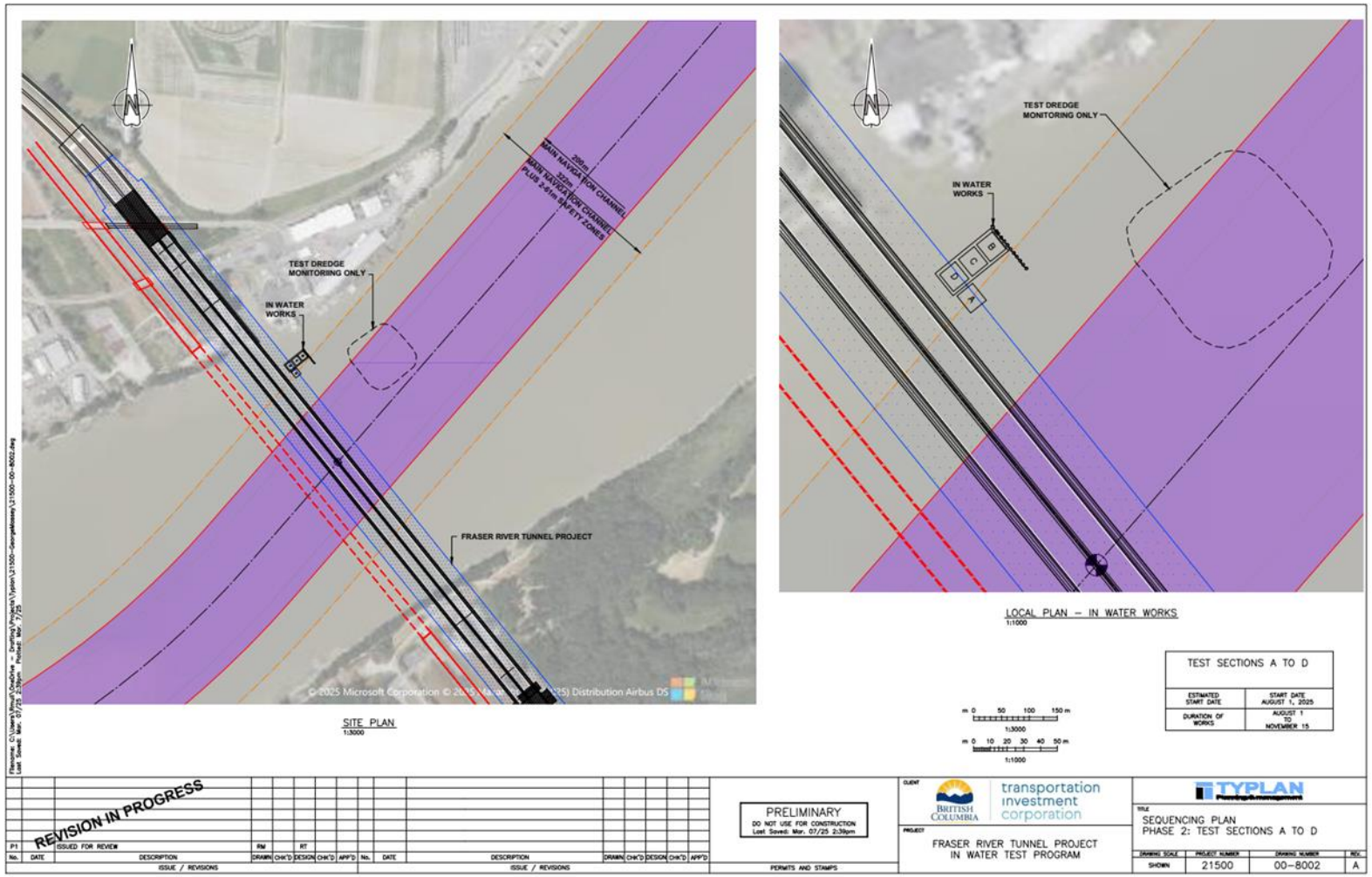




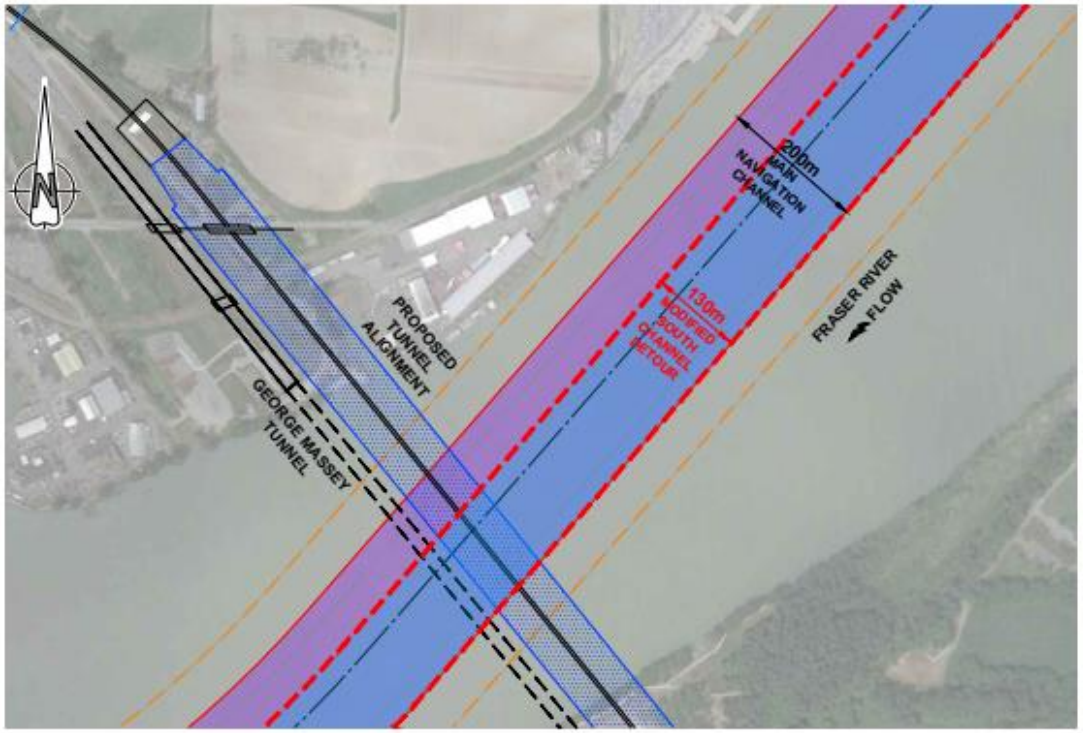
In-River Test Program Navigation Channel Detours

Modified South Navigation Channel Detour
South Navigation Channel Detour

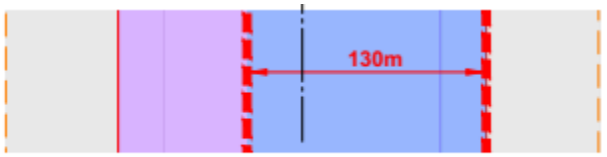
In-River Test Program



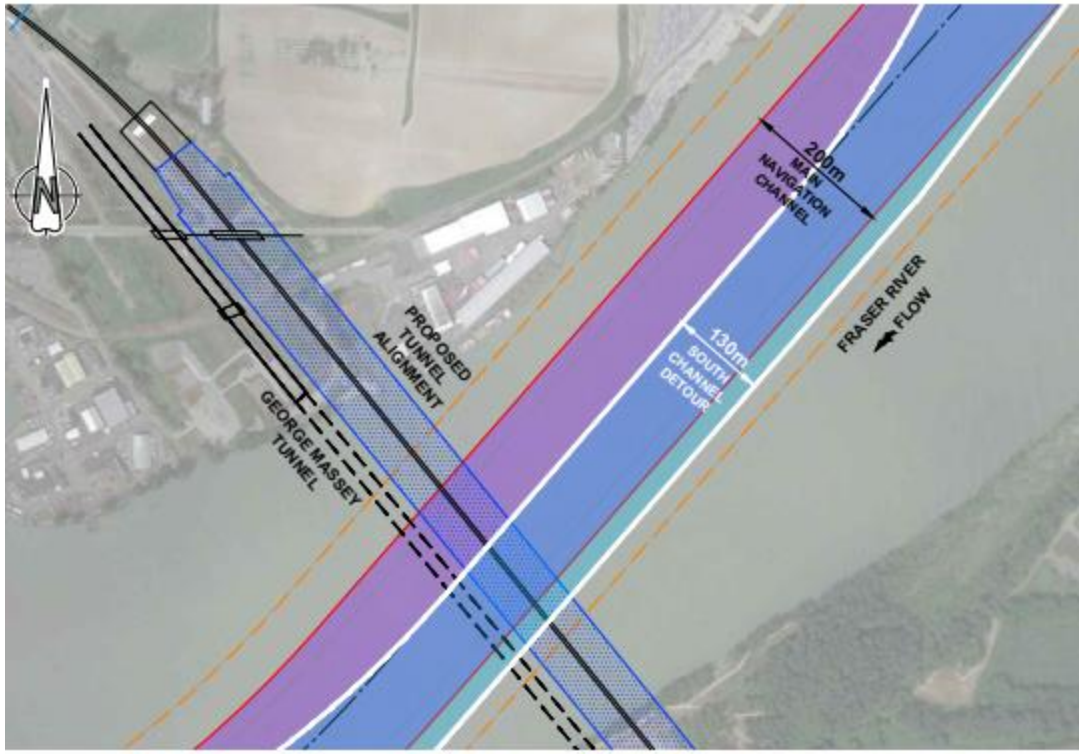
Navigation Channel Detours being Implemented for the In-River Test Program



