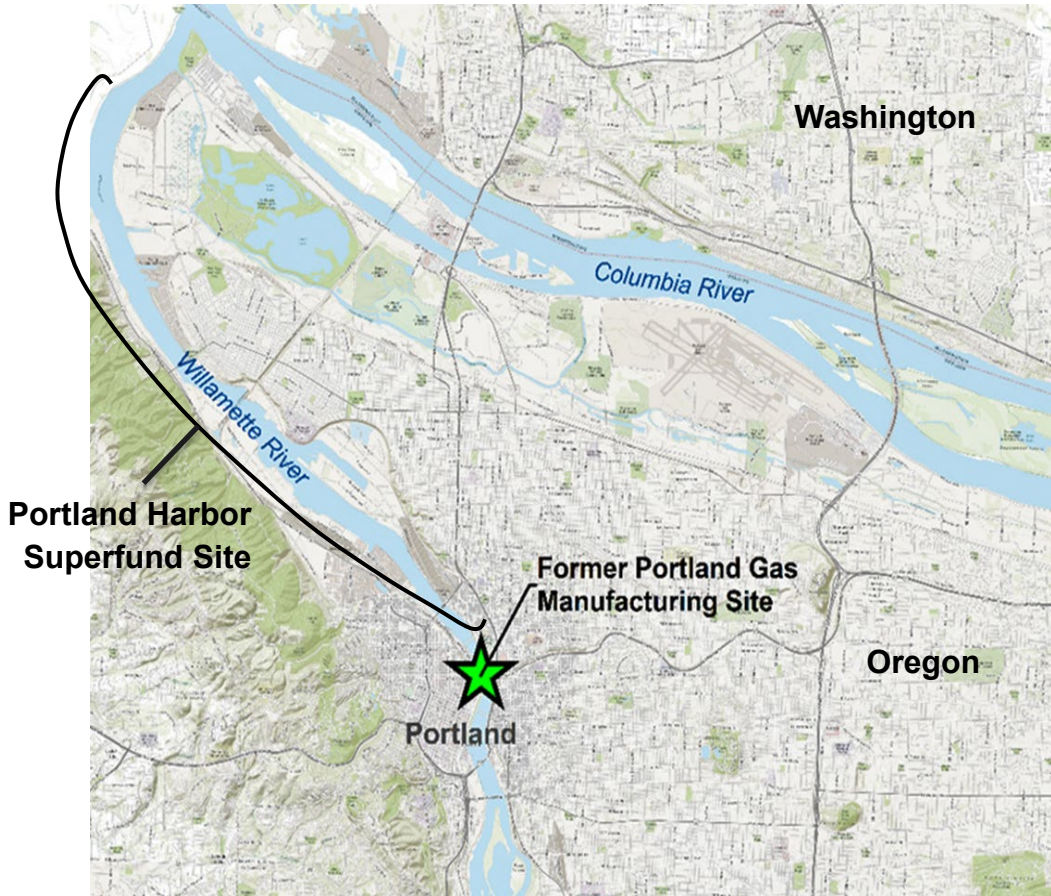


Dredging Contaminated Sediments Mixed with Large Building Demolition Debris, Artifacts, and Munitions

