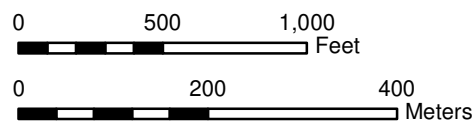


- Early Action Area
- Boeing South Storm Drain removal area
- ENR/AC Pilot plot
- Recovery Category 1
- Intertidal area^a
- Shoaled subtidal area in navigation channel
- Subtidal area outside of shoaled area
- Area not covered by bathymetric survey
- Bridge
- Dock/pier/marina
- LDW Superfund Site
- King Co tax parcel
- Federal Navigation Channel
- River mile

^a The blue intertidal area between the shoreward limit of the 2020 bathymetric survey and the shoreline is inferred.
 Note: The federally regulated channel depth in the upper reach is -15 ft MLLW.



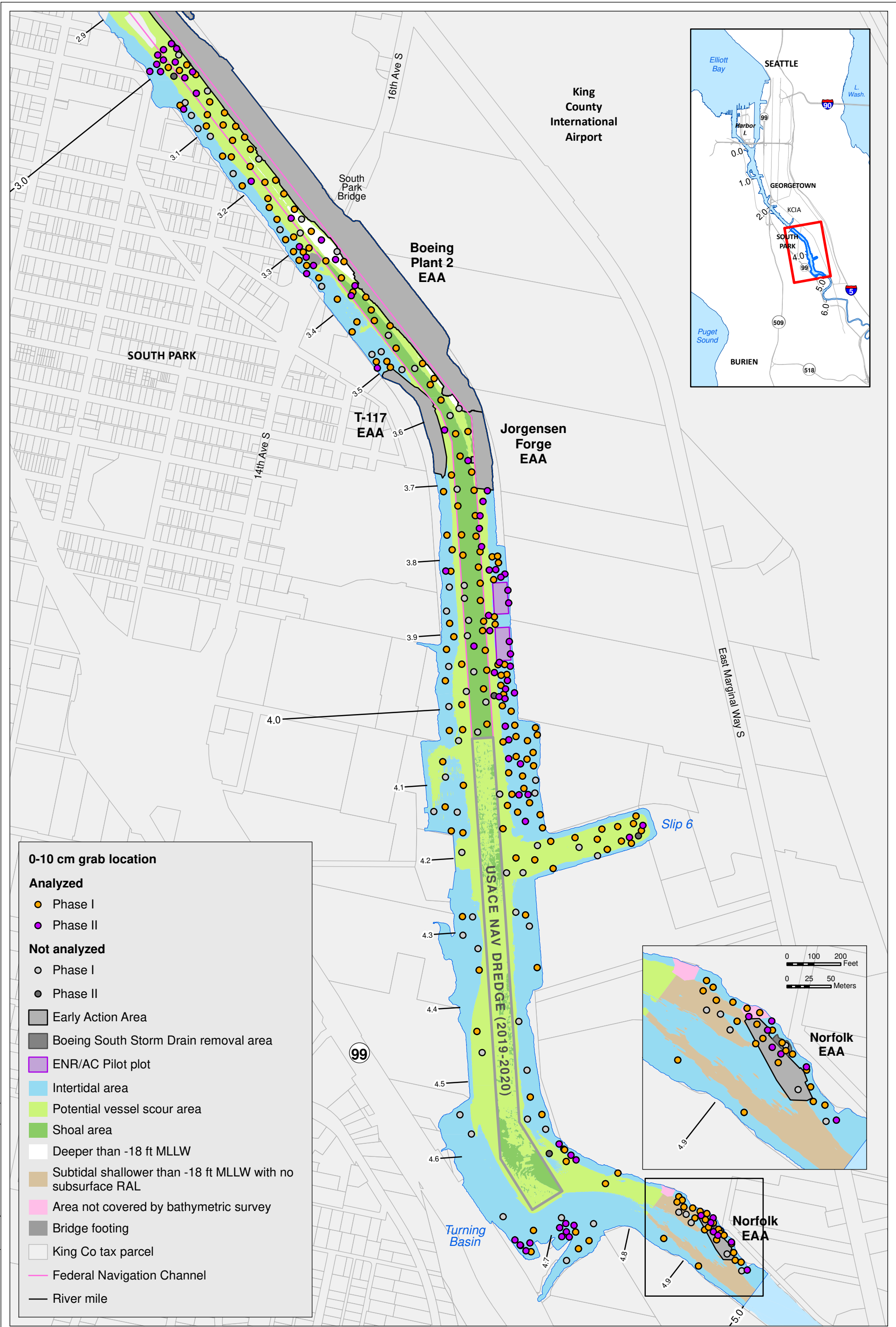
Lower Duwamish Waterway Group
 Port of Seattle / City of Seattle / King County / The Boeing Company



Map 2-1. Upper reach of the LDW

PRE-DESIGN INVESTIGATION DATA EVALUATION
 REPORT FOR THE LDW UPPER REACH JULY 15, 2022

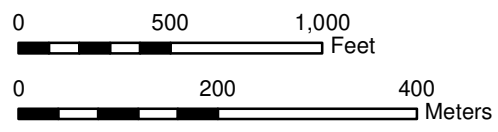
Prepared by craigh, 7/18/22; W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 2-1 7059 Upper Reach.mxd



Prepared by craigh. 7/15/22. W:\Projects\Duwamish\AOC4\GIS\Maps and Analyses\Phase I\Map 2-2a\Map 2-2a 7234 Phase I PDI locations - surface.mxd

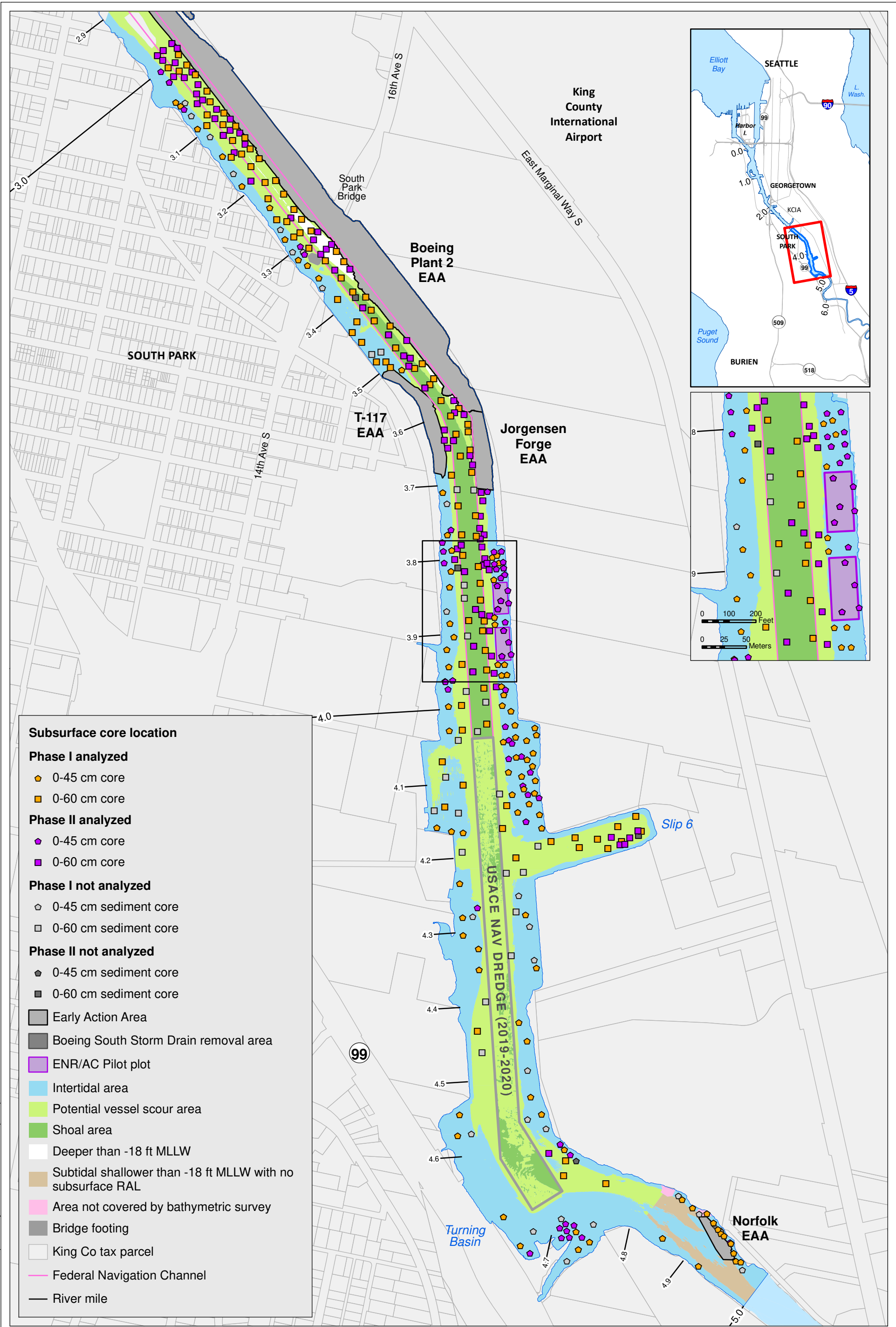


Lower Duwamish Waterway Group
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Map 2-2a. Phase I and II PDI surface sediment chemistry sample locations