MODIFIED SOUTH CHANNEL DETOUR
1:5000



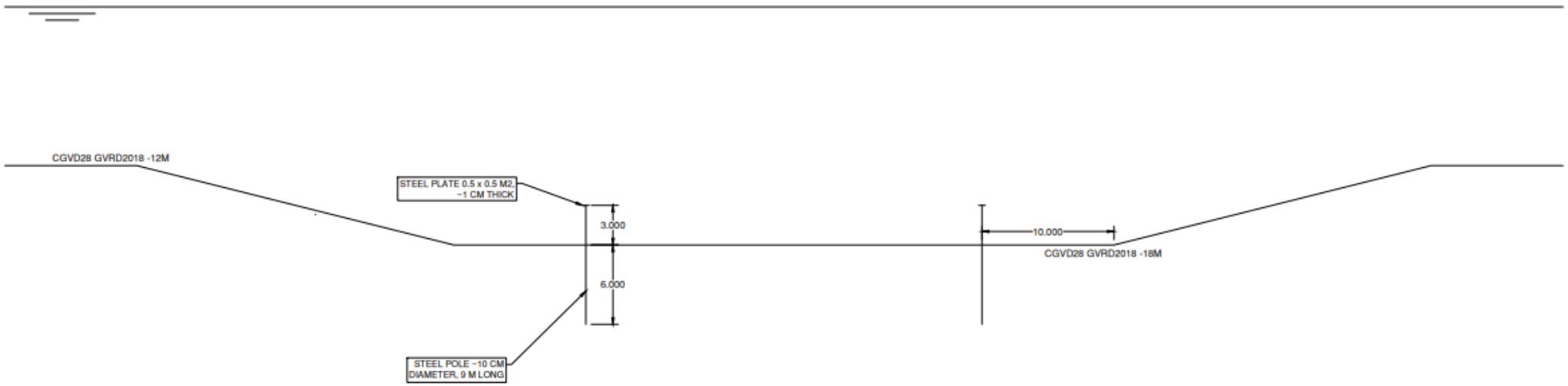
MODIFIED SOUTH CHANNEL DETOUR



SOUTH CHANNEL DETOUR

SOUTH CHANNEL DETOUR

Supplemental Test Dredge Program Sedimentation Monitoring within the Test Dredge



CROSS SECTION
1:200
SUPPLEMENTARY TEST DREDGE

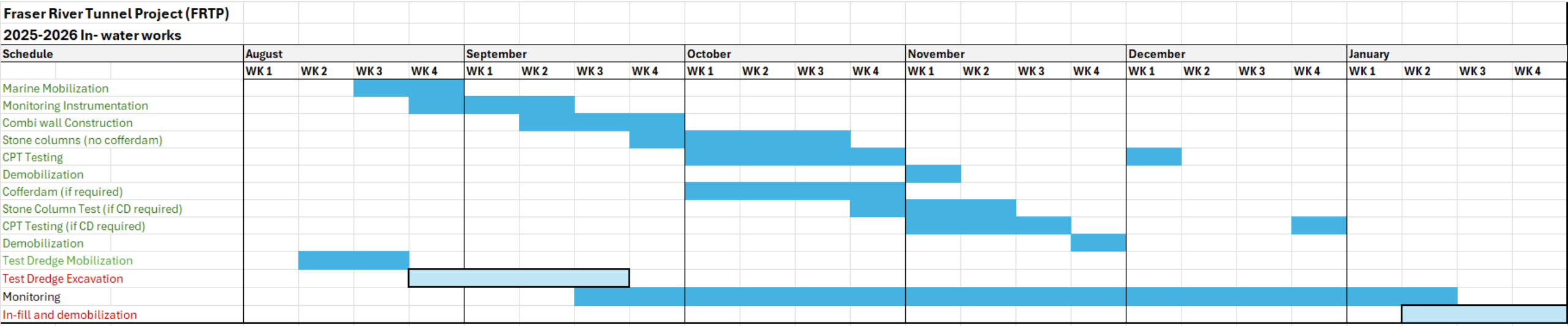
Typical Marine Construction Staging Equipment Configurations

Marine Construction Staging Plan Schedule and Overview

In-River Works and Supplemental Test Dredge

Fraser River Tunnel Project (FRTP)

2025-2026 In- water works



Notes:

Navigation Channel Detour Implemented

Main Navigation Channel (Existing)