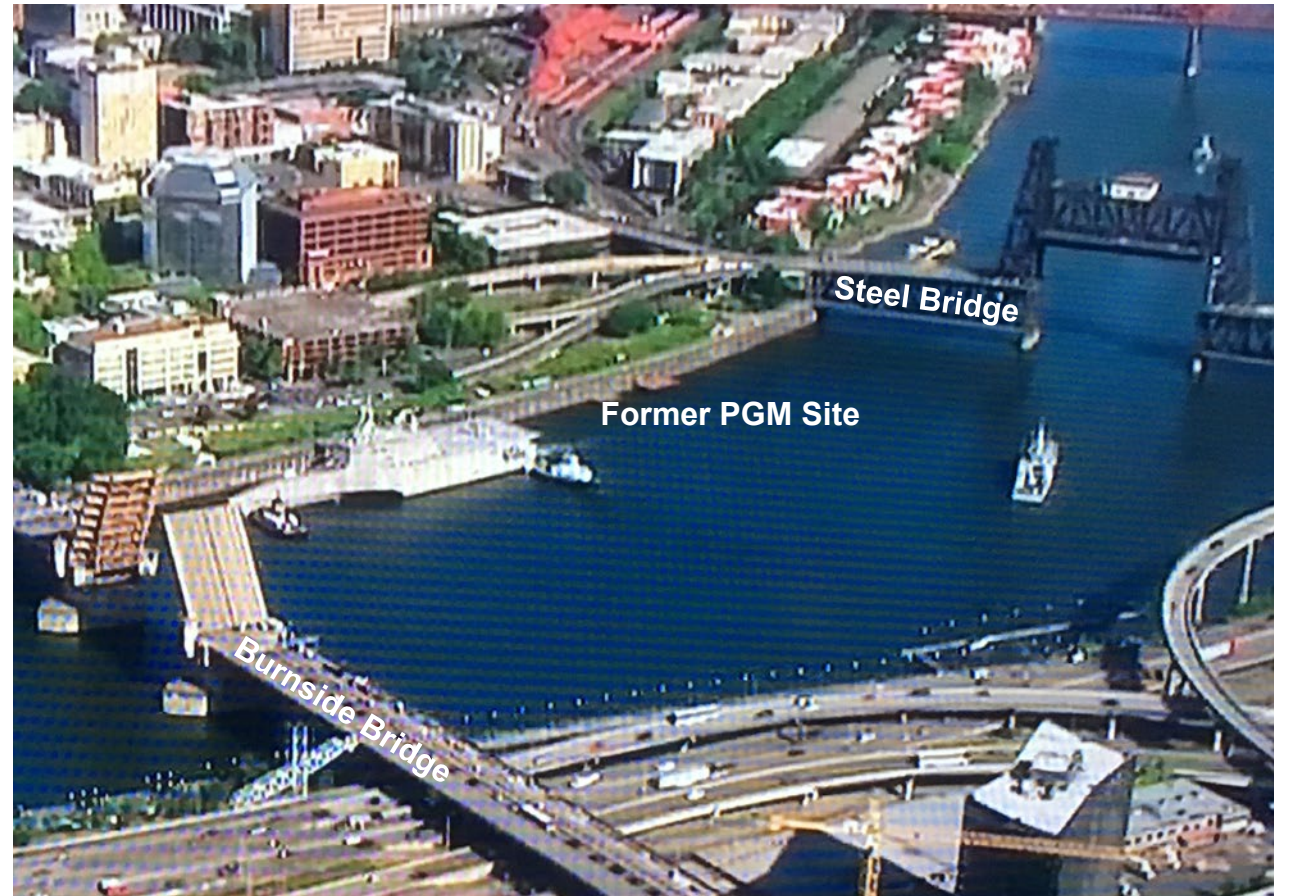
Presented by: Kendra Skellenger, PE, Anchor QEA
Collaborators: Todd Thornburg, PhD, RG, Anchor QEA;
Bob Wyatt, RG, NW Natural; and Mike Crystal,
Sevenson Environmental Services