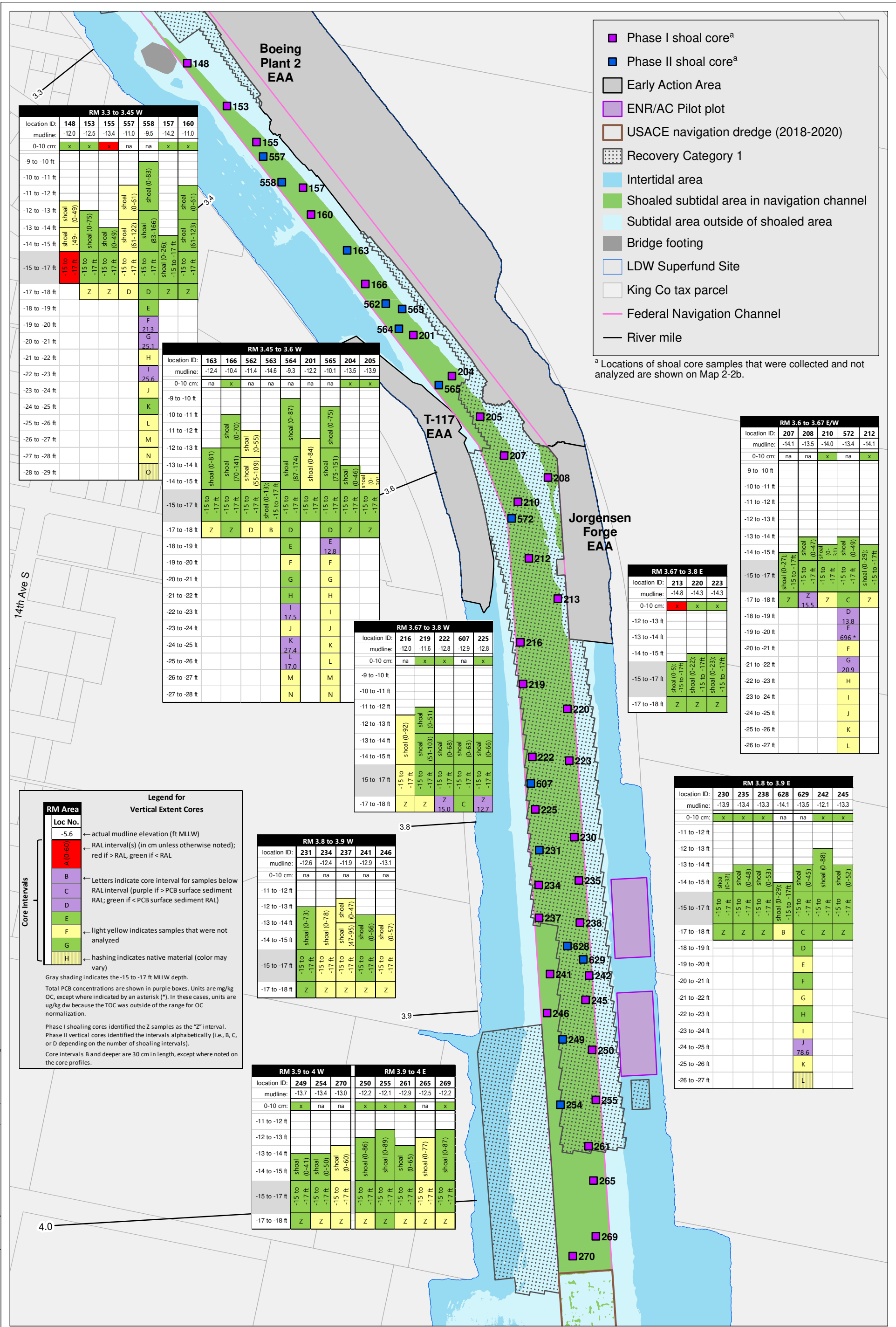
PRE-DESIGN INVESTIGATION DATA EVALUATION
 REPORT FOR THE LDW UPPER REACH
 JULY 15, 2022



- Subsurface core location**
- Phase I analyzed**
- 0-45 cm core
 - 0-60 cm core
- Phase II analyzed**
- 0-45 cm core
 - 0-60 cm core
- Phase I not analyzed**
- 0-45 cm sediment core
 - 0-60 cm sediment core
- Phase II not analyzed**
- 0-45 cm sediment core
 - 0-60 cm sediment core
- Early Action Area
 - Boeing South Storm Drain removal area
 - ENR/AC Pilot plot
 - Intertidal area
 - Potential vessel scour area
 - Shoal area
 - Deeper than -18 ft MLLW
 - Subtidal shallower than -18 ft MLLW with no subsurface RAL
 - Area not covered by bathymetric survey
 - Bridge footing
 - King Co tax parcel
 - Federal Navigation Channel
 - River mile

Prepared by craigh, 7/15/22; W:\Projects\Duwamish\AOC4\GIS\Maps and Analyses\Phase I\Data Evaluation\Report\Map 2-2b 7234 Phase I PDI locations - subsurface.mxd





- Phase I shoal core^a
- Phase II shoal core^a
- Early Action Area
- ENR/AC Pilot plot
- USACE navigation dredge (2018-2020)
- Recovery Category 1
- Intertidal area
- Shoaled subtidal area in navigation channel
- Subtidal area outside of shoaled area
- Bridge footing
- LDW Superfund Site
- King Co tax parcel
- Federal Navigation Channel
- River mile

^a Locations of shoal core samples that were collected and not analyzed are shown on Map 2-2b.

RM 3.3 to 3.45 W							
location ID:	148	153	155	557	558	157	160
mudline:	-12.0	-12.5	-13.4	-11.0	-9.5	-14.2	-11.0
0-10 cm:	x	x	x	na	na	x	x
-9 to -10 ft							
-10 to -11 ft							
-11 to -12 ft							
-12 to -13 ft	shoal (0-49)						
-13 to -14 ft	shoal (49-149)	shoal (0-75)	shoal (0-49)	shoal (0-61)	shoal (83-166)	shoal (0-83)	
-14 to -15 ft	shoal (149-175)	shoal (75-175)	shoal (49-175)	shoal (61-122)	shoal (166-175)	shoal (83-166)	
-15 to -17 ft	shoal (175-177)	shoal (175-177)	shoal (175-177)	shoal (122-177)	shoal (175-177)	shoal (166-177)	
-17 to -18 ft	Z	Z	Z	D	D	Z	Z
-18 to -19 ft							
-19 to -20 ft							
-20 to -21 ft							
-21 to -22 ft							
-22 to -23 ft							
-23 to -24 ft							
-24 to -25 ft							
-25 to -26 ft							
-26 to -27 ft							
-27 to -28 ft							
-28 to -29 ft							

RM 3.45 to 3.6 W									
location ID:	163	166	562	563	564	201	565	204	205
mudline:	-12.4	-10.4	-11.4	-14.6	-9.3	-12.2	-10.1	-13.5	-13.9
0-10 cm:	na	x	na	na	na	na	na	x	x
-9 to -10 ft									
-10 to -11 ft									
-11 to -12 ft									
-12 to -13 ft									
-13 to -14 ft	shoal (0-81)	shoal (0-70)	shoal (0-55)	shoal (0-13)	shoal (0-84)	shoal (0-87)	shoal (0-75)	shoal (0-46)	shoal (0-80)
-14 to -15 ft	shoal (81-177)	shoal (70-141)	shoal (55-109)	shoal (13-177)	shoal (84-177)	shoal (87-174)	shoal (75-151)	shoal (46-177)	shoal (80-177)
-15 to -17 ft	shoal (177-177)	shoal (141-177)	shoal (109-177)	shoal (177-177)	shoal (177-177)	shoal (174-177)	shoal (151-177)	shoal (177-177)	shoal (177-177)
-17 to -18 ft	Z	Z	D	B	D	D	Z	Z	Z
-18 to -19 ft									
-19 to -20 ft									
-20 to -21 ft									
-21 to -22 ft									
-22 to -23 ft									
-23 to -24 ft									
-24 to -25 ft									
-25 to -26 ft									
-26 to -27 ft									
-27 to -28 ft									
-28 to -29 ft									

RM 3.67 to 3.8 W					
location ID:	216	219	222	607	225
mudline:	-12.0	-11.6	-12.8	-12.9	-12.8
0-10 cm:	na	x	x	na	x
-9 to -10 ft					
-10 to -11 ft					
-11 to -12 ft					
-12 to -13 ft					
-13 to -14 ft					
-14 to -15 ft					
-15 to -17 ft	shoal (0-92)	shoal (0-51)	shoal (0-68)	shoal (0-63)	shoal (0-66)
-17 to -18 ft	Z	Z	Z	C	Z

RM 3.67 to 3.8 E			
location ID:	213	220	223
mudline:	-14.8	-14.3	-14.3
0-10 cm:	x	x	x
-9 to -10 ft			
-10 to -11 ft			
-11 to -12 ft			
-12 to -13 ft			
-13 to -14 ft			
-14 to -15 ft			
-15 to -17 ft	shoal (0-5)	shoal (0-22)	shoal (0-23)
-17 to -18 ft	Z	Z	Z

RM 3.6 to 3.67 E/W					
location ID:	207	208	210	572	212
mudline:	-14.1	-13.5	-14.0	-13.4	-14.1
0-10 cm:	na	na	x	na	x
-9 to -10 ft					
-10 to -11 ft					
-11 to -12 ft					
-12 to -13 ft					
-13 to -14 ft					
-14 to -15 ft					
-15 to -17 ft	shoal (0-27)	shoal (0-47)	shoal (0-31)	shoal (0-49)	shoal (0-29)
-17 to -18 ft	Z	Z	Z	C	Z
-18 to -19 ft					
-19 to -20 ft					
-20 to -21 ft					
-21 to -22 ft					
-22 to -23 ft					
-23 to -24 ft					
-24 to -25 ft					
-25 to -26 ft					
-26 to -27 ft					

Legend for Vertical Extent Cores

RM Area	Loc No.
Core intervals	A (0-60)
	B
	C
	D
	E
	F
	G
	H

- ← actual mudline elevation (ft MLLW)
- ← RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
- ← Letters indicate core interval for samples below RAL interval (purple if > PCB surface sediment RAL; green if < PCB surface sediment RAL)
- ← light yellow indicates samples that were not analyzed
- ← hashing indicates native material (color may vary)

Gray shading indicates the -15 to -17 ft MLLW depth.

Total PCB concentrations are shown in purple boxes. Units are mg/kg OC, except where indicated by an asterisk (*). In these cases, units are ug/kg dw because the TOC was outside of the range for OC normalization.

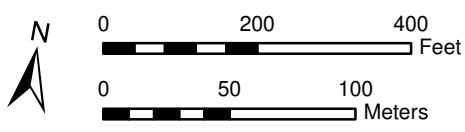
Phase I shoaling cores identified the Z-samples as the "Z" interval. Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).