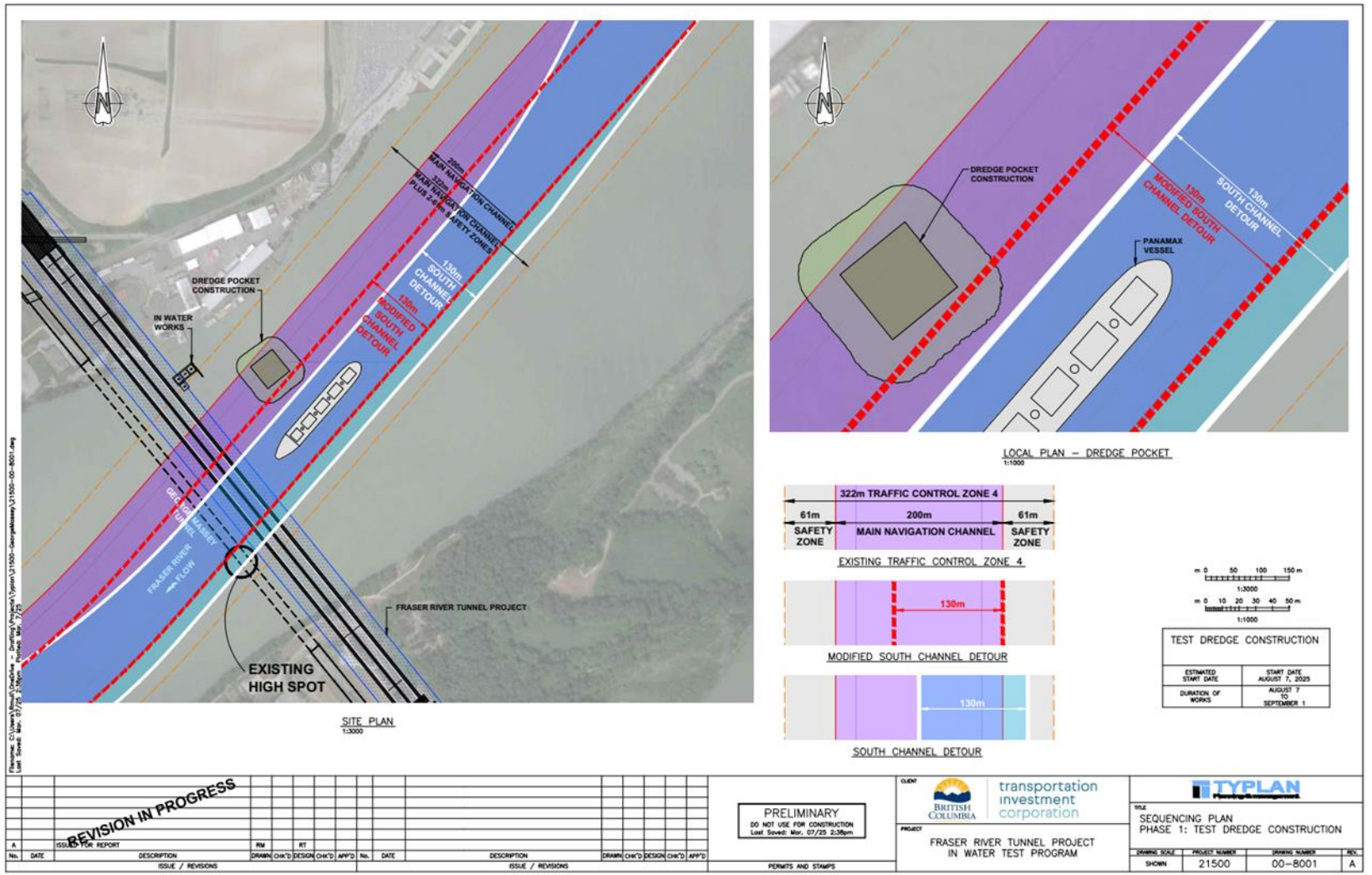
Modified 130m South Navigation Detour

Location of Works

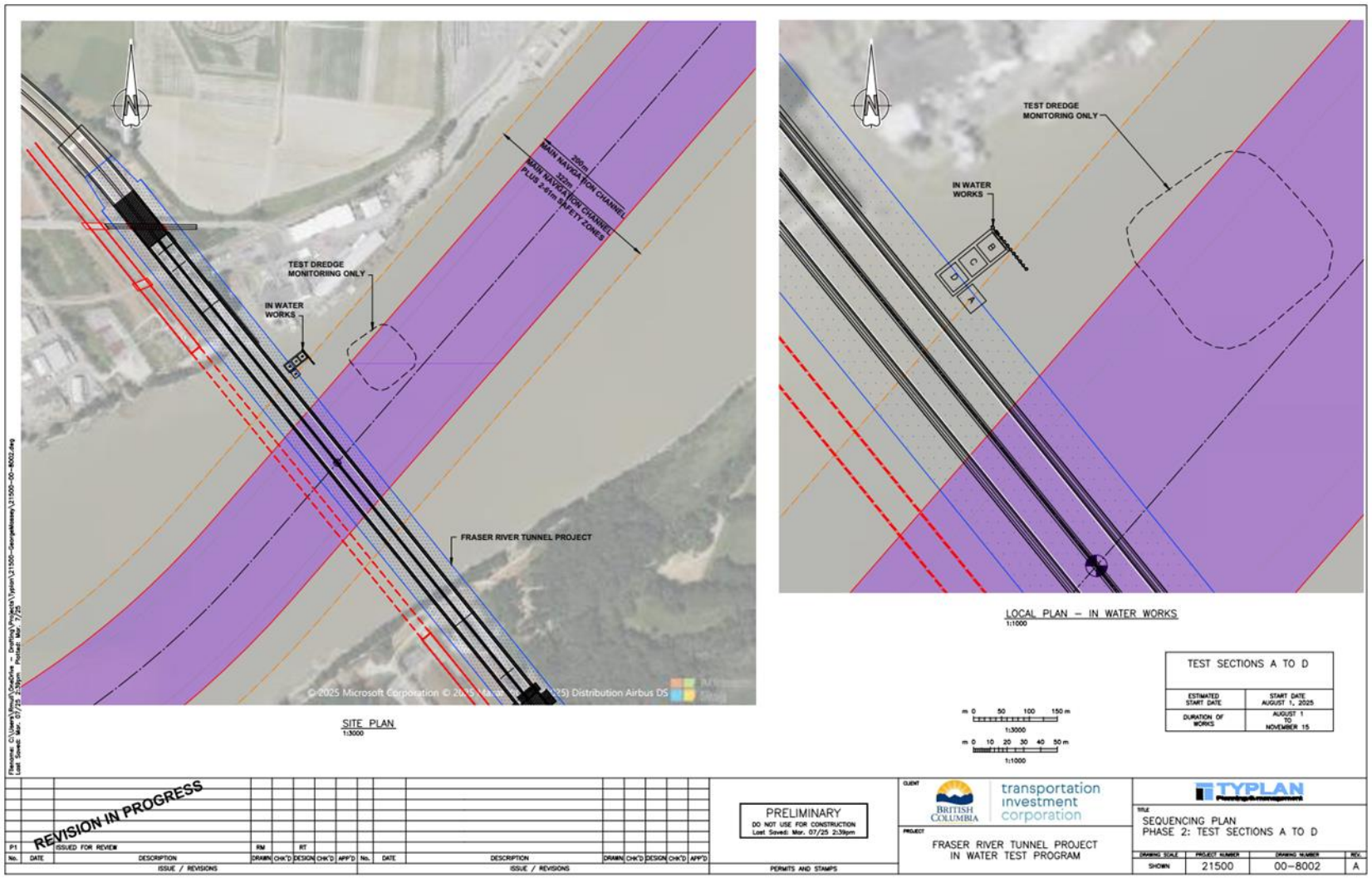
Administrative Safety Zone

Portion of Main Navigation channel

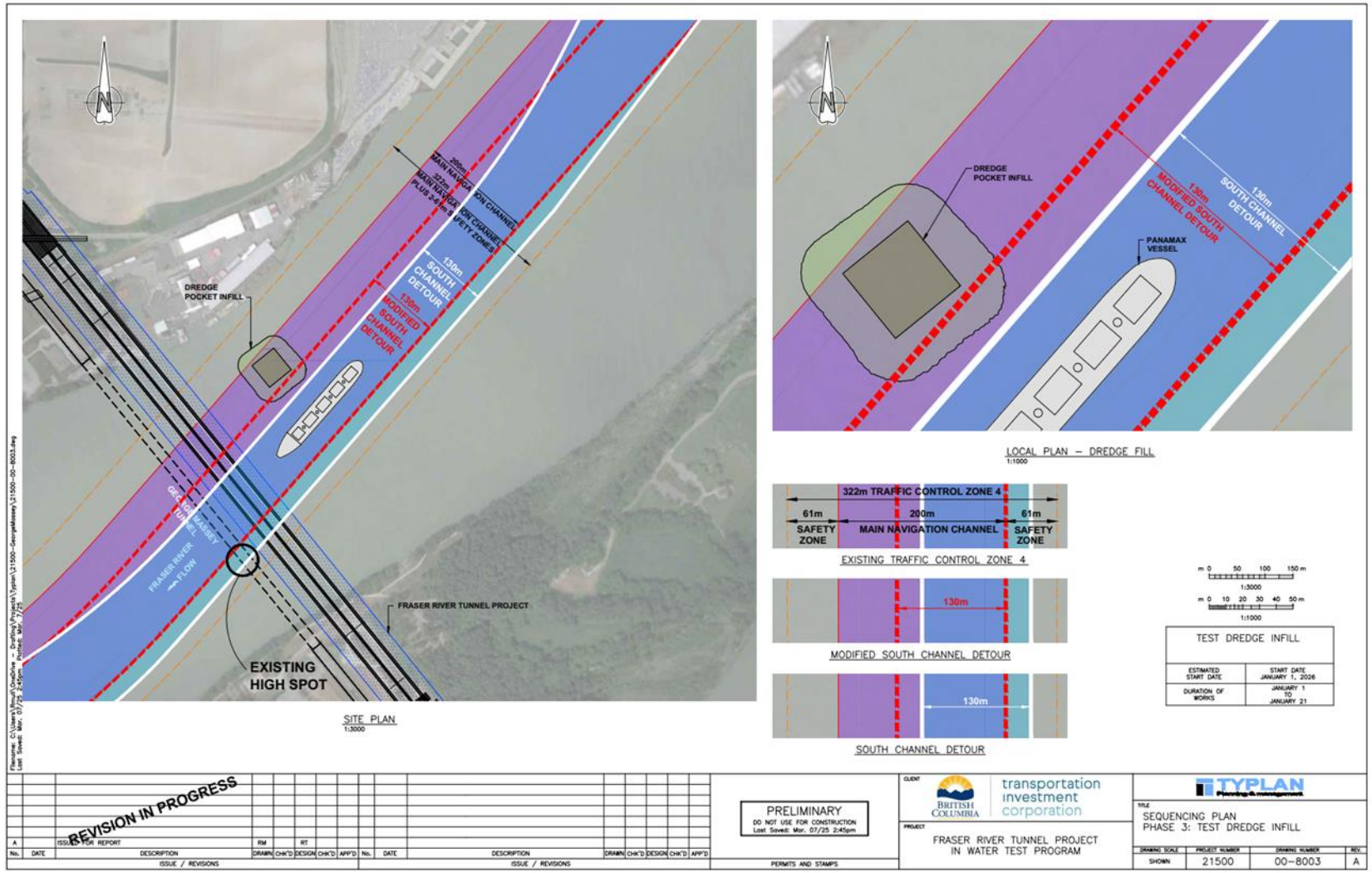
Marine Construction Staging Plan Overview