Former Portland Gas Manufacturing (PGM) Site Location and History



Site vicinity map



Site location

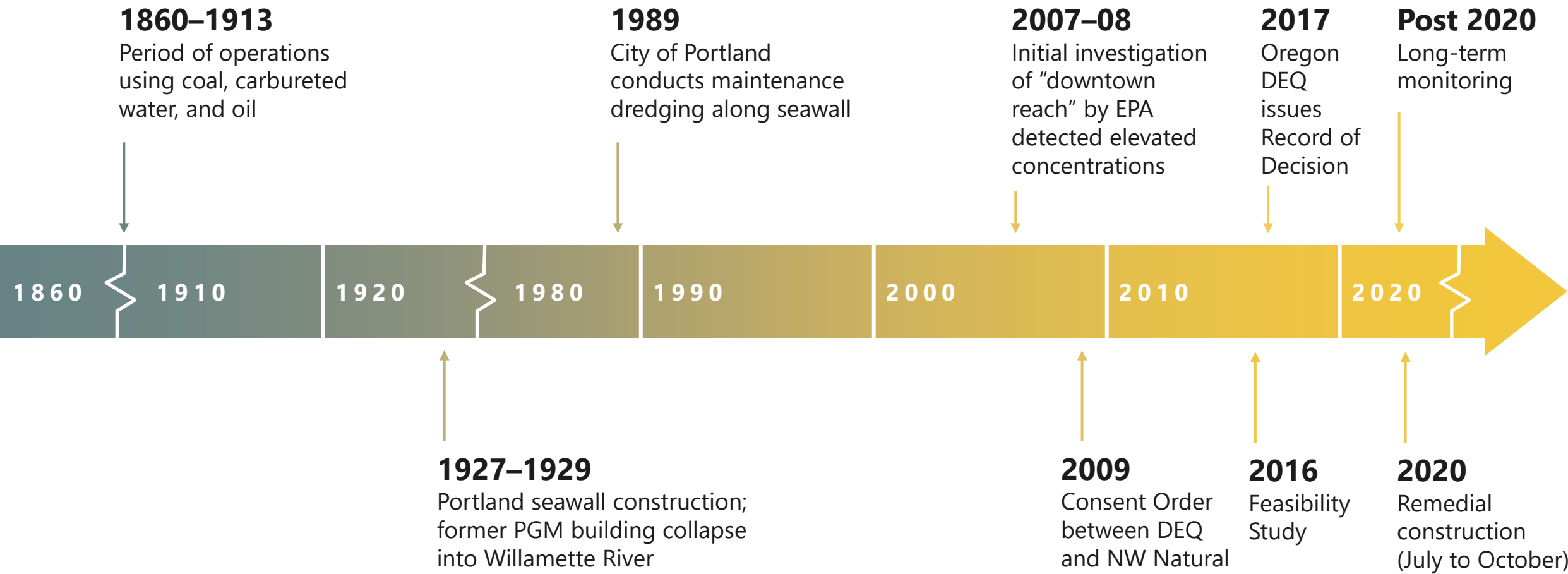


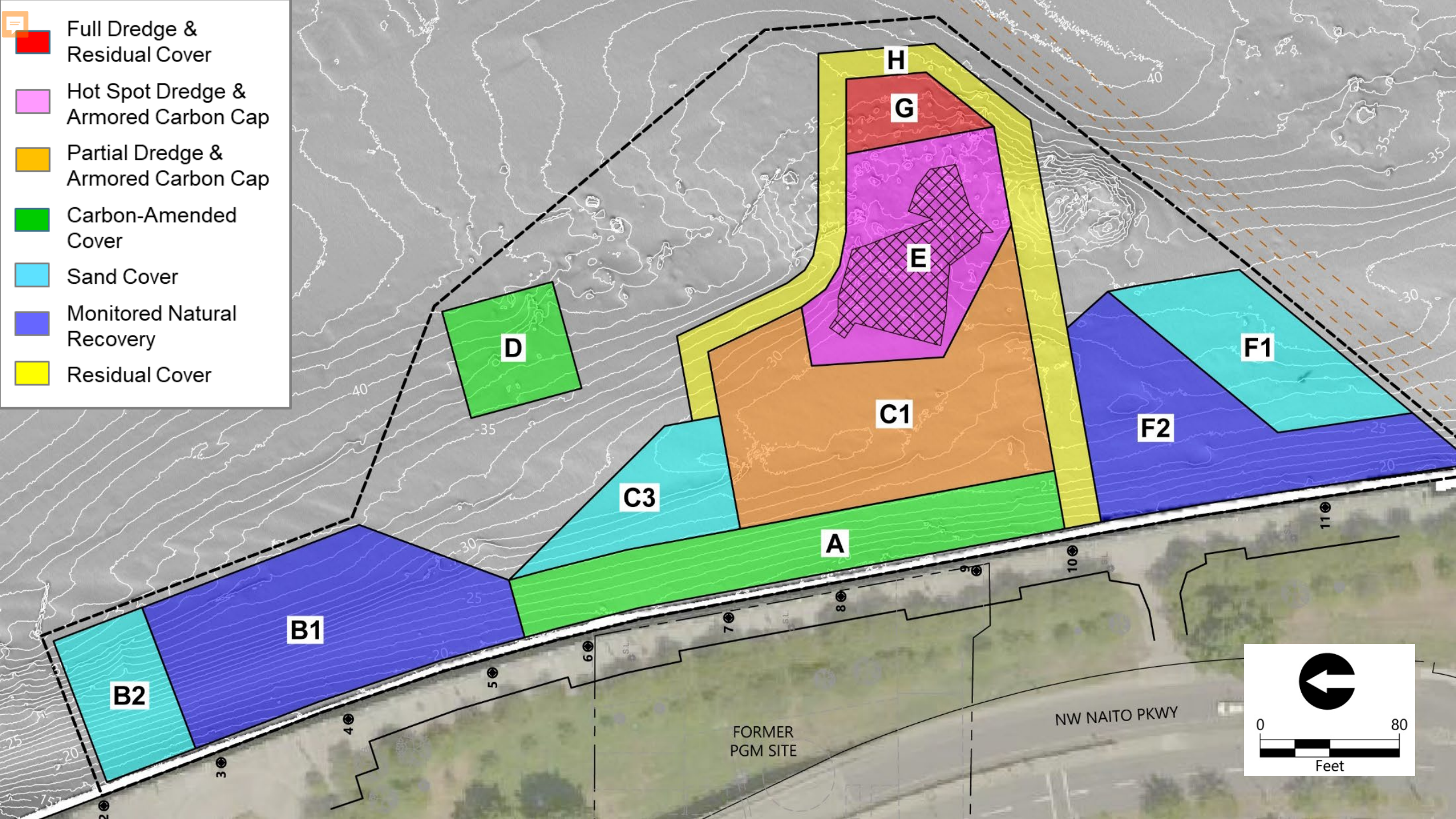
PGM Plant, 1913

1928 Portland Seawall Demolition



Timeline of Former PGM Site

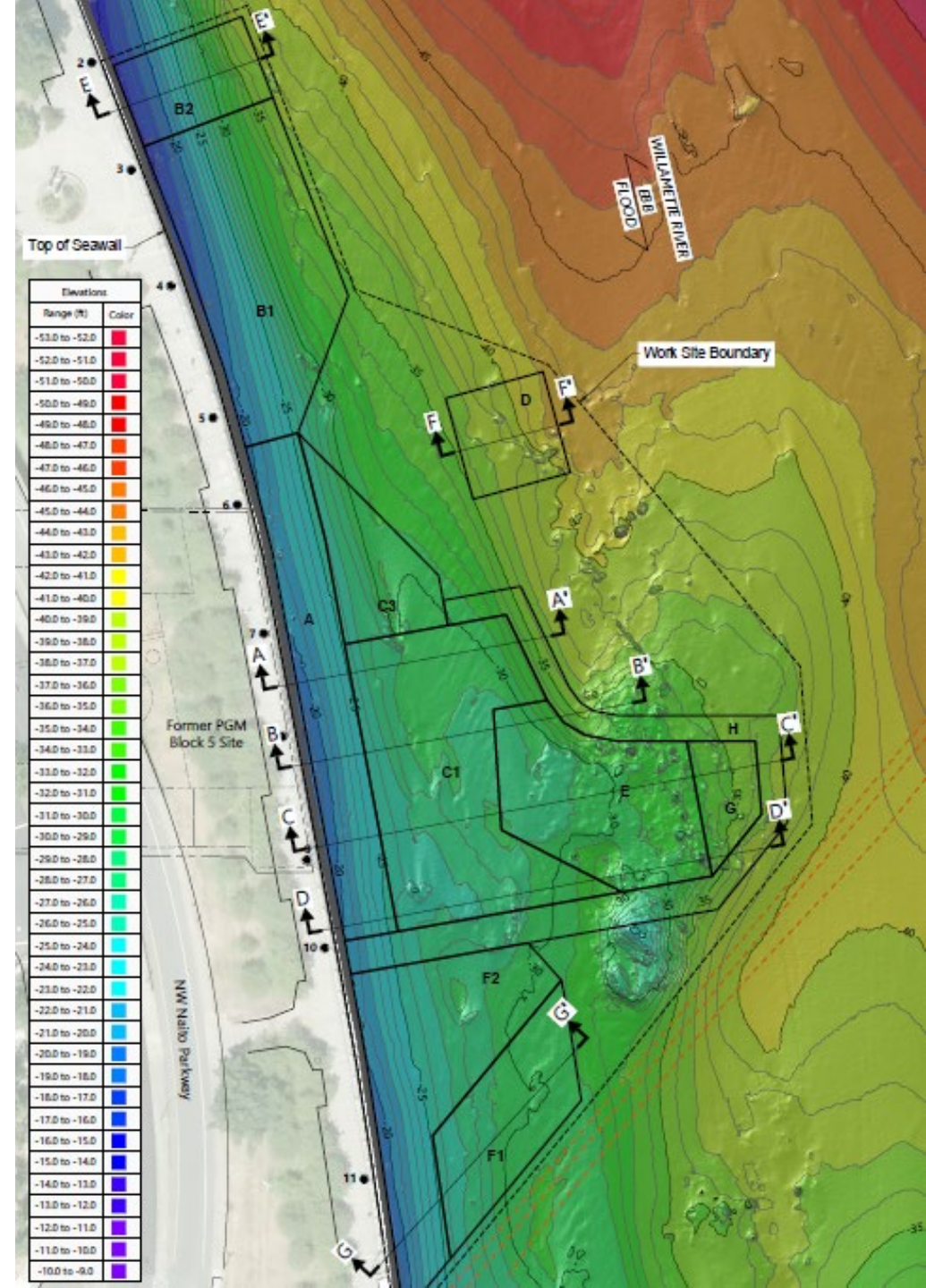




Historical Debris

- Large pile of debris was present offshore
- Preconstruction diver observations confirmed that the pile contained large sections of brick wall, concrete, lumber, and corrugated sheet metal
- Evaluation of historical debris led to recording as an archeological site