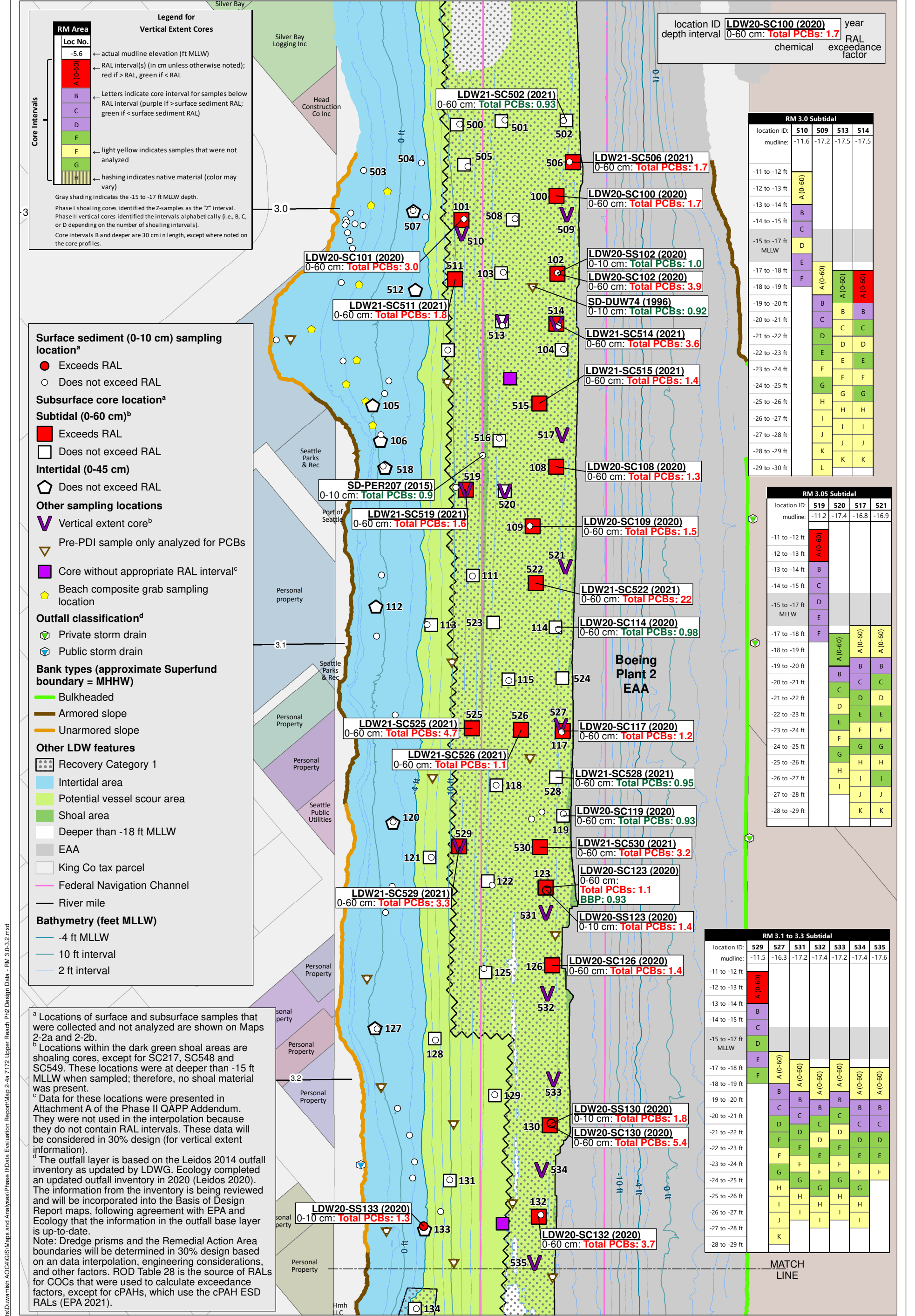
Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

RM 3.8 to 3.9 W					
location ID:	231	234	237	241	246
mudline:	-12.6	-12.4	-11.9	-12.9	-13.1
0-10 cm:	na	na	na	na	na
-11 to -12 ft					
-12 to -13 ft					
-13 to -14 ft	shoal (0-73)	shoal (0-78)	shoal (0-47)		
-14 to -15 ft	shoal (73-177)	shoal (78-177)	shoal (47-95)	shoal (0-66)	shoal (0-57)
-15 to -17 ft	shoal (177-177)	shoal (177-177)	shoal (95-177)	shoal (66-177)	shoal (57-177)
-17 to -18 ft	Z	Z	Z	Z	Z

RM 3.9 to 4 W			RM 3.9 to 4 E					
location ID:	249	254	270	250	255	261	265	269
mudline:	-13.7	-13.4	-13.0	-12.2	-12.1	-12.9	-12.5	-12.2
0-10 cm:	x	na	na	x	x	x	na	x
-11 to -12 ft								
-12 to -13 ft								
-13 to -14 ft	shoal (0-41)	shoal (0-50)	shoal (0-60)	shoal (0-86)	shoal (0-89)	shoal (0-65)	shoal (0-77)	shoal (0-87)
-14 to -15 ft	shoal (41-177)	shoal (50-177)	shoal (60-177)	shoal (86-177)	shoal (89-177)	shoal (65-177)	shoal (77-177)	shoal (87-177)
-15 to -17 ft	shoal (177-177)	shoal (177-177)	shoal (177-177)	shoal (177-177)	shoal (177-177)	shoal (177-177)	shoal (177-177)	shoal (177-177)
-17 to -18 ft	Z	Z	Z	Z	Z	Z	Z	Z

RM 3.8 to 3.9 E							
location ID:	230	235	238	628	629	242	245
mudline:	-13.9	-13.4	-13.3	-14.1	-13.5	-12.1	-13.3
0-10 cm:	x	x	x	na	na	x	x
-11 to -12 ft							
-12 to -13 ft							
-13 to -14 ft							
-14 to -15 ft	shoal (0-32)	shoal (0-48)	shoal (0-53)	shoal (0-29)	shoal (0-45)	shoal (0-88)	shoal (0-52)
-15 to -17 ft	shoal (32-177)	shoal (48-177)	shoal (53-177)	shoal (29-177)	shoal (45-177)	shoal (88-177)	shoal (52-177)
-17 to -18 ft	Z	Z	Z	B	C	Z	Z
-18 to -19 ft							
-19 to -20 ft							
-20 to -21 ft							
-21 to -22 ft							
-22 to -23 ft							
-23 to -24 ft							
-24 to -25 ft							
-25 to -26 ft							
-26 to -27 ft							





Legend for Vertical Extent Cores

RM Area

Loc No.
A (0-60)
B
C
D
E
F
G
H
I
J
K
L

- actual mudline elevation (ft MLLW)
- RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
- Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; green if < surface sediment RAL)
- light yellow indicates samples that were not analyzed
- hashing indicates native material (color may vary)

Gray shading indicates the -15 to -17 ft MLLW depth.

Phase I shoaling cores identified the Z-samples as the "Z" interval. Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).

Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

Surface sediment (0-10 cm) sampling location^a

- Exceeds RAL
- Does not exceed RAL

Subsurface core location^a

Subtidal (0-60 cm)^b

- Exceeds RAL
- Does not exceed RAL

Intertidal (0-45 cm)

- Does not exceed RAL

Other sampling locations

- Vertical extent core^b
- Pre-PDI sample only analyzed for PCBs
- Core without appropriate RAL interval^c
- Beach composite grab sampling location

Outfall classification^d

- Private storm drain
- Public storm drain

Bank types (approximate Superfund boundary = MHHW)

- Bulkheaded
- Armored slope
- Unarmored slope

Other LDW features

- Recovery Category 1
- Intertidal area
- Potential vessel scour area
- Shoal area
- Deeper than -18 ft MLLW
- EAA
- King Co tax parcel
- Federal Navigation Channel
- River mile

Bathymetry (feet MLLW)

- 4 ft MLLW
- 10 ft interval
- 2 ft interval

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.

^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.

^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).

^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.

Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).

location ID: **LDW20-SC100 (2020)** year: **2020**
 depth interval: **0-60 cm: Total PCBs: 1.7** chemical: **RAL** exceedance factor

RM 3.0 Subtidal

location ID:	510	509	513	514
mudline:	-11.6	-17.2	-17.5	-17.5
-11 to -12 ft	A (0-60)			
-12 to -13 ft	B			
-13 to -14 ft	C			
-14 to -15 ft	D			
-15 to -17 ft MLLW	E			
-17 to -18 ft	F	A (0-60)		
-18 to -19 ft		B	A (0-60)	A (0-60)
-19 to -20 ft		C	B	B
-20 to -21 ft		D	C	C
-21 to -22 ft		E	D	D
-22 to -23 ft		F	E	E
-23 to -24 ft		G	F	F
-24 to -25 ft		H	G	G
-25 to -26 ft		I	H	H
-26 to -27 ft		J	I	I
-27 to -28 ft		K	J	J
-28 to -29 ft		L	K	K