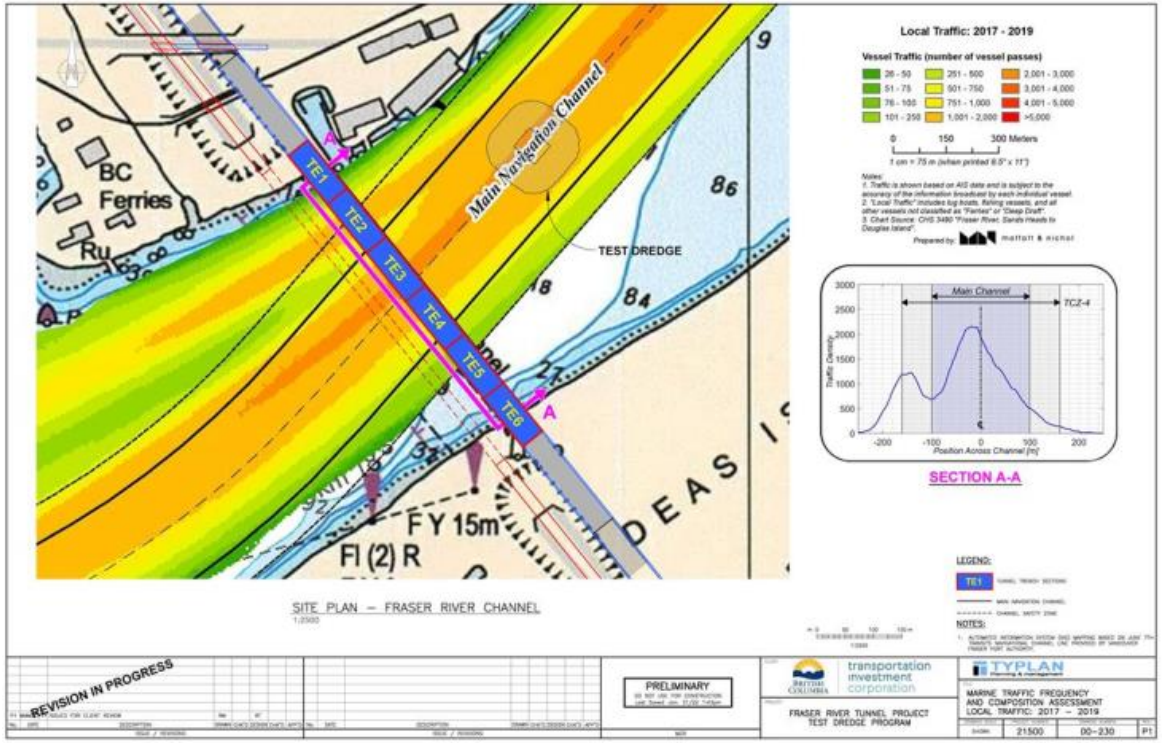
Marine Construction Staging Plan Overview



Marine Construction Staging Plan Overview



Lessons Learned: Geotechnical Investigations 2023-2024 Key marine safety issues with In–River Test Program



Direct communications on VHF channels between marine stakeholders and marine contractor required

Adherence to use of which navigation detour being implemented is critical

Wake from tug and tow and ferry operations effects marine construction vessels, especially support vessels for ground improvement activities

AIS must be provided on all marine construction staging vessels

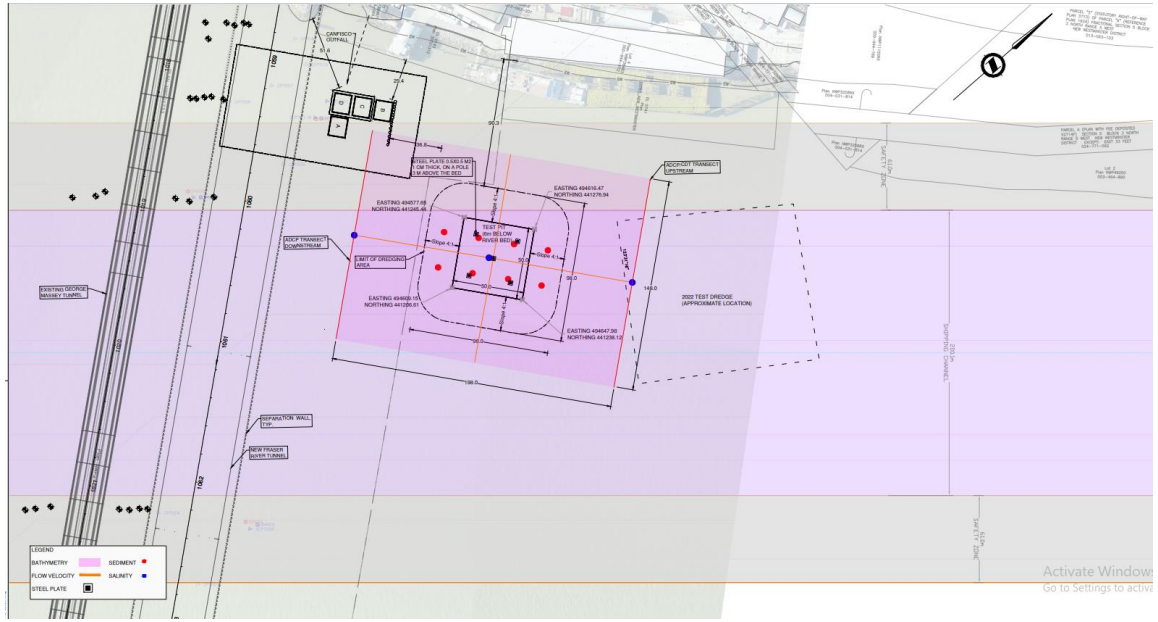
Marine community awareness of works

Key Construction and Marine Safety Issues

Contractors Awareness

Number of transits and patterns in the general area of the works

Scheduling related to implementation of South Navigation Channel Detour for test dredge creation and infill related to deep-sea transits



Marine Operators Awareness

Wake effects on support vessels

Modification of existing patterns of use to avoid In-river Test Program activities

CMC (Local Tug and Tow Operators) and Seaspan Ferries of cutting corners of the main navigation channel