Preconstruction bathymetry map





Diver Photos of Offshore Building Debris








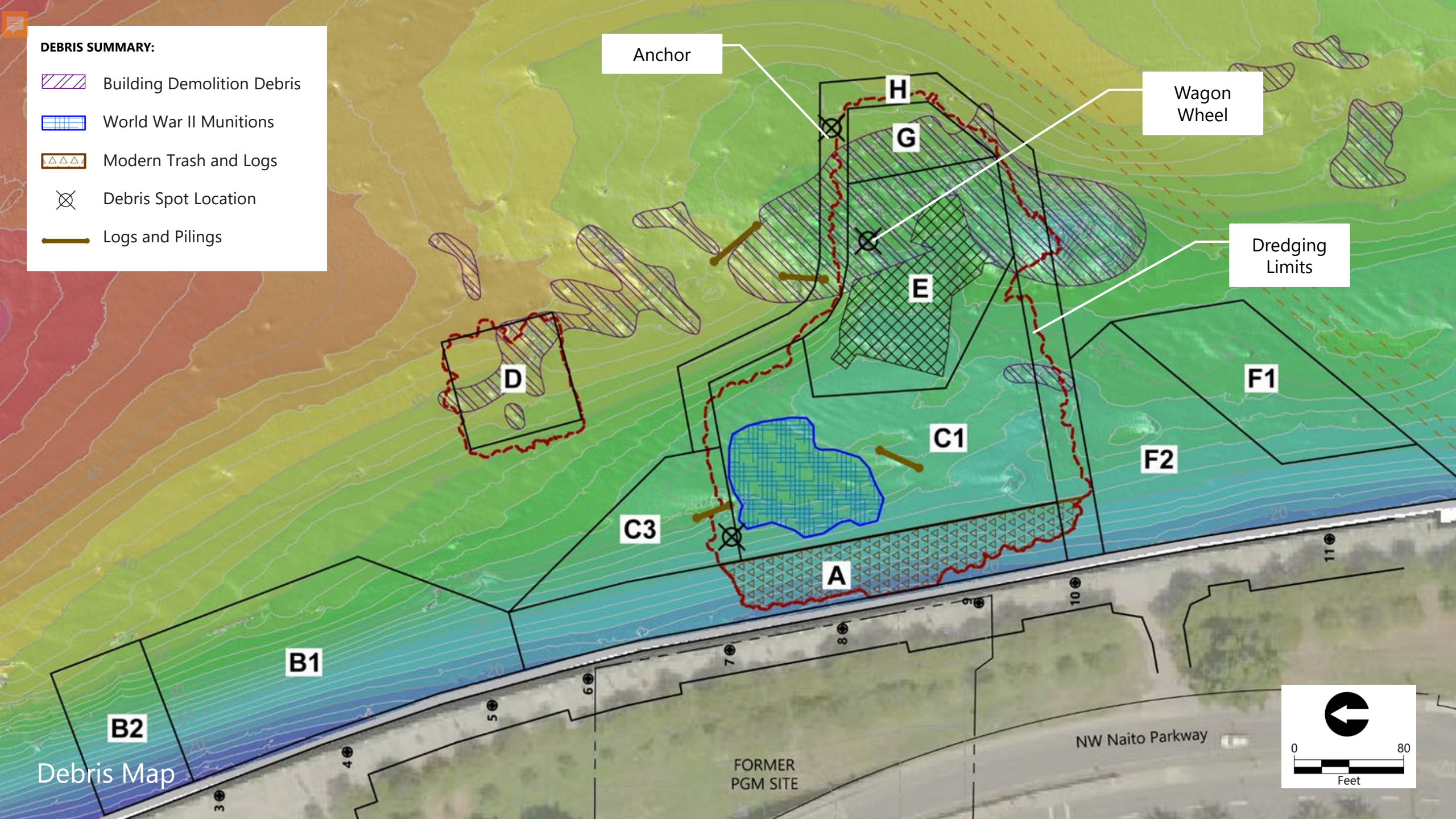
Former PGM plant structure



Brick wall, angle iron, and arch window

DEBRIS SUMMARY:

-  Building Demolition Debris
-  World War II Munitions
-  Modern Trash and Logs
-  Debris Spot Location
-  Logs and Pilings