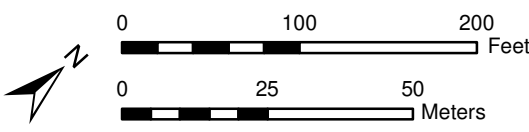
RM 3.05 Subtidal

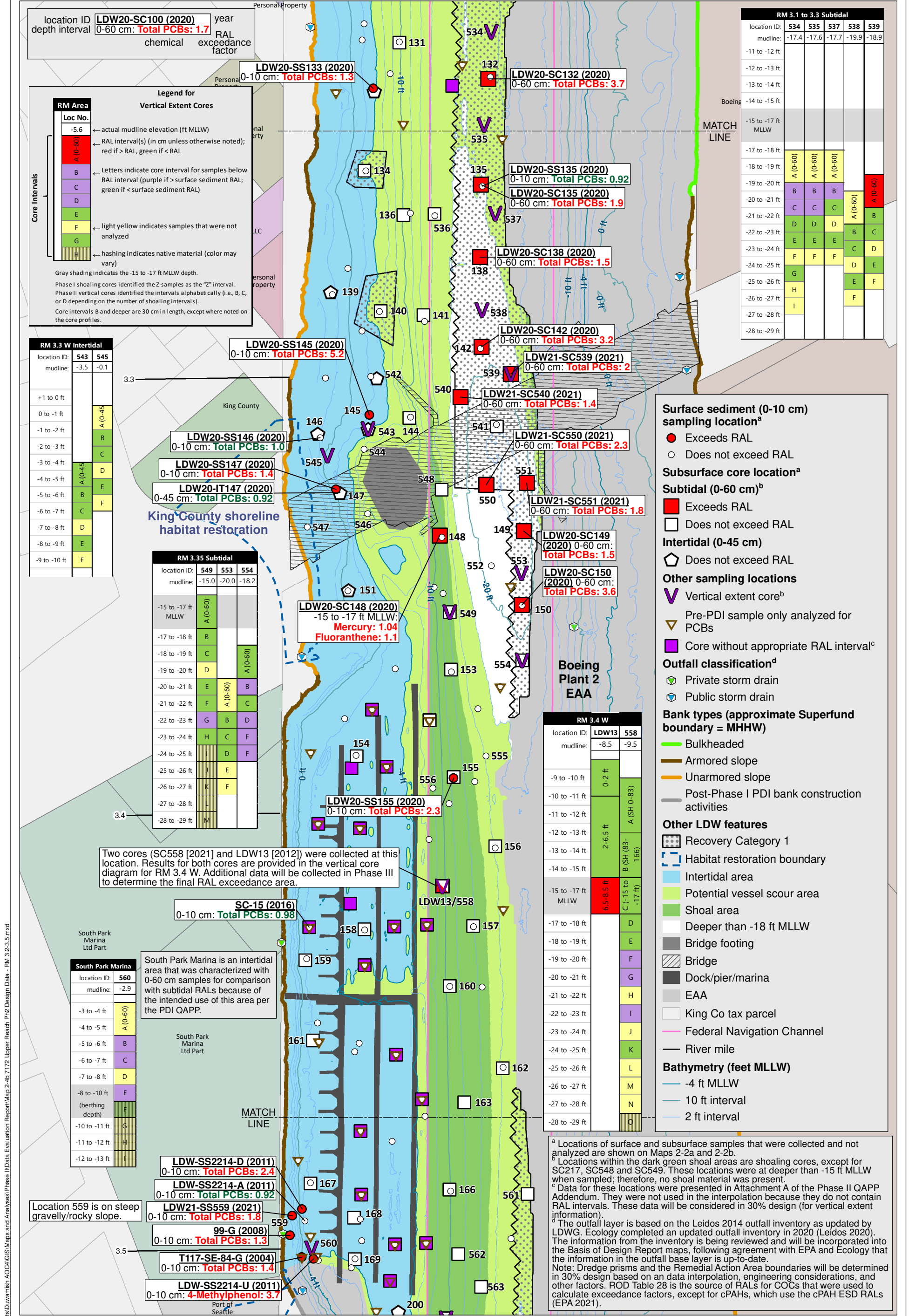
location ID:	519	520	517	521
mudline:	-11.2	-17.4	-16.8	-16.9
-11 to -12 ft	A (0-60)			
-12 to -13 ft	B			
-13 to -14 ft	C			
-14 to -15 ft	D			
-15 to -17 ft MLLW	E			
-17 to -18 ft	F	A (0-60)		
-18 to -19 ft		B	A (0-60)	A (0-60)
-19 to -20 ft		C	B	B
-20 to -21 ft		D	C	C
-21 to -22 ft		E	D	D
-22 to -23 ft		F	E	E
-23 to -24 ft		G	F	F
-24 to -25 ft		H	G	G
-25 to -26 ft		I	H	H
-26 to -27 ft		J	I	I
-27 to -28 ft		K	J	J
-28 to -29 ft		L	K	K

RM 3.1 to 3.3 Subtidal

location ID:	529	527	531	532	533	534	535
mudline:	-11.5	-16.3	-17.2	-17.4	-17.2	-17.4	-17.6
-11 to -12 ft	A (0-60)						
-12 to -13 ft	B						
-13 to -14 ft	C						
-14 to -15 ft	D						
-15 to -17 ft MLLW	E						
-17 to -18 ft	F	A (0-60)					
-18 to -19 ft		B	A (0-60)				
-19 to -20 ft		C	B	A (0-60)			
-20 to -21 ft		D	C	C	A (0-60)		
-21 to -22 ft		E	D	D	B	A (0-60)	
-22 to -23 ft		F	E	E	C	C	
-23 to -24 ft		G	F	F	D	D	
-24 to -25 ft		H	G	G	E	E	
-25 to -26 ft		I	H	H	F	F	
-26 to -27 ft		J	I	I	G	G	
-27 to -28 ft		K	J	J	H	H	
-28 to -29 ft		L	K	K	I	I	

Prepared by craigh, 7/15/22; W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II Data Evaluation\Report\Map 2-4a 7172 Upper Reach Pl2 Design Data - RM 3.0-3.2.mxd





location ID **LDW20-SC100 (2020)** year
 depth interval **0-60 cm: Total PCBs: 1.7** RAL
 chemical **PCBs** exceedance
 factor

Legend for Vertical Extent Cores

RM Area
 Loc No.
 -5.6 actual mudline elevation (ft MLLW)
 A (0-60) RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
 B Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; green if < surface sediment RAL)
 C
 D
 E
 F light yellow indicates samples that were not analyzed
 G
 H hashing indicates native material (color may vary)

Gray shading indicates the -15 to -17 ft MLLW depth.
 Phase I shoaling cores identified the Z-samples as the "Z" interval.
 Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).
 Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

RM 3.3 W Intertidal

location ID:	543	545
mudline:	-3.5	-0.1
+1 to 0 ft		A (0-4.5)
0 to -1 ft		B
-1 to -2 ft		C
-2 to -3 ft		D
-3 to -4 ft		E
-4 to -5 ft		F
-5 to -6 ft		
-6 to -7 ft		
-7 to -8 ft		
-8 to -9 ft		
-9 to -10 ft		

RM 3.35 Subtidal

location ID:	549	553	554
mudline:	-15.0	-20.0	-18.2
-15 to -17 ft MLLW	A (0-60)		
-17 to -18 ft	B		
-18 to -19 ft	C		
-19 to -20 ft	D		
-20 to -21 ft	E	A (0-60)	B
-21 to -22 ft	F		C
-22 to -23 ft	G	B	D
-23 to -24 ft	H	C	E
-24 to -25 ft	I	D	F
-25 to -26 ft	J	E	
-26 to -27 ft	K	F	
-27 to -28 ft	L		
-28 to -29 ft	M		

RM 3.4 W

location ID:	LDW13	558
mudline:	-8.5	-9.5
-9 to -10 ft	0-2 ft	
-10 to -11 ft		
-11 to -12 ft	2-6.5 ft	A (SH 0-83)
-12 to -13 ft		
-13 to -14 ft		
-14 to -15 ft		
-15 to -17 ft MLLW	6.5-9.5 ft	B (SH (83-166))
-17 to -18 ft		C (-15 to -17 ft)
-18 to -19 ft		D
-19 to -20 ft		E
-20 to -21 ft		F
-21 to -22 ft		G
-22 to -23 ft		H
-23 to -24 ft		I
-24 to -25 ft		J
-25 to -26 ft		K
-26 to -27 ft		L
-27 to -28 ft		M
-28 to -29 ft		N
		O

RM 3.1 to 3.3 Subtidal

location ID:	534	535	537	538	539
mudline:	-17.4	-17.6	-17.7	-19.9	-18.9
-11 to -12 ft					
-12 to -13 ft					
-13 to -14 ft					
-14 to -15 ft					
-15 to -17 ft MLLW					
-17 to -18 ft					
-18 to -19 ft	A (0-60)	A (0-60)	A (0-60)		
-19 to -20 ft	B	B	B		A (0-60)
-20 to -21 ft	C	C	C		B
-21 to -22 ft	D	D	D		C
-22 to -23 ft	E	E	E		D
-23 to -24 ft	F	F	F		E
-24 to -25 ft	G				F
-25 to -26 ft	H				G
-26 to -27 ft	I				H
-27 to -28 ft					I
-28 to -29 ft					J

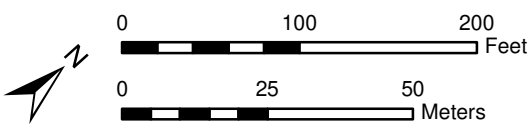
- Surface sediment (0-10 cm) sampling location^a**
- Exceeds RAL
 - Does not exceed RAL
- Subsurface core location^a**
- Subtidal (0-60 cm)^b**
- Exceeds RAL
 - Does not exceed RAL
- Intertidal (0-45 cm)**
- ◡ Does not exceed RAL
- Other sampling locations**
- ∇ Vertical extent core^b
 - ▽ Pre-PDI sample only analyzed for PCBs
 - Core without appropriate RAL interval^c
- Outfall classification^d**
- ◡ Private storm drain
 - ◡ Public storm drain
- Bank types (approximate Superfund boundary = MHHW)**
- Bulkheaded
 - Armored slope
 - Unarmored slope
 - Post-Phase I PDI bank construction activities
- Other LDW features**
- Recovery Category 1
 - Habitat restoration boundary
 - Intertidal area
 - Potential vessel scour area
 - Shoal area
 - Deeper than -18 ft MLLW
 - Bridge footing
 - Bridge
 - Dock/pier/marina
 - EAA
 - King Co tax parcel
 - Federal Navigation Channel
 - River mile
- Bathymetry (feet MLLW)**
- -4 ft MLLW
 - 10 ft interval
 - 2 ft interval