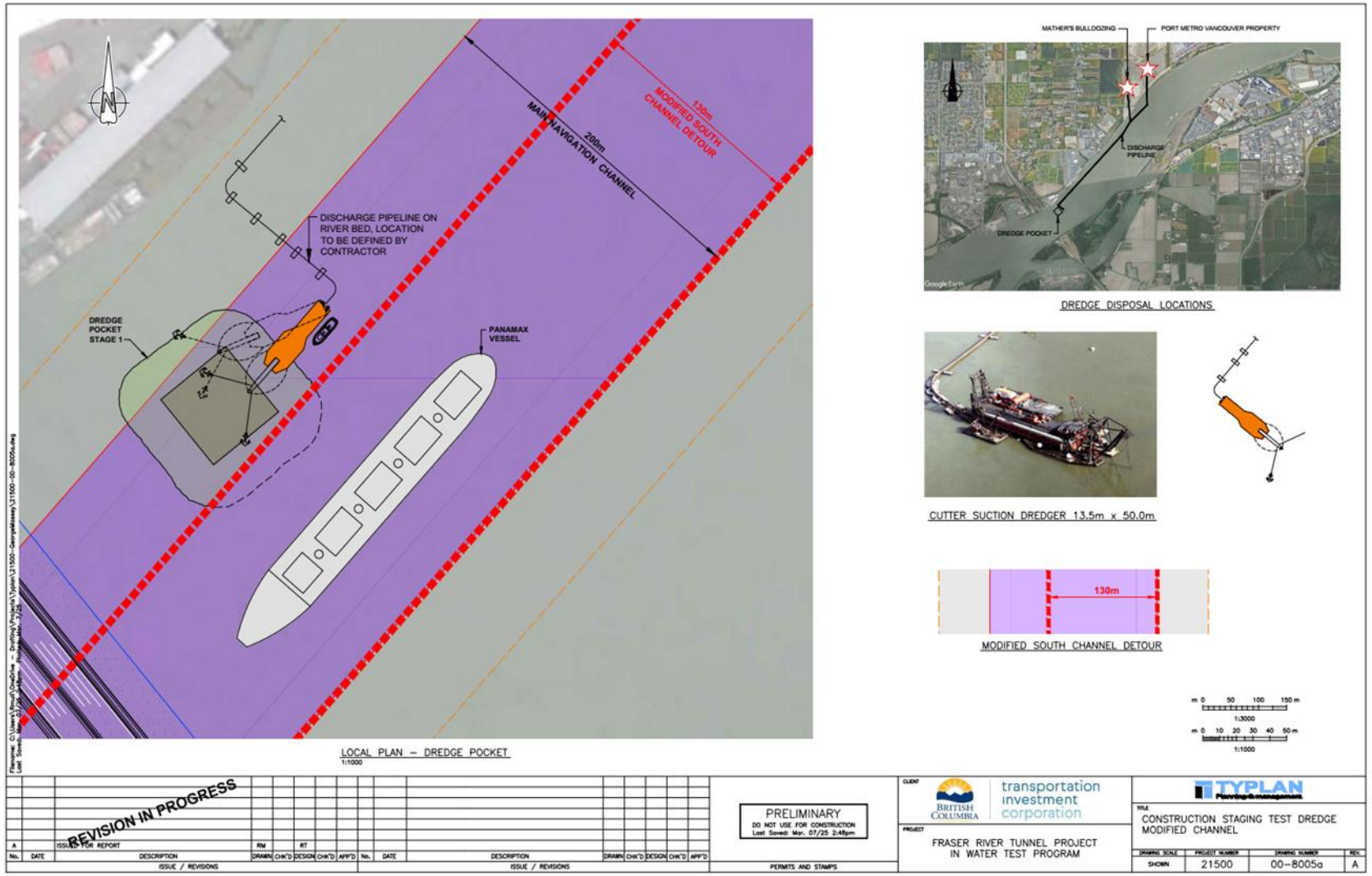
South Modified Navigation Detour

To Limit interferences to navigation the Modified South Navigation detour will be utilized as much as possible

The south Navigation Detour will only be utilized if required during the construction and infill of the Supplemental Test Dredge

Marine Construction Staging Equipment

Marine Construction Staging Equipment



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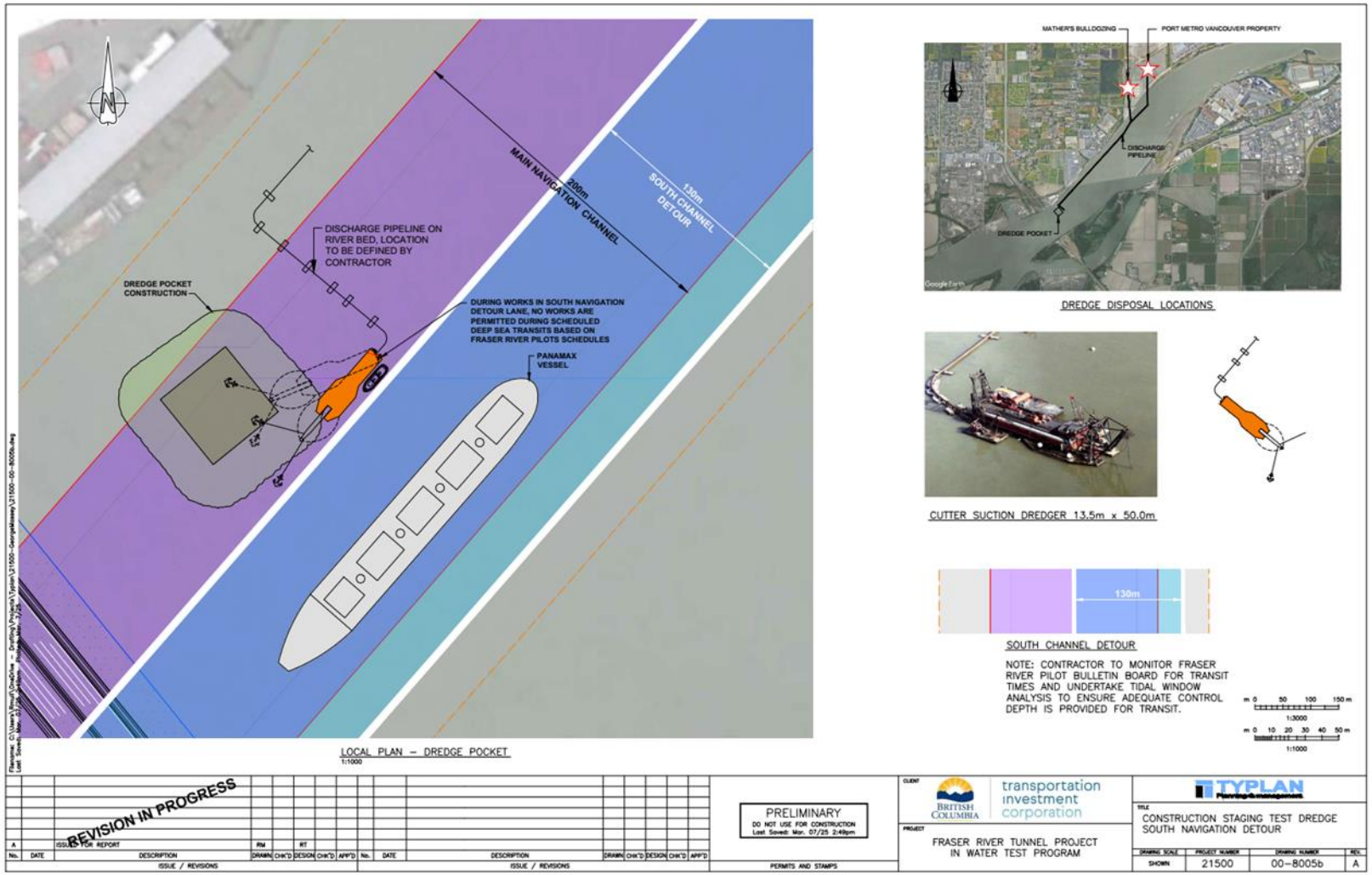

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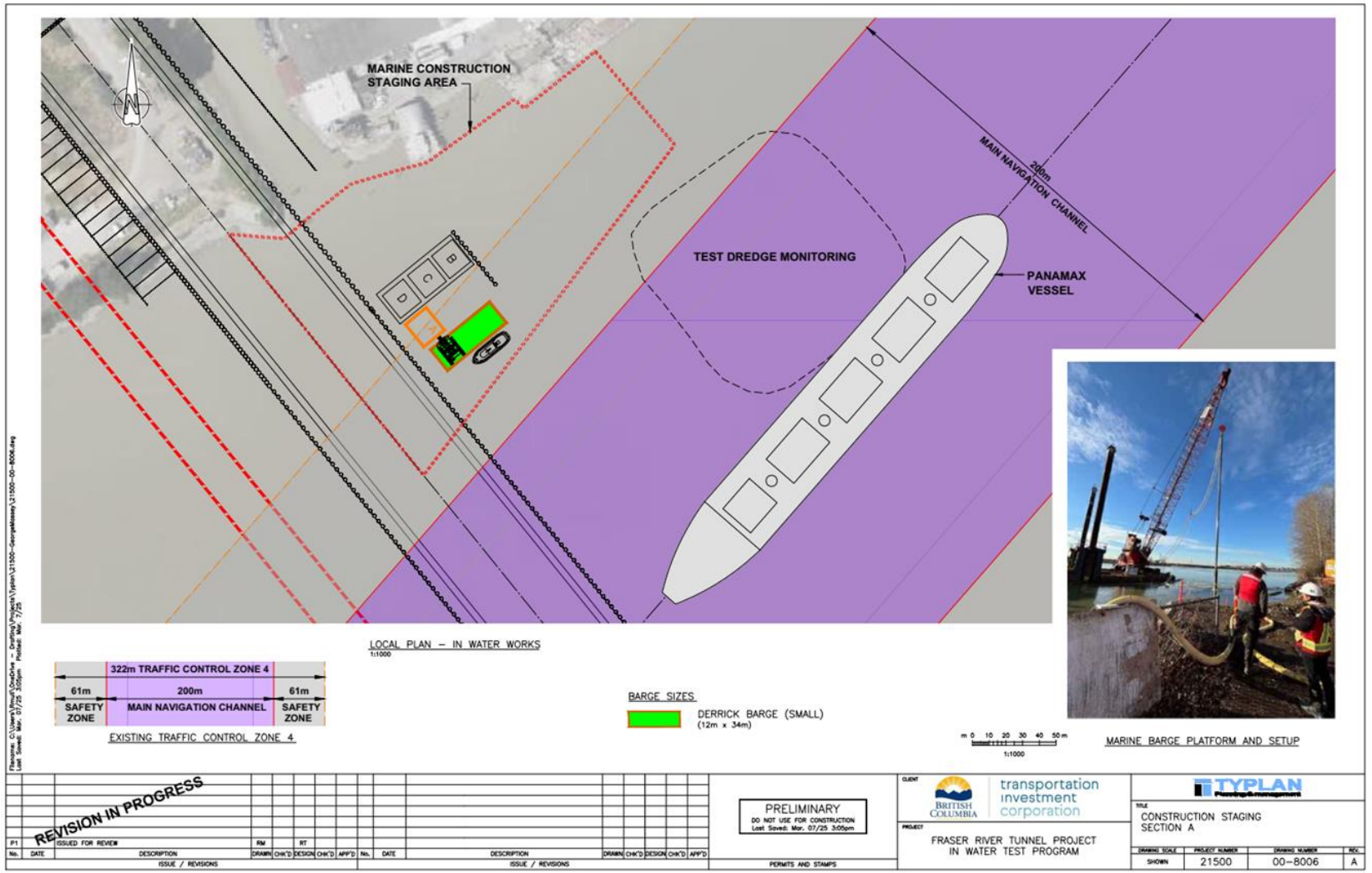