Anchor

Wagon Wheel

Dredging Limits

D

H
G

E

F1

C1

F2

C3

A

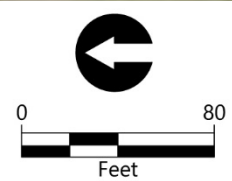
B1

B2

Debris Map

FORMER PGM SITE

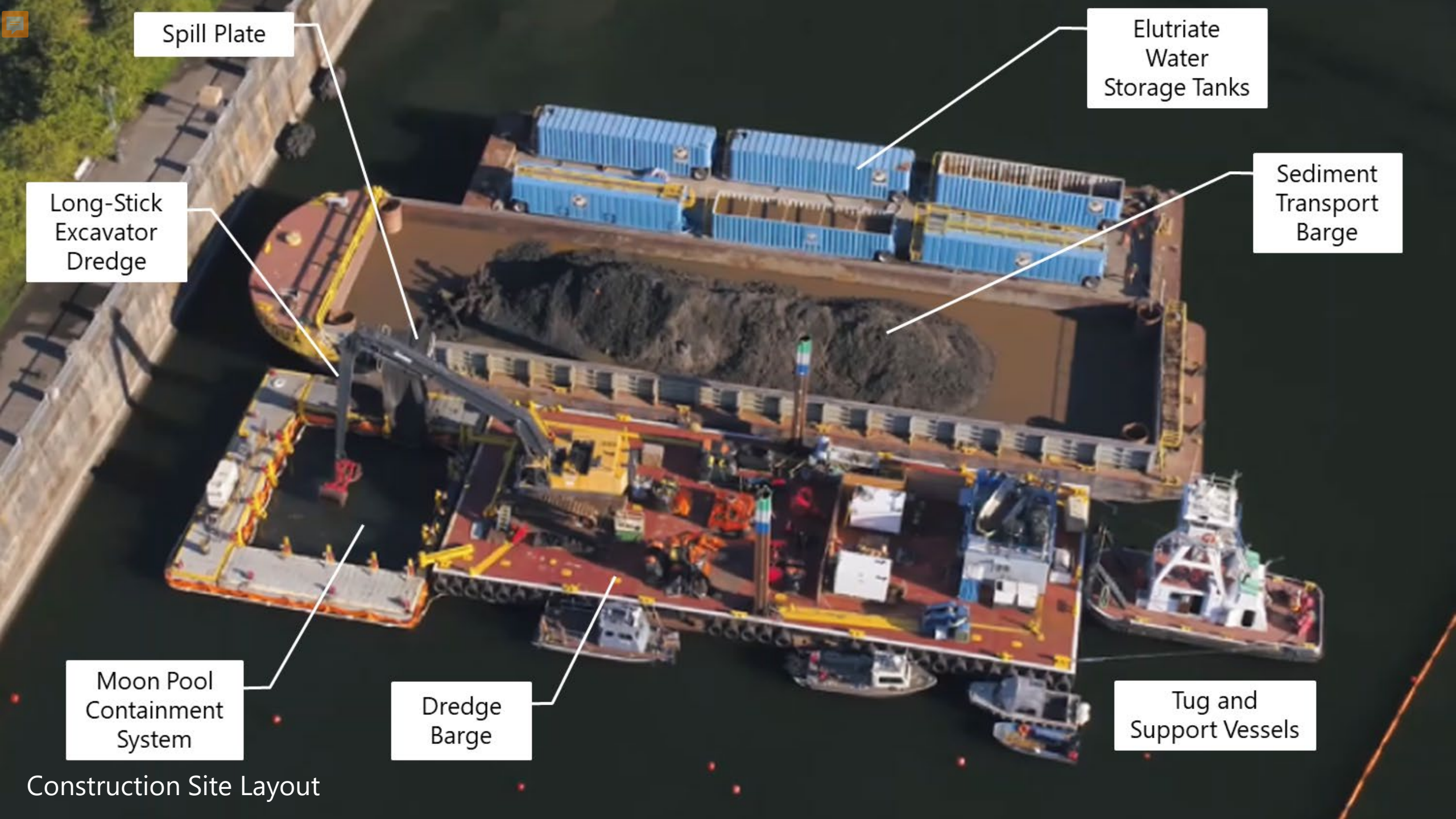
NW Naito Parkway





Debris Removal Methods and Discoveries

- Initial surface debris removal activities began July 13
- Additional subsurface debris continued to be encountered and removed along with contaminated sediment through the end of dredging
- Debris removal was also required to prepare substrates for cap and cover placement
- In addition to historical demolition debris, other items encountered included modern trash, potential cultural objects, logs and pilings, and World War II munitions