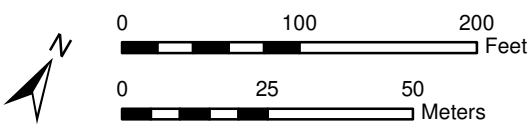
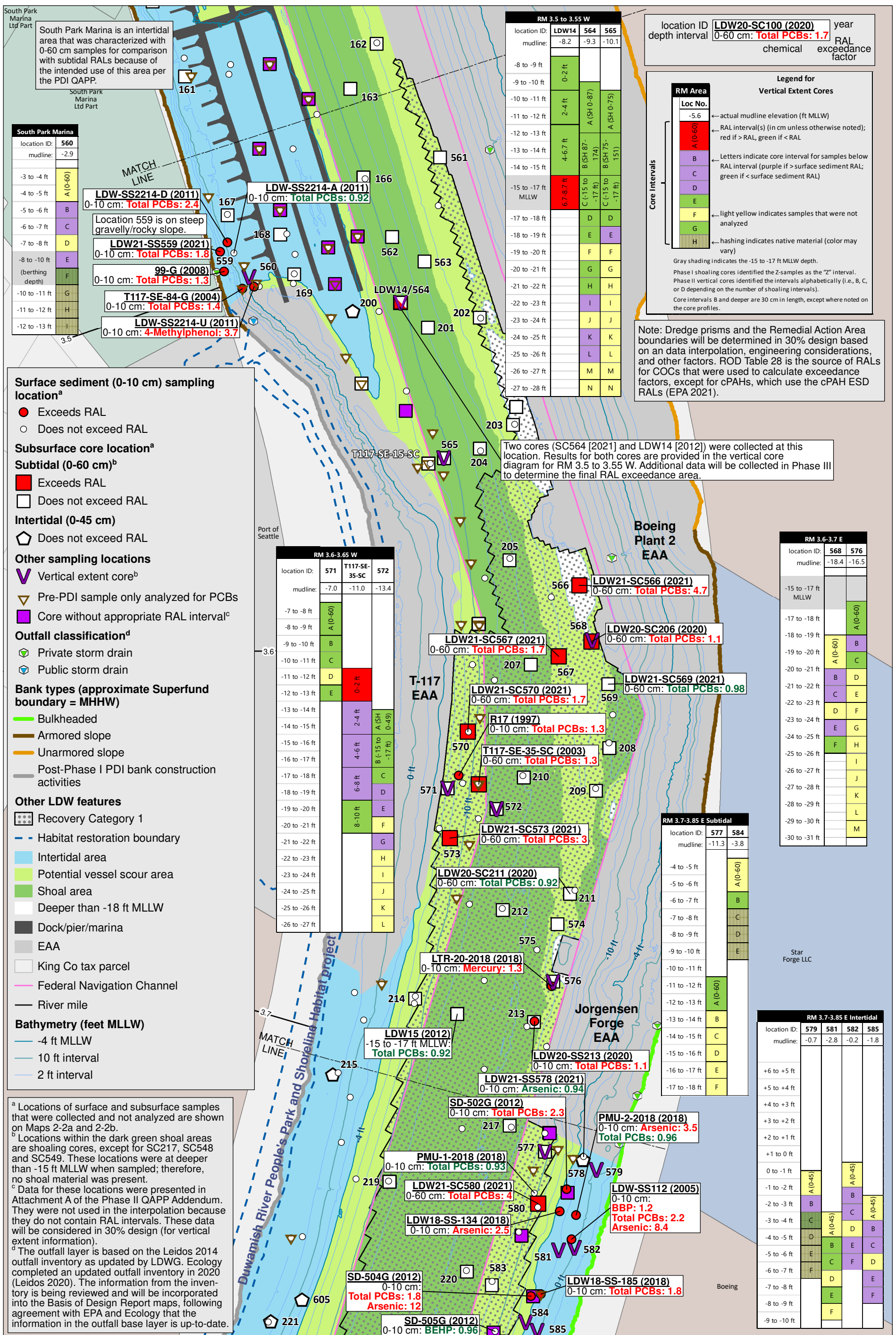
Two cores (SC558 [2021] and LDW13 [2012]) were collected at this location. Results for both cores are provided in the vertical core diagram for RM 3.4 W. Additional data will be collected in Phase III to determine the final RAL exceedance area.

South Park Marina is an intertidal area that was characterized with 0-60 cm samples for comparison with subtidal RALs because of the intended use of this area per the PDI QAPP.

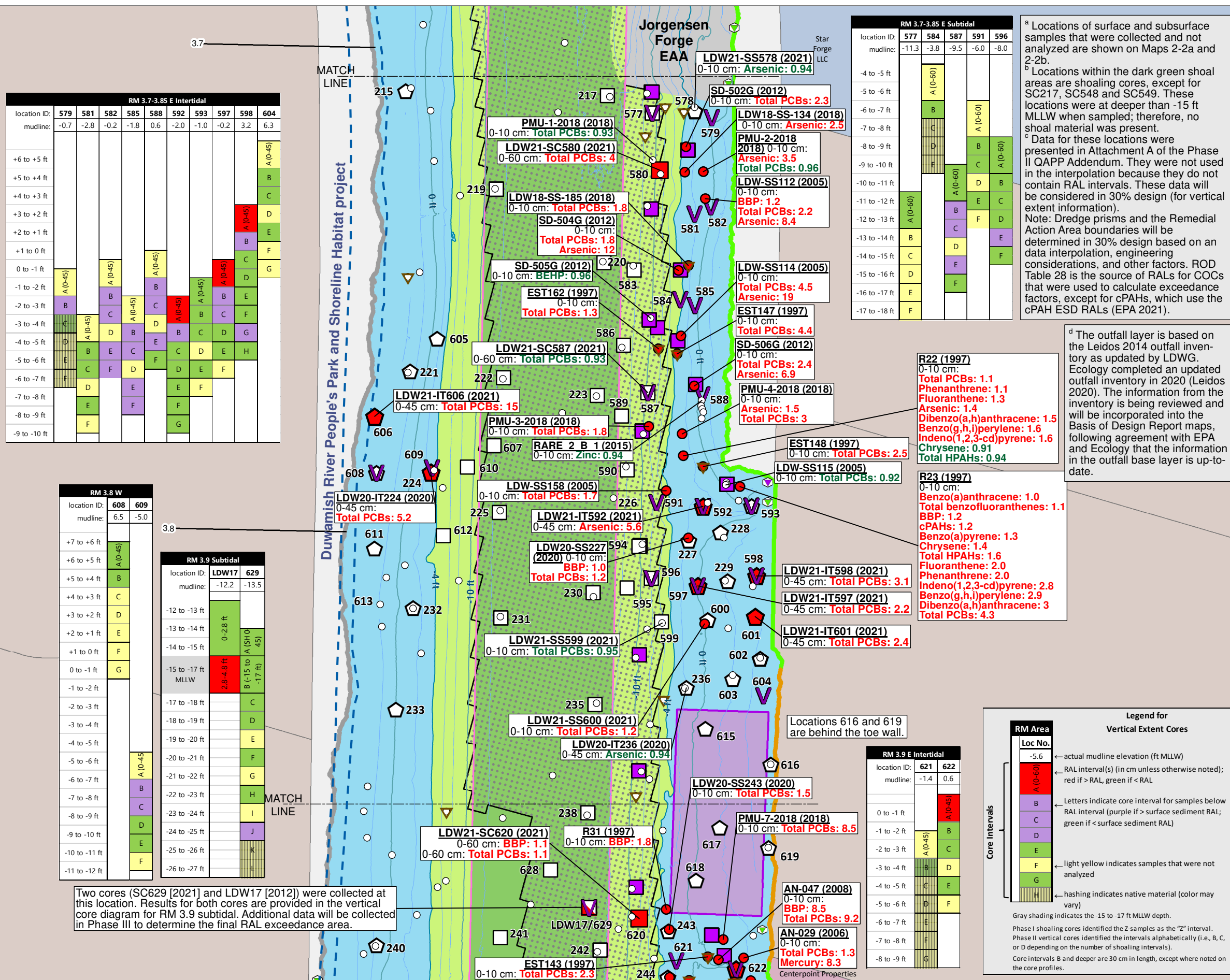
Location 559 is on steep gravelly/rocky slope.

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.
^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.
^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).
^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.
 Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).





Prepared by craigh, 7/15/22; W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II\Map 2-4c 7/17/22 Upper Reach PH2 Design Data - RM 3.5-3.7.mxd



Surface sediment (0-10 cm) sampling location^a

- Exceeds RAL
- Does not exceed RAL

Subsurface core location^a

Subtidal (0-60 cm)^b

- Exceeds RAL
- Does not exceed RAL

Intertidal (0-45 cm)

- ◆ Exceeds RAL
- ◇ Does not exceed RAL

Other sampling locations

- ∇ Vertical extent core^b
- ▽ Pre-PDI sample only analyzed for PCBs
- ◻ Core without appropriate RAL interval^c

Outfall classification^d

- ◻ EOF/storm drain
- ◻ Private storm drain

Bank types (approximate Superfund boundary = MHHW)

- Bulkheaded
- Unarmored slope
- Post-Phase I PDI bank construction activities

Other LDW features

- ◻ Recovery Category 1
- ◻ King Co tax parcel
- Habitat restoration boundary
- Federal Navigation Channel
- Intertidal area
- Potential vessel scour area
- Shoal area
- EAA
- ◻ ENR/AC Pilot plot

Bathymetry (feet MLLW)

- -4 ft MLLW
- 10 ft interval
- 2 ft interval

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.

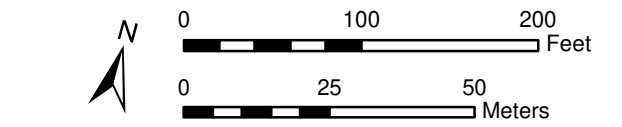
^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.

^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).

^d Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on a data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).

^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.

Two cores (SC629 [2021] and LDW17 [2012]) were collected at this location. Results for both cores are provided in the vertical core diagram for RM 3.9 subtidal. Additional data will be collected in Phase III to determine the final RAL exceedance area.



Map 2-4d. RAL exceedances and vertical extent core results in the design dataset, RM 3.7 to RM 3.85

PRE-DESIGN INVESTIGATION DATA EVALUATION REPORT FOR THE LDW UPPER REACH JULY 15, 2022

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.
^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.
^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).
^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date. Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).