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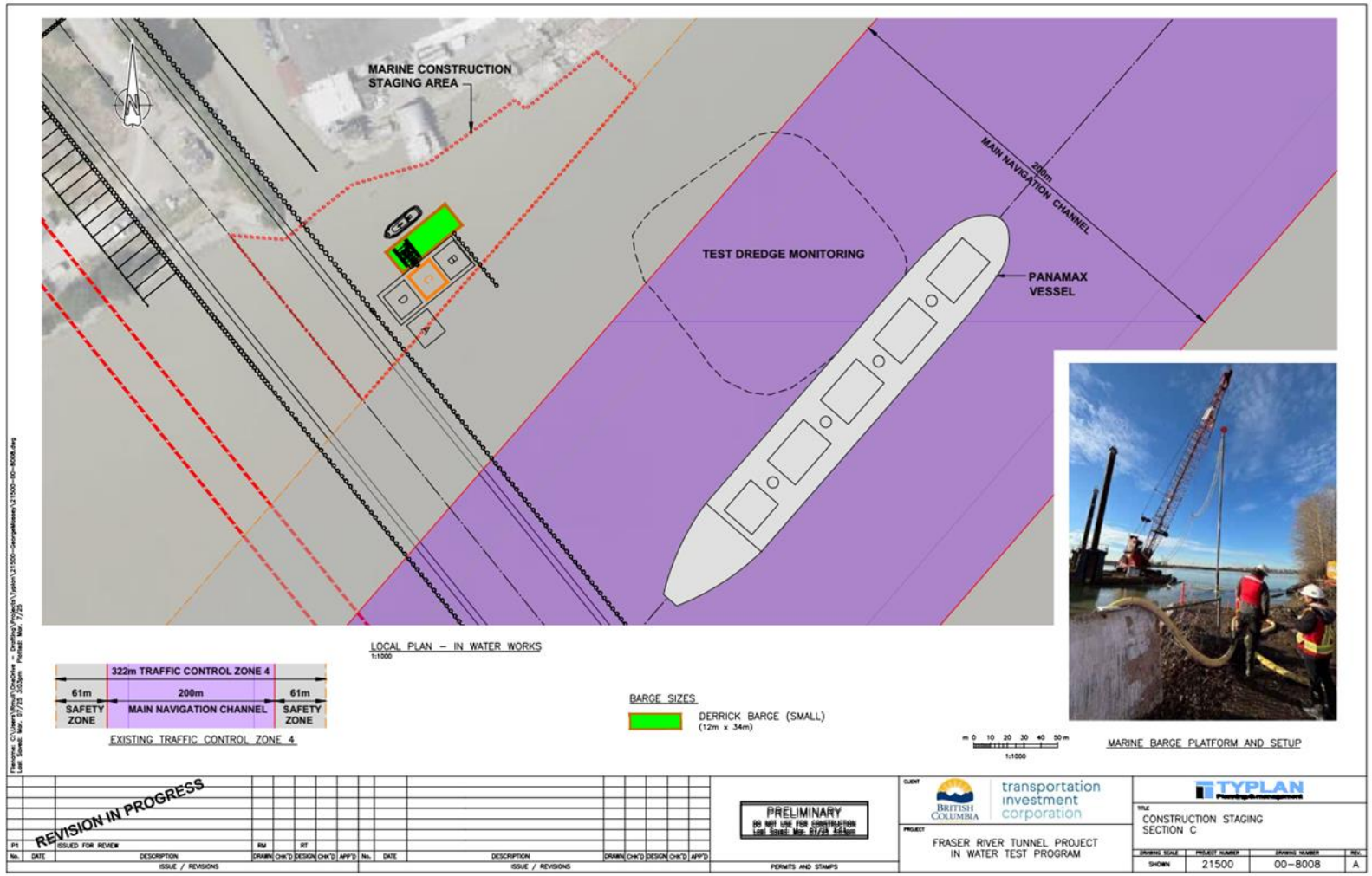

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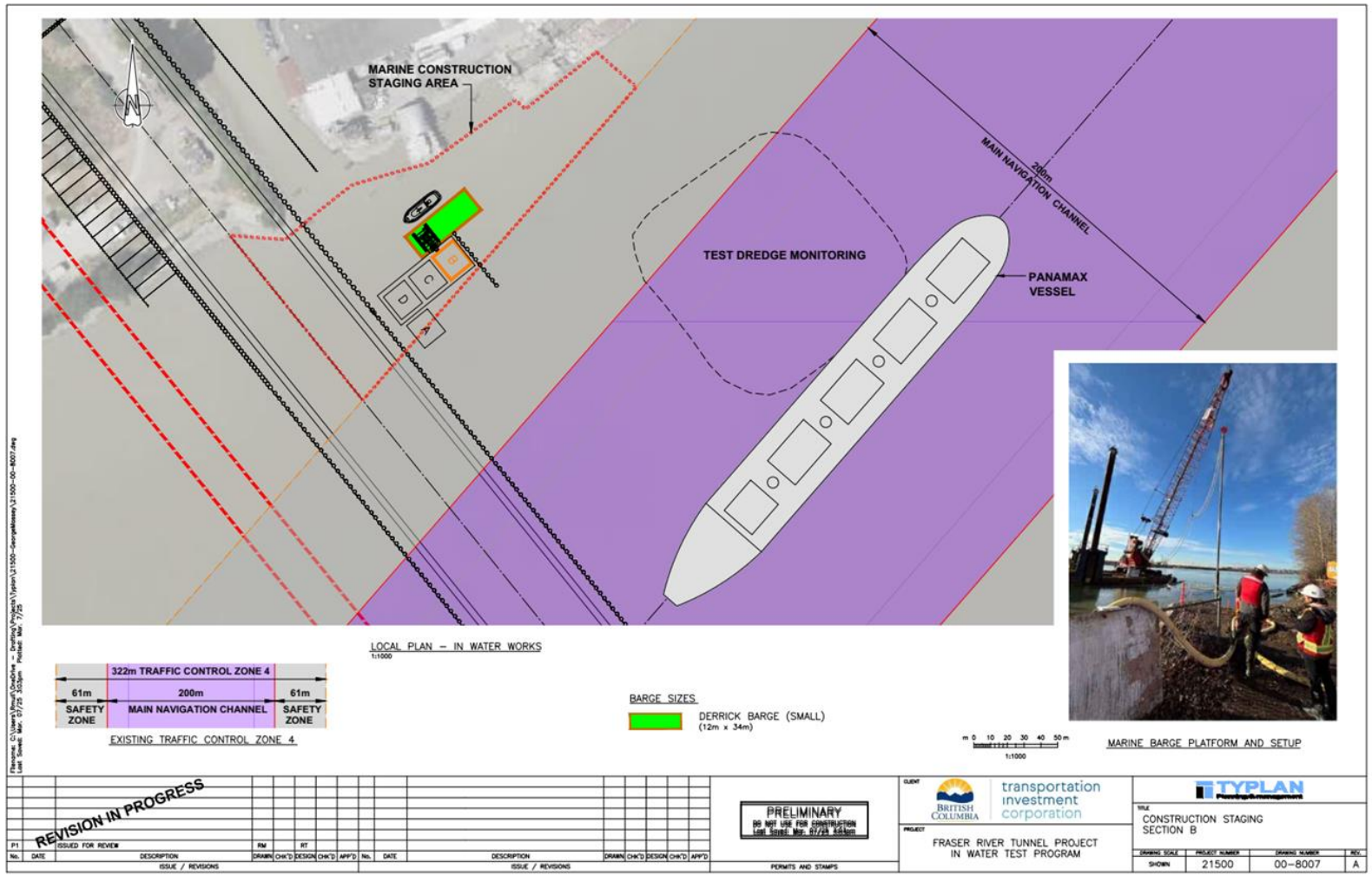