Spill Plate

Elutriate
Water
Storage Tanks

Long-Stick
Excavator
Dredge

Sediment
Transport
Barge

Moon Pool
Containment
System

Dredge
Barge

Tug and
Support Vessels

Construction Site Layout

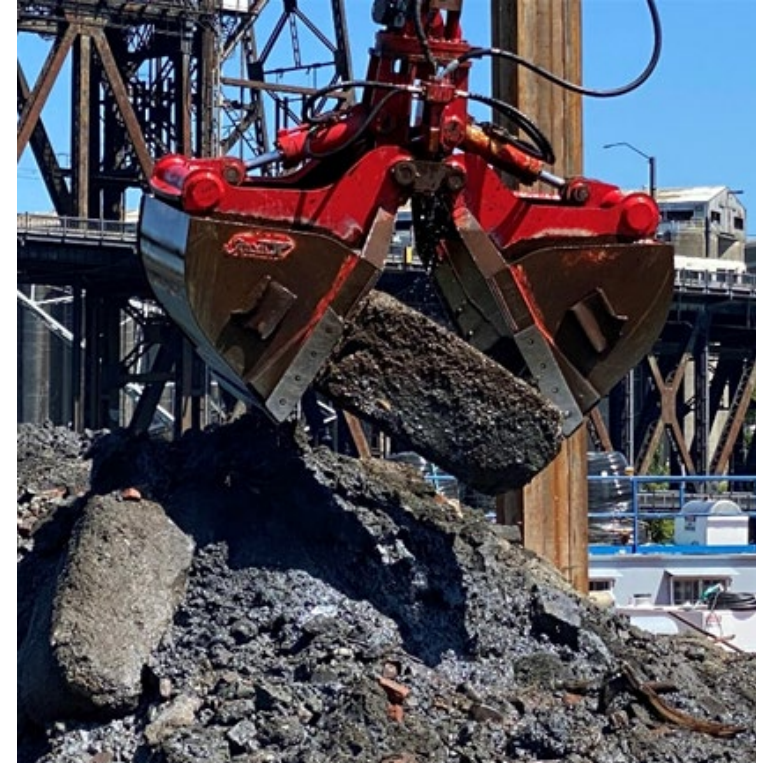
Building Demolition Debris



Brick wall segment



Concrete blocks



Modern Trash and Logs



Bicycles and scooters



Logs

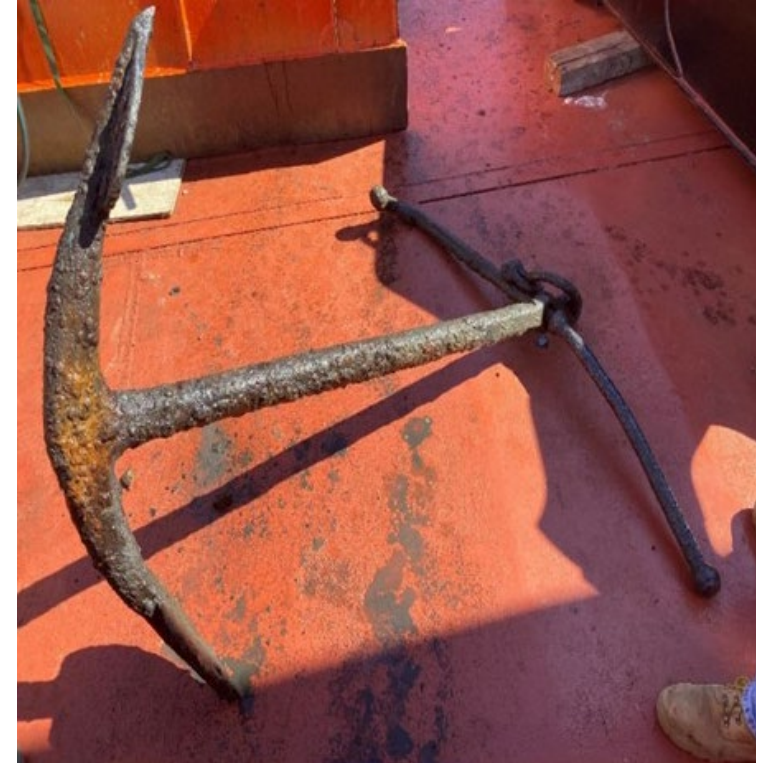
Non-Significant Historical Debris



Wheel hub and spokes



1913 Portland Gas and Coke Company delivery wagons



6-foot anchor

MEC Discovery

- World War II-era Munitions and Explosives of Concern (MEC) discovered July 23, 2020
 - Two 20-mm rounds and 1 rifle bullet
- Discovered at the base of the spill plate
- Work suspended for 19 days while plans were prepared and safety protections put into place



20-mm rounds and rifle bullet



Munitions Response Planning

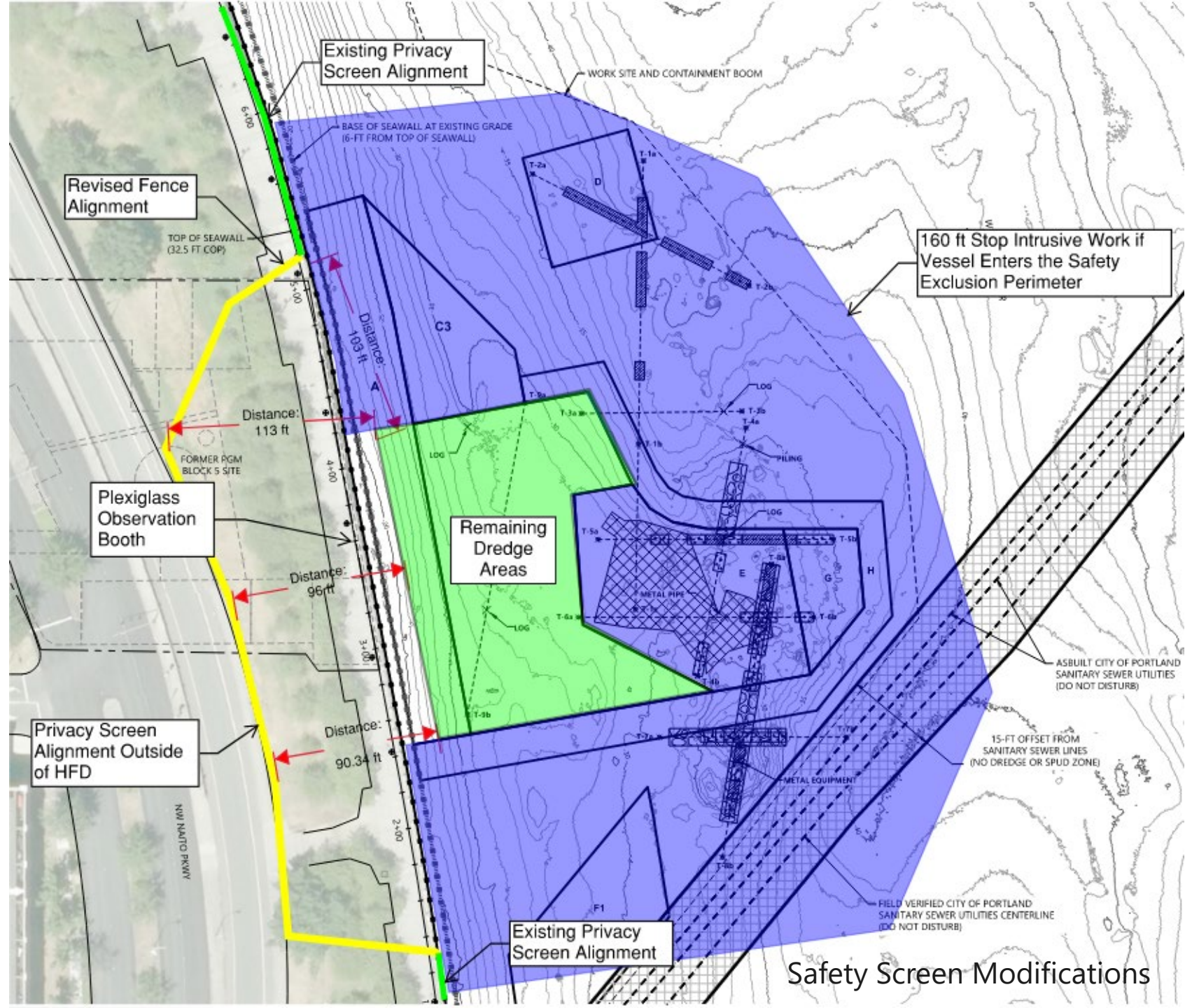
- Engaged munitions expert USA Environmental
- Developed revised work plans for dredging and dredged materials screening for munitions recovery
- Permitted an exclusion zone in Waterfront Park and set up blast shields in work areas
- Munitions sorting operation in Vancouver, Washington