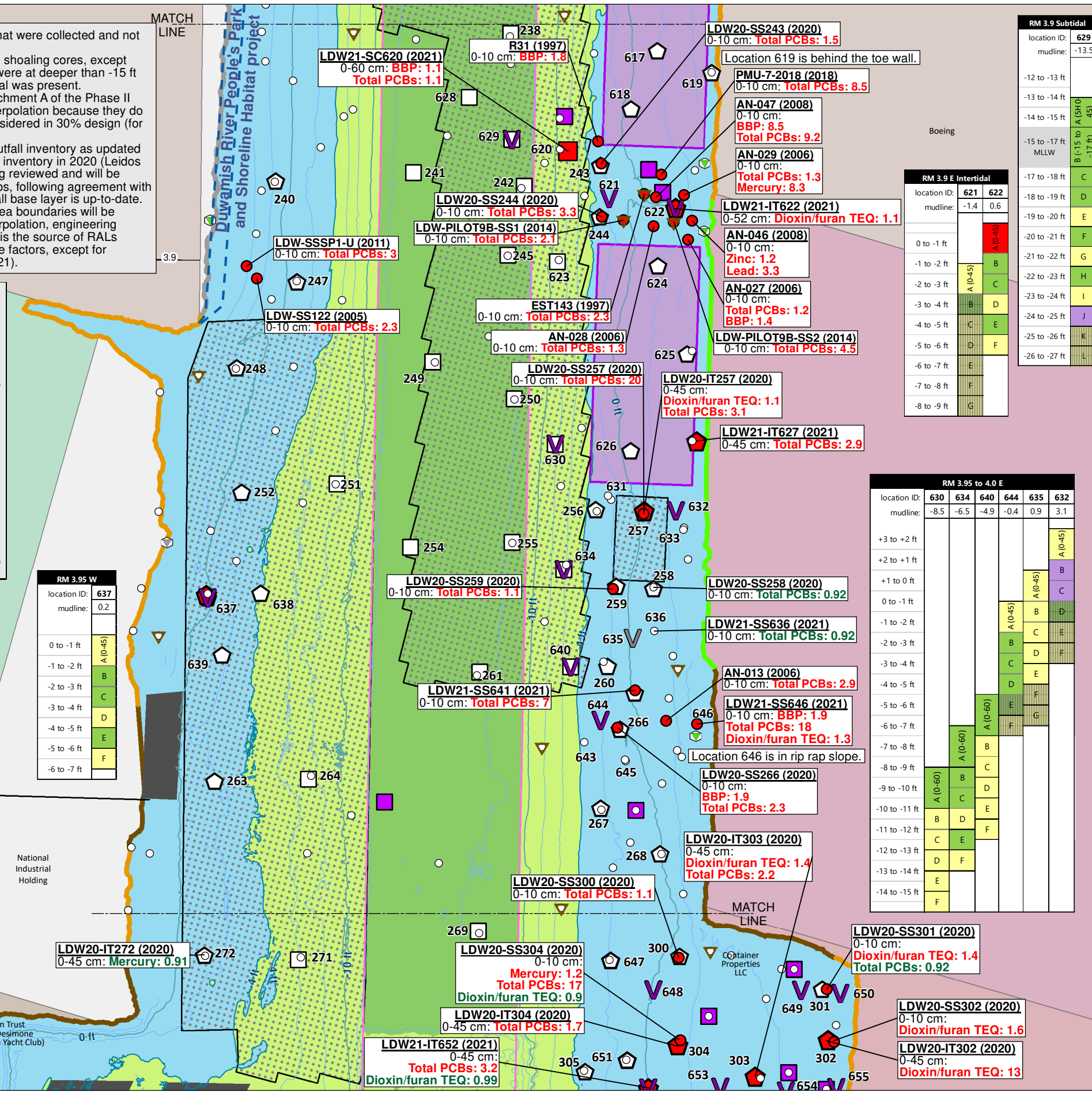
Legend for Vertical Extent Cores

RM Area	Loc No.	Notes
-5.6		← actual mudline elevation (ft MLLW)
A (0-60)		← RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
B		← Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; green if < surface sediment RAL)
C		
D		
E		
F		← light yellow indicates samples that were not analyzed
G		
H		← hashing indicates native material (color may vary)

Gray shading indicates the -15 to -17 ft MLLW depth.
 Phase I shoaling cores identified the Z-samples as the "Z" interval.
 Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).
 Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

RM Area	648	649	650	652	653	654	655
location ID:	648	649	650	652	653	654	655
mudline:	-0.3	5.1	7.2	0.9	3.3	4.1	6.2
+7 to +6 ft							
+6 to +5 ft			A (0-45)				A (0-45)
+5 to +4 ft			B				B
+4 to +3 ft			C				C
+3 to +2 ft			D				D
+2 to +1 ft			E				E
+1 to 0 ft			F				F
0 to -1 ft			G				G
-1 to -2 ft			H				H
-2 to -3 ft			I				I
-3 to -4 ft			J				J
-4 to -5 ft			K				K
-5 to -6 ft			L				L
-6 to -7 ft			M				M
-7 to -8 ft			N				N

Note: Shading added to help differentiate transects, which are presented here from west to east.



RM Area	637
location ID:	637
mudline:	0.2
0 to -1 ft	A (0-45)
-1 to -2 ft	B
-2 to -3 ft	C
-3 to -4 ft	D
-4 to -5 ft	E
-5 to -6 ft	F
-6 to -7 ft	G

RM Area	630	634	640	644	635	632
location ID:	630	634	640	644	635	632
mudline:	-8.5	-6.5	-4.9	-0.4	0.9	3.1
+3 to +2 ft						
+2 to +1 ft						
+1 to 0 ft						
0 to -1 ft						
-1 to -2 ft						
-2 to -3 ft						
-3 to -4 ft						
-4 to -5 ft						
-5 to -6 ft						
-6 to -7 ft						
-7 to -8 ft						
-8 to -9 ft						
-9 to -10 ft						
-10 to -11 ft						
-11 to -12 ft						
-12 to -13 ft						
-13 to -14 ft						
-14 to -15 ft						

Surface sediment (0-10 cm) sampling location^a

- Exceeds RAL
- Does not exceed RAL

Subsurface core location^a

Subtidal (0-60 cm)^b

- Exceeds RAL
- Does not exceed RAL

Intertidal (0-45 cm)

- Exceeds RAL
- Does not exceed RAL

Other sampling locations

- ∇ Vertical extent core^b
- ∇ Vertical archive
- ▽ Pre-PDI sample only analyzed for PCBs
- Core without appropriate RAL interval^c

Outfall classification^d

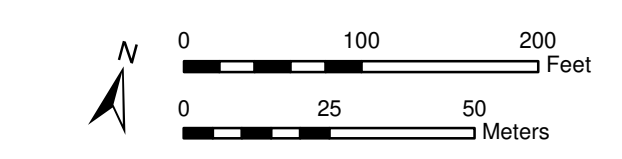
- Private storm drain
- Pipe of unresolved origin and/or use
- +

Bank types (approximate Superfund boundary = MHHW)

- █ Bulkheaded
- █ Armored slope
- █ Unarmored slope
- █ Post-Phase I PDI bank construction activities

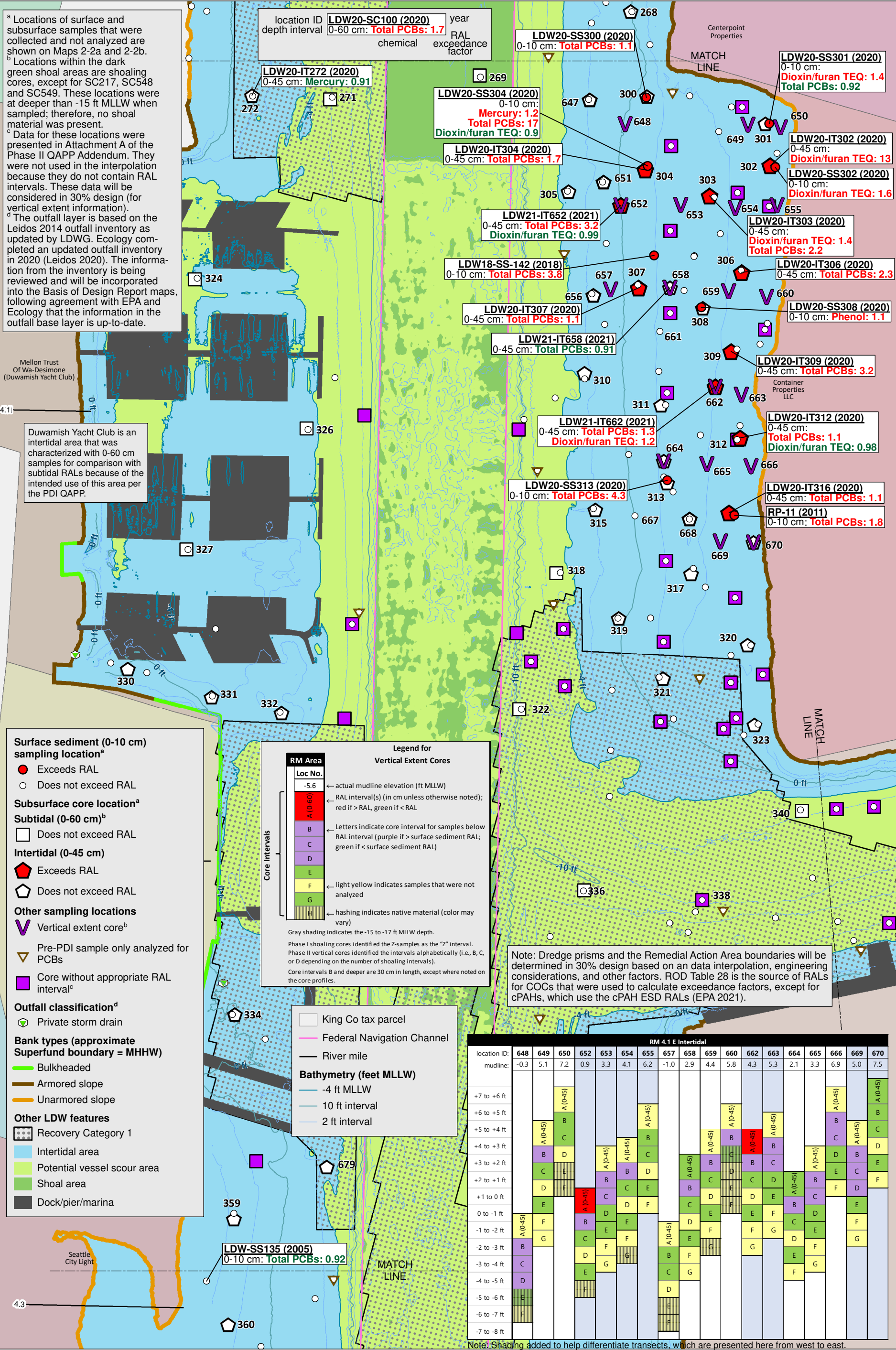
Other LDW features

- █ Recovery Category 1
- █ Habitat restoration boundary
- █ Intertidal area
- █ Potential vessel scour area
- █ Shoal area
- █ Dock/pier/marina
- █ ENR/AC Pilot plot
- King Co tax parcel
- █ Federal Navigation Channel
- █ River mile
- █ Bathymetry (feet MLLW)
- █ -4 ft MLLW
- █ 10 ft interval
- █ 2 ft interval



Map 2-4e. RAL exceedances and vertical extent core results in the design dataset, RM 3.85 to RM 4.05

PRE-DESIGN INVESTIGATION DATA EVALUATION REPORT FOR THE LDW UPPER REACH JULY 15, 2022



^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.

^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.

^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).

^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.