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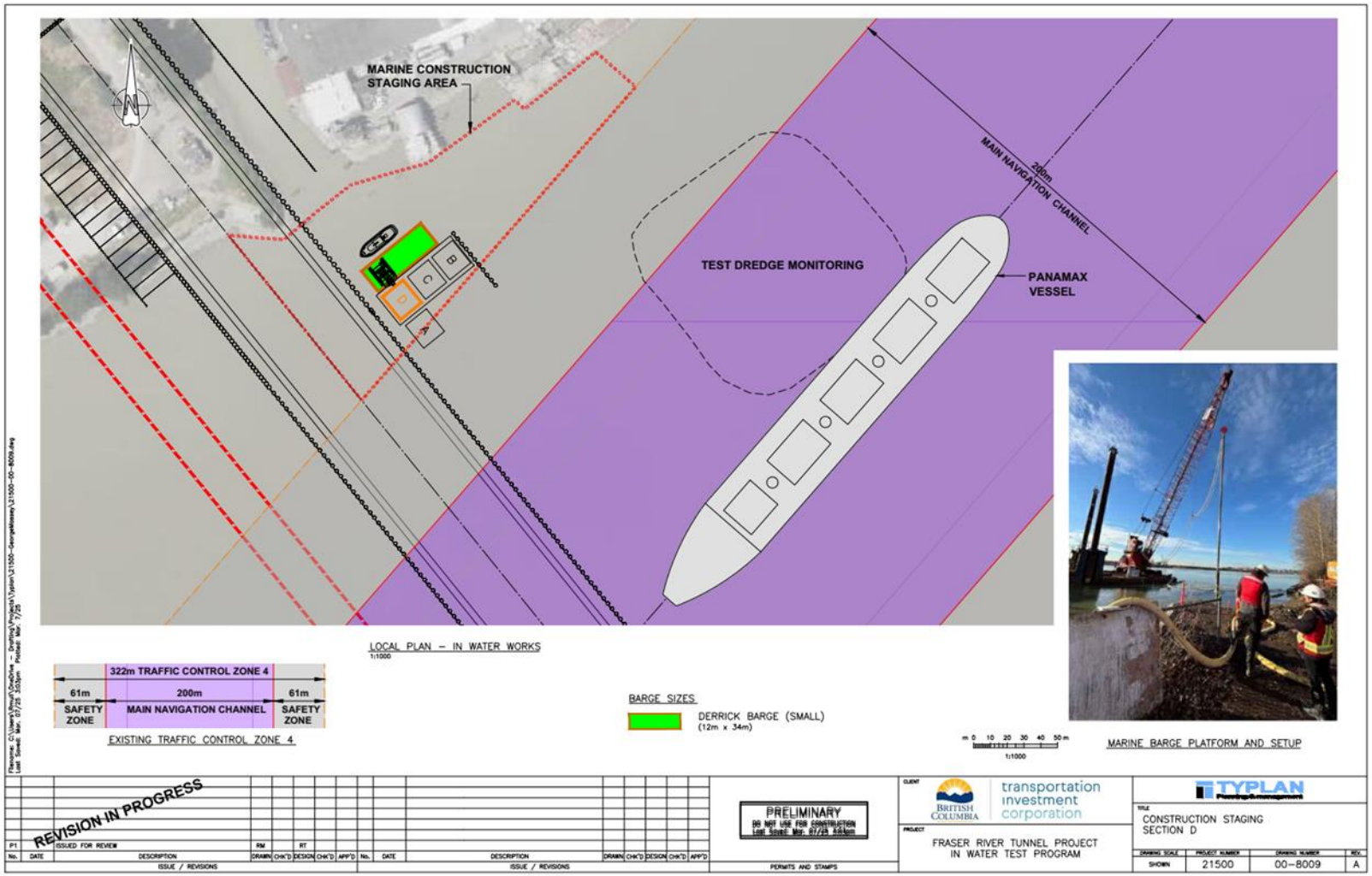

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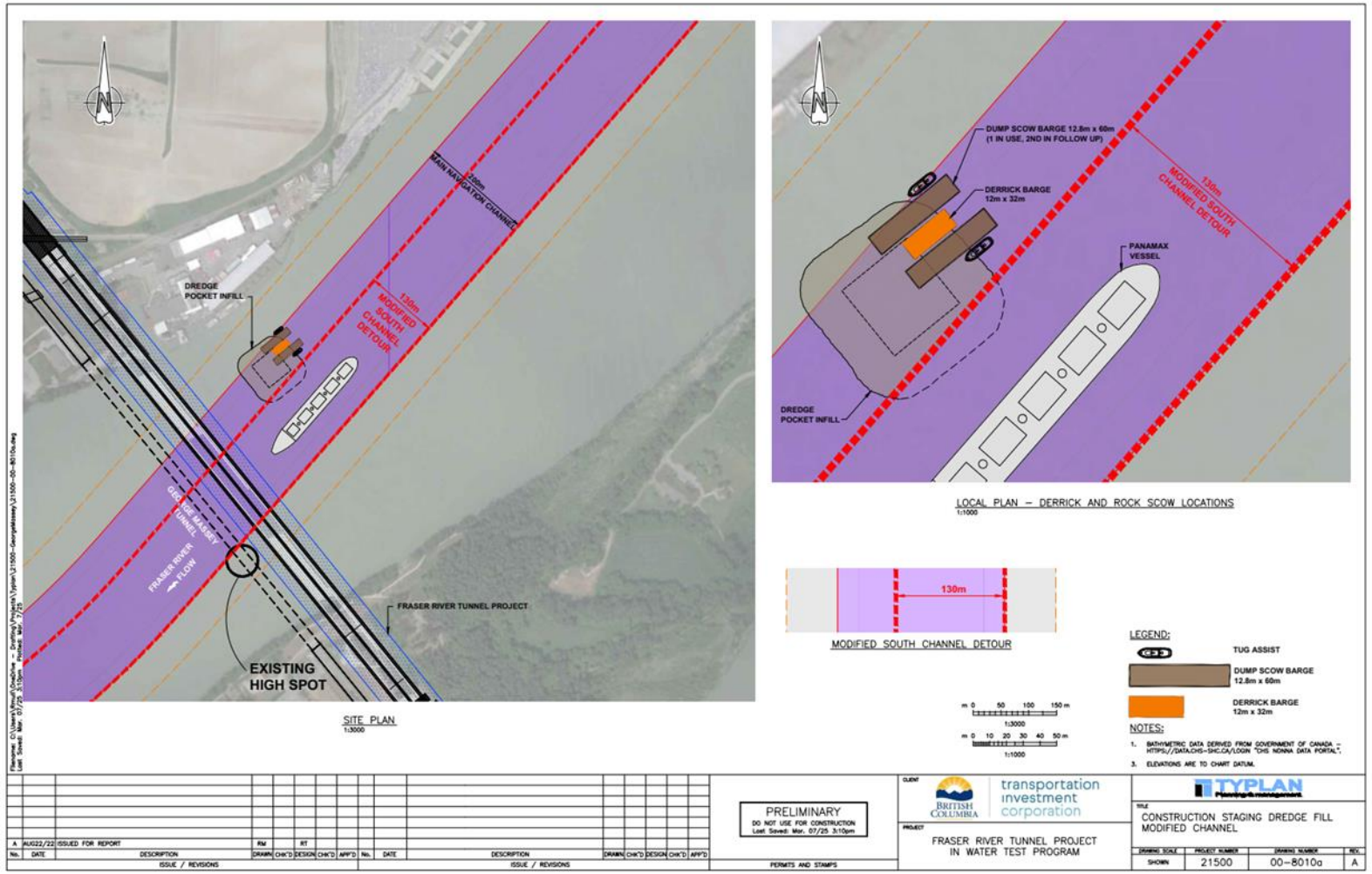
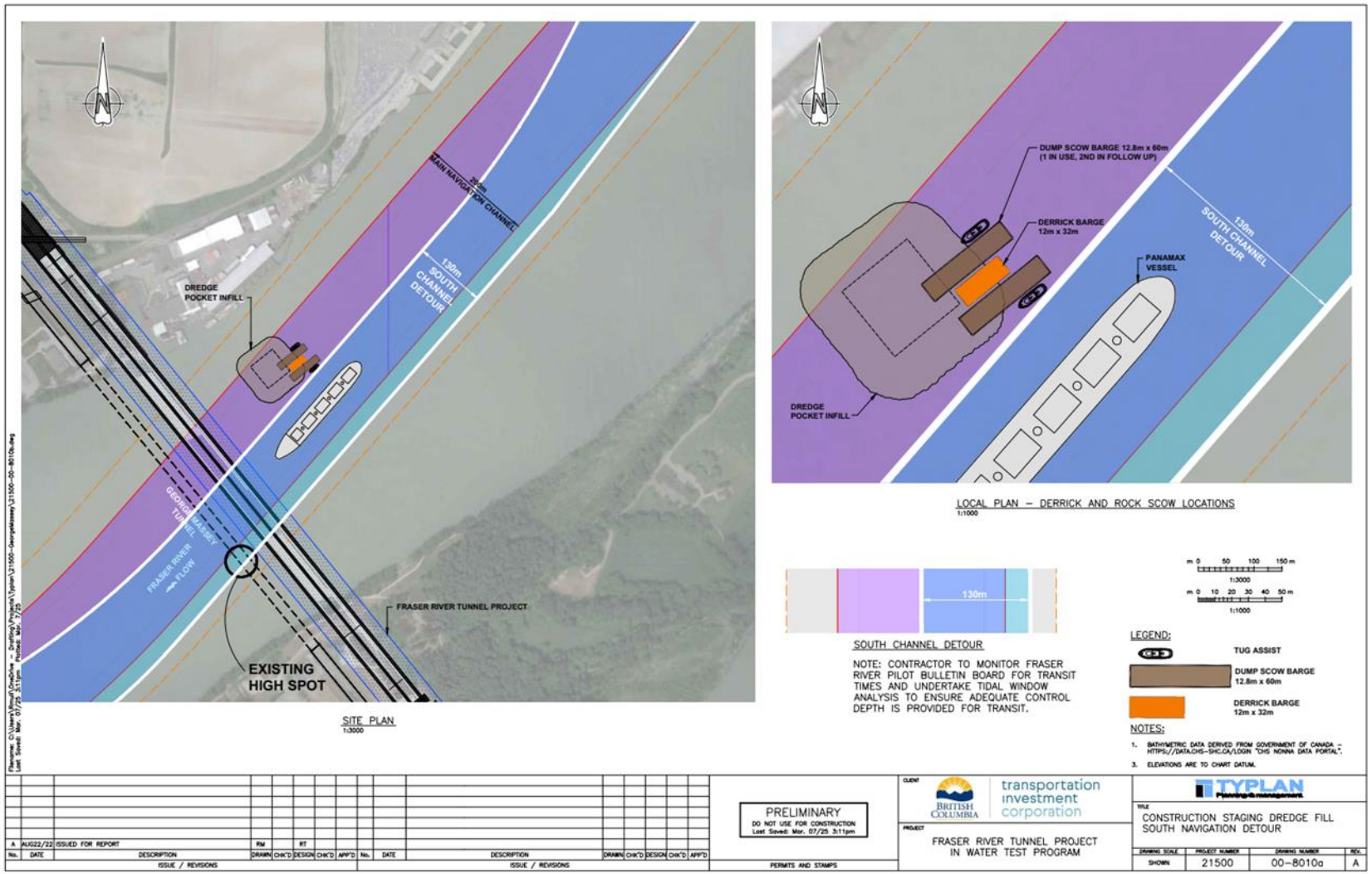