Bulletproof glass barrier



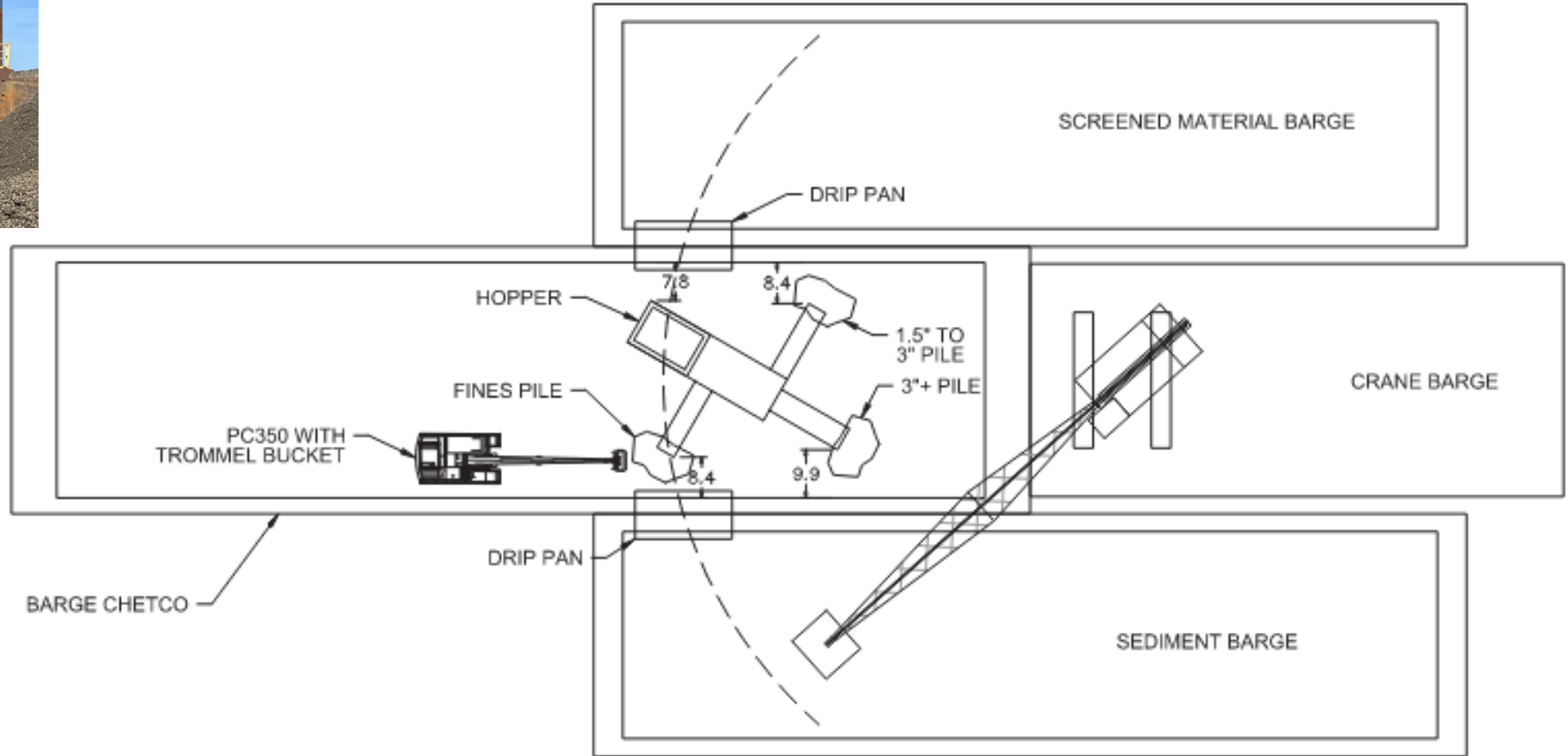
Bulletproof glass agency observation booth



Safety Screen Modifications



Barge-mounted power screening



Munitions Screening Process



Hand raking by munitions expert

Historical World War II Munitions



Ammunition box with 36 incendiary and 175 high-explosive 20-mm rounds



Munitions expert with "practice" rounds



20-mm high-explosive and incendiary rounds



Summary

- Well-coordinated team from NW Natural, SES, Anchor QEA, Oregon DEQ, and USA Environmental helped establish a path forward for the remedial action that was safe for workers and the community
- All munitions associated with the PGM remediation work were disposed of or destroyed
- All target sediment dredge areas were successfully removed, with debris removal 100% effective

THANK YOU



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