Mellon Trust Of Wa-Desimone (Duwamish Yacht Club)

Duwamish Yacht Club is an intertidal area that was characterized with 0-60 cm samples for comparison with subtidal RALs because of the intended use of this area per the PDI QAPP.

Surface sediment (0-10 cm) sampling location^a

- Exceeds RAL
- Does not exceed RAL

Subsurface core location^a

Subtidal (0-60 cm)^b

- Does not exceed RAL

Intertidal (0-45 cm)

- Exceeds RAL
- Does not exceed RAL

Other sampling locations

- ∇ Vertical extent core^b
- ∇ Pre-PDI sample only analyzed for PCBs
- Core without appropriate RAL interval^c

Outfall classification^d

- Private storm drain

Bank types (approximate Superfund boundary = MHHW)

- Bulkheaded
- Armored slope
- Unarmored slope

Other LDW features

- Recovery Category 1
- Intertidal area
- Potential vessel scour area
- Shoal area
- Dock/pier/marina

Legend for Vertical Extent Cores

RM Area	Loc No.	Notes
-5.6		actual mudline elevation (ft MLLW)
A (0-60)		RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
B		Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; green if < surface sediment RAL)
C		
D		
E		
F		light yellow indicates samples that were not analyzed
G		hashing indicates native material (color may vary)

Gray shading indicates the -15 to -17 ft MLLW depth.

Phase I shoaling cores identified the Z-samples as the "Z" interval. Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals). Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

King Co tax parcel

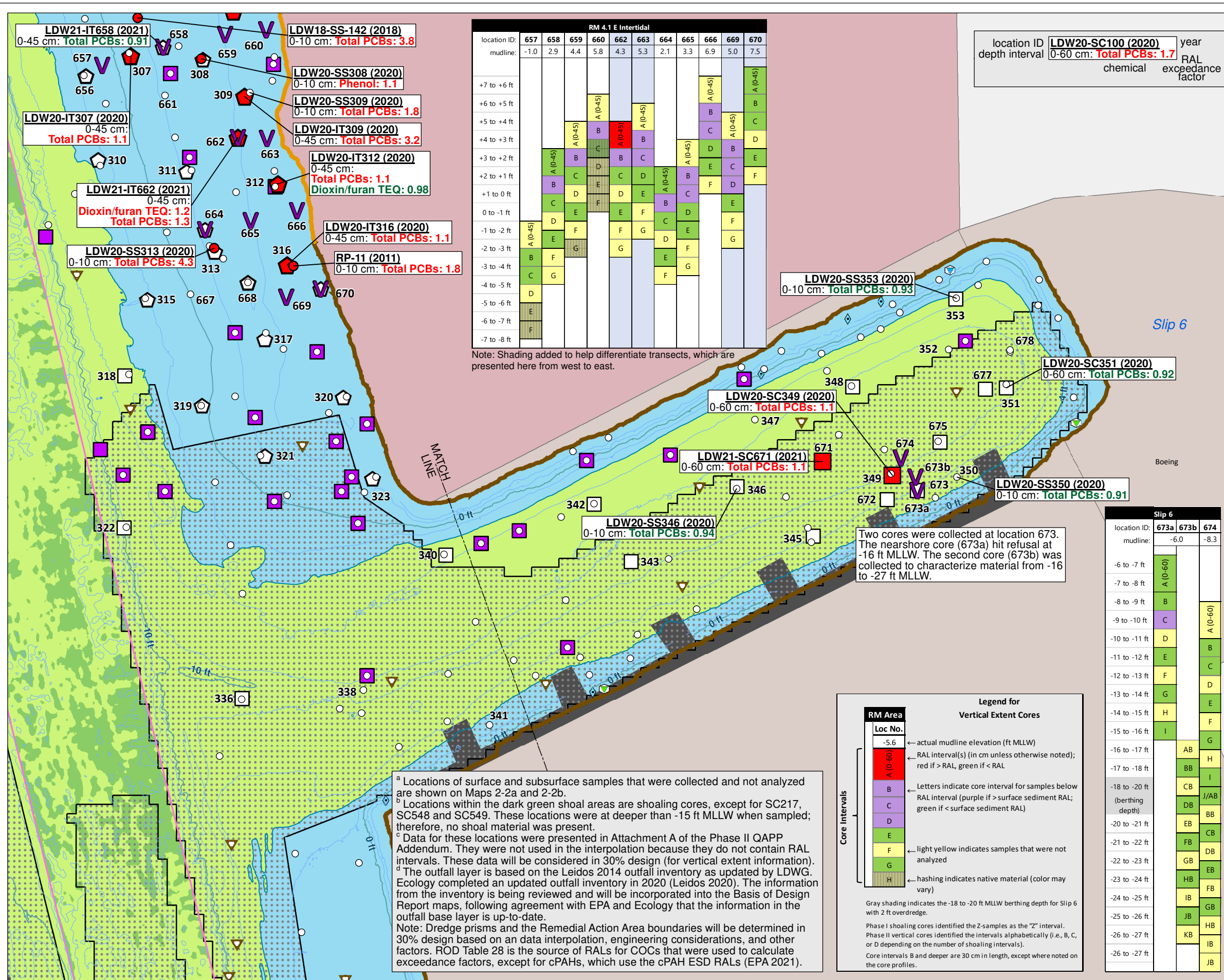
Federal Navigation Channel

River mile

Bathymetry (feet MLLW)

- 4 ft MLLW
- 10 ft interval
- 2 ft interval

Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).



Surface sediment (0-10 cm) sampling location^a

- Exceeds RAL
- Does not exceed RAL

Subsurface core location^a

Subtidal (0-60 cm)^b

- Exceeds RAL
- Does not exceed RAL

Intertidal (0-45 cm)

- ◆ Exceeds RAL
- ◇ Does not exceed RAL

Other sampling locations

- ∇ Vertical extent core^b
- ▽ Pre-PDI sample only analyzed for PCBs
- ◻ Core without appropriate RAL interval^c

Outfall classification^d

- ◊ Private storm drain
- ◈ Public storm drain
- ◉ Abandoned/inactive

Bank types (approximate Superfund boundary = MHHW)

- Armored slope
- Unarmored slope

Other LDW features

- ▨ Recovery Category 1
- Intertidal area
- Potential vessel scour area
- Shoal area
- Dock/pier/marina
- King Co tax parcel
- Federal Navigation Channel

Bathymetry (feet MLLW)

- -4 ft MLLW
- 10 ft interval
- 2 ft interval

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.

^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.

^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).

^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.

Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).

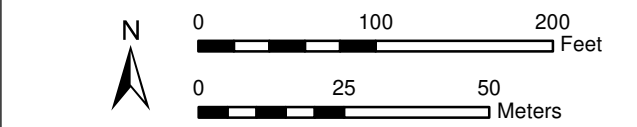
Legend for Vertical Extent Cores

RM Area	Loc No.	Description
-5.6		actual mudline elevation (ft MLLW)
A (0-60)		RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
B		Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; green if < surface sediment RAL)
C		
D		
E		
F		light yellow indicates samples that were not analyzed
G		
H		hashing indicates native material (color may vary)

Gray shading indicates the -18 to -20 ft MLLW berthing depth for Slip 6 with 2 ft overdrudge.

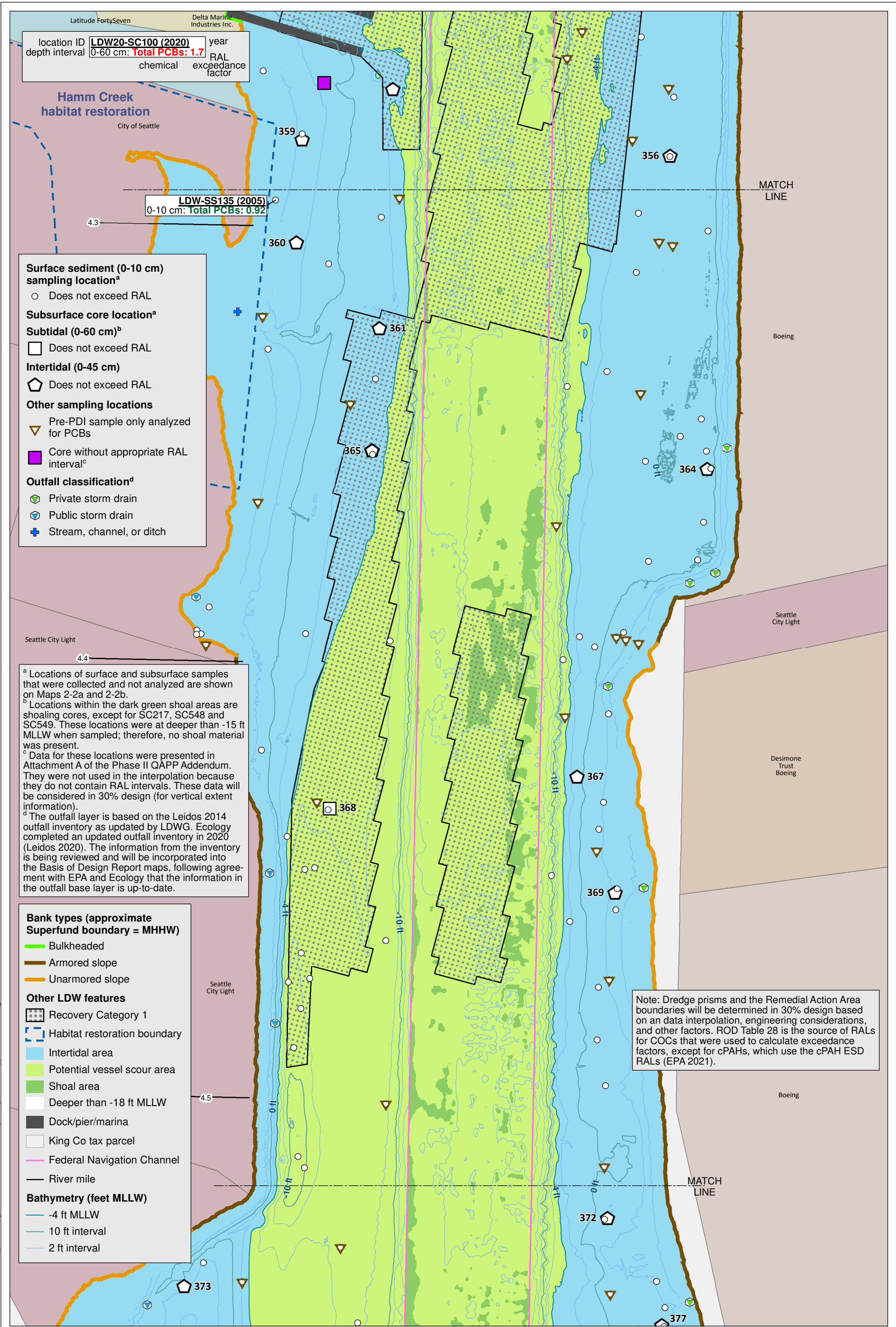
Phase I shoaling cores identified the Z-samples as the "Z" interval. Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals). Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

location ID:	673a	673b	674
mudline:	-6.0	-8.3	
-6 to -7 ft	A (0-60)		
-7 to -8 ft	B		
-8 to -9 ft	C		A (0-60)
-9 to -10 ft	D		
-10 to -11 ft	E		B
-11 to -12 ft	F		C
-12 to -13 ft	G		D
-13 to -14 ft	H		E
-14 to -15 ft	I		F
-15 to -16 ft		AB	G
-16 to -17 ft		BB	H
-17 to -18 ft		CB	I
-18 to -20 ft (berthing depth)		CB	J/AB
-20 to -21 ft		EB	BB
-21 to -22 ft		FB	CB
-22 to -23 ft		GB	DB
-23 to -24 ft		HB	EB
-24 to -25 ft		IB	FB
-25 to -26 ft		JB	GB
-26 to -27 ft		KB	HB
-26 to -27 ft			IB
-26 to -27 ft			JB