Marine Construction Staging Equipment



Marine Communication Plan

Contacts

Stakeholder	Key Contact	Phone Number	Mobile	Email
Port Authority	Dave Hart	604 461 6664	604 219 9421	Dave.Hard@portvancouver.com
	Nathan Smith	604 665 9246	N/A	Nathan.Smilth@portvancouver.com
Navigation Protection Program	Conal Kavanagh	604 775 8867	N/A	Conal.Kavanagh@tc.gc.ca
Contractor	TBD	TBD	TBD	TBD
Fraser River Pilots	David Marjoribanks	N/A	604 815 3338	RiverPilot36@yahoo.com
	Gordon Cooper		778 908 5445	FRP_Committee@googlegroups.com
Marine Communications and Traffic Systems	TBD	TBD	TBD	http://www.ccg-gcc.gc.ca/Marine-Communications/Home
Transportation Investment Corporation	TBD	TBD	TBD	TBD
Cross Fraser Partnership	TBD	TBD	TBD	TBD
Fraser river Industrial Alliance	Tanya Hayes	604 312 3212	N/A	THayes@pandh.ca
	Kevin Segal	604 521 6681	N/A	Kevin.Segal@walwil.com
	Tim Kelburn	778 838 7930	N/A	Tim.Kjellbotn@dpworld.com
Council of Marine Carriers	Paul Hilder	604 687 9678	604 315 1603	PHilder@comc.cc
Marine User Groups	Various			

Test Program Marine Support

1000 HP Twin Screw Tug

Tug Assist
Smaller Support Craft

Support Vessel
TBD by contractor

Marine VHS Channels

Issuance of NAVWARNS

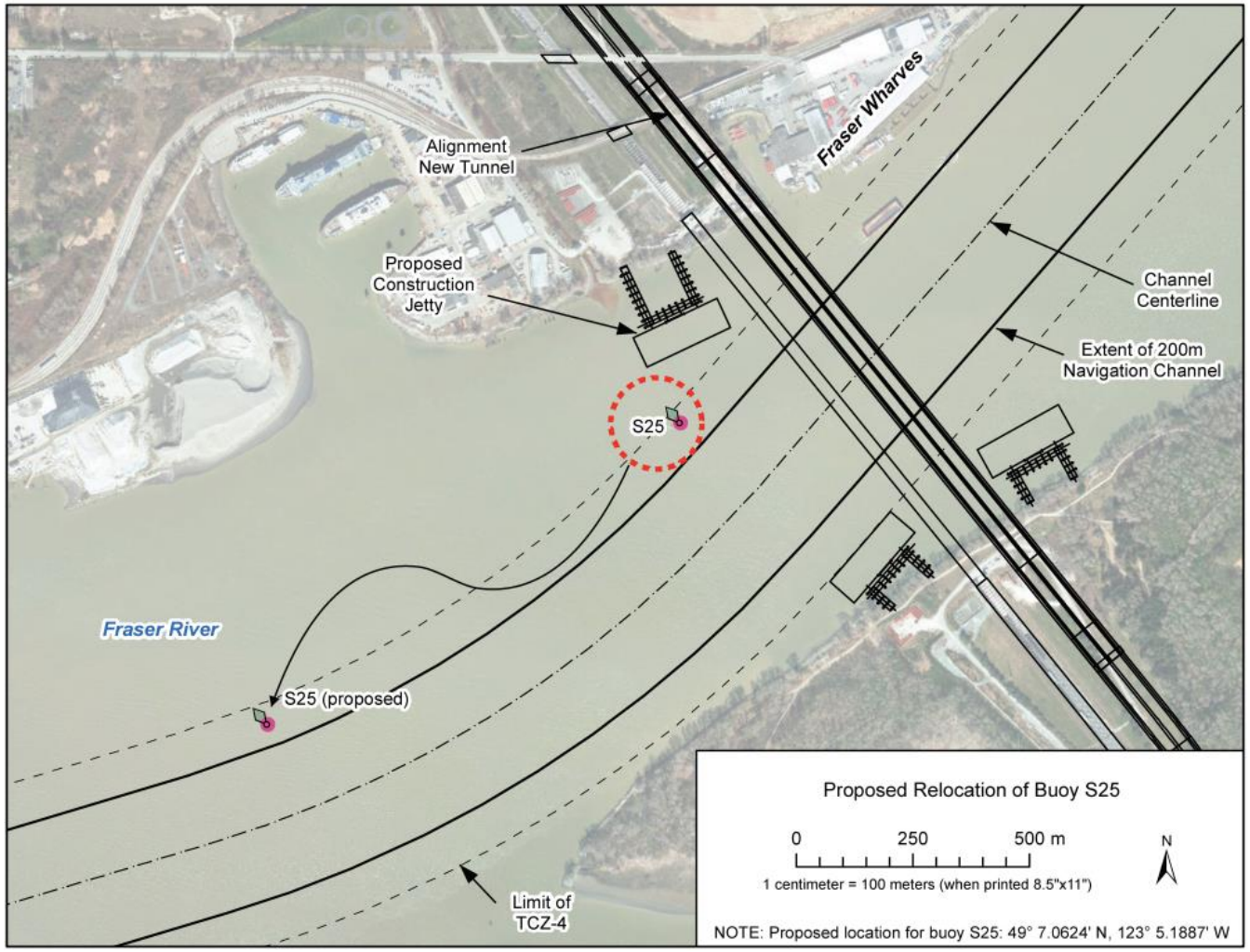
Project related daily issuance of Construction Notices will be provided to MUG membership (e.g., Seaspan Ferries, Council of Marine Carriers (CMC), Fraser River Pilots (FRP), Fraser River Industrial Alliance (FRIA)

MCTS CCG will receive weekly NAVWARN notices

FRASER RIVER
INDUSTRIAL ASSOCIATION

Relocation of Buoy S25

Aids to Navigation Support



Thank you