Map 2-4g. RAL exceedances and vertical extent core results in the design dataset, Slip 6

PRE-DESIGN INVESTIGATION DATA EVALUATION REPORT FOR THE LDW UPPER REACH JULY 15, 2022



location ID **LDW20-SC100 (2020)** year
 depth interval **0-60 cm: Total PCBs: 1.7** RAL
 chemical exceedance factor

LDW-SS135 (2005)
 0-10 cm: Total PCBs: 0.92

- Surface sediment (0-10 cm) sampling location^a**
- Does not exceed RAL
- Subsurface core location^a**
- Subtidal (0-60 cm)^b**
- Does not exceed RAL
- Intertidal (0-45 cm)**
- ◡ Does not exceed RAL
- Other sampling locations**
- ◡ Pre-PDI sample only analyzed for PCBs
 - Core without appropriate RAL interval^c
- Outfall classification^d**
- ◡ Private storm drain
 - ◡ Public storm drain
 - ⊕ Stream, channel, or ditch

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.

^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.

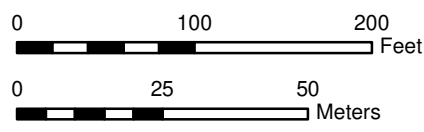
^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).

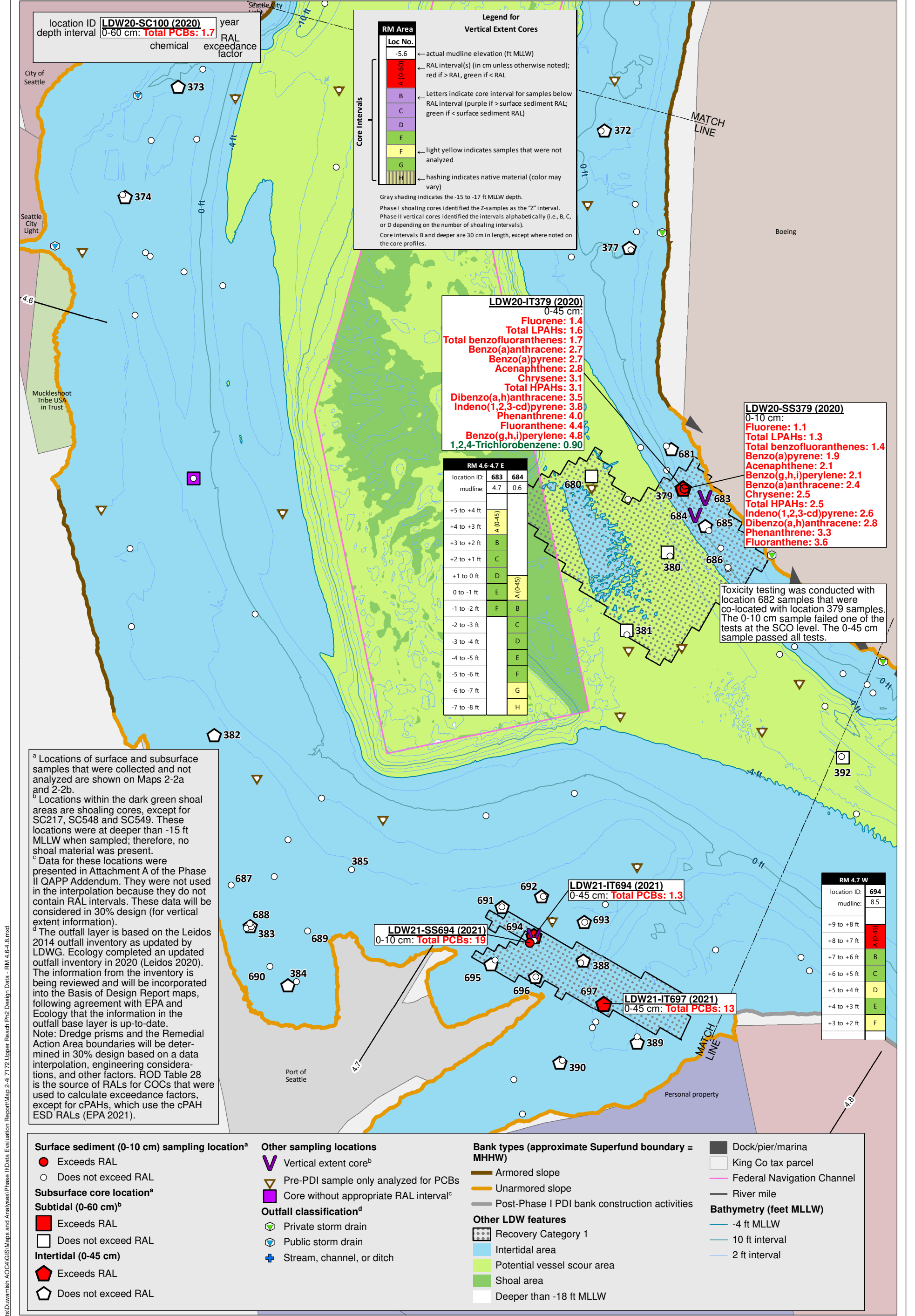
^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.

- Bank types (approximate Superfund boundary = MHHW)**
- Bulkheaded
 - Armored slope
 - Unarmored slope
- Other LDW features**
- ▨ Recovery Category 1
 - ▭ Habitat restoration boundary
 - ▭ Intertidal area
 - ▭ Potential vessel scour area
 - ▭ Shoal area
 - ▭ Deeper than -18 ft MLLW
 - ▭ Dock/pier/marina
 - ▭ King Co tax parcel
 - ▭ Federal Navigation Channel
 - River mile
- Bathymetry (feet MLLW)**
- -4 ft MLLW
 - 10 ft interval
 - 2 ft interval

Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).

Prepared by craigh. 7/15/22. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 2-4h 7172 Upper Reach Pl2 Design Data - RM 4.3-4.5.mxd





location ID: **LDW20-SC100 (2020)** year: **2020**
 depth interval: **0-60 cm: Total PCBs: 1.7** RAL exceedance factor: **1.7**
 chemical: **Total PCBs**

Legend for Vertical Extent Cores

RM Area	Loc No.
-5.6	-5.6
A (0-60)	A (0-60)
B	B
C	C
D	D
E	E
F	F
G	G
H	H

← actual mudline elevation (ft MLLW)
 ← RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
 ← Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; green if < surface sediment RAL)
 ← light yellow indicates samples that were not analyzed
 ← hashing indicates native material (color may vary)
 Gray shading indicates the -15 to -17 ft MLLW depth.
 Phase I shoaling cores identified the Z-samples as the "Z" interval.
 Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).
 Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

LDW20-IT379 (2020)
 0-45 cm:
 Fluorene: 1.4
 Total LPAHs: 1.6
 Total benzofluoranthenes: 1.7
 Benzo(a)anthracene: 2.7
 Benzo(a)pyrene: 2.7
 Acenaphthene: 2.8
 Chrysene: 3.1
 Total HPAHs: 3.1
 Dibenzo(a,h)anthracene: 3.5
 Indeno(1,2,3-cd)pyrene: 3.8
 Phenanthrene: 4.0
 Fluoranthene: 4.4
 Benzo(g,h,i)perylene: 4.8
 1,2,4-Trichlorobenzene: 0.90

LDW20-SS379 (2020)
 0-10 cm:
 Fluorene: 1.1
 Total LPAHs: 1.3
 Total benzofluoranthenes: 1.4
 Benzo(a)pyrene: 1.9
 Acenaphthene: 2.1
 Benzo(g,h,i)perylene: 2.1
 Benzo(a)anthracene: 2.4
 Chrysene: 2.5
 Total HPAHs: 2.5
 Indeno(1,2,3-cd)pyrene: 2.6
 Dibenzo(a,h)anthracene: 2.8
 Phenanthrene: 3.3
 Fluoranthene: 3.6

RM 4.6-4.7 E	
location ID:	683 684
mudline:	4.7 0.6
+5 to +4 ft	
+4 to +3 ft	A (0-45)
+3 to +2 ft	B
+2 to +1 ft	C
+1 to 0 ft	D
0 to -1 ft	E A (0-45)
-1 to -2 ft	F B
-2 to -3 ft	C
-3 to -4 ft	D
-4 to -5 ft	E
-5 to -6 ft	F
-6 to -7 ft	G
-7 to -8 ft	H

Toxicity testing was conducted with location 682 samples that were co-located with location 379 samples. The 0-10 cm sample failed one of the tests at the SCO level. The 0-45 cm sample passed all tests.

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.
^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.
^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).
^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.
 Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on a data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).

RM 4.7 W	
location ID:	694
mudline:	8.5
+9 to +8 ft	
+8 to +7 ft	A (0-45)
+7 to +6 ft	B
+6 to +5 ft	C
+5 to +4 ft	D
+4 to +3 ft	E
+3 to +2 ft	F

Surface sediment (0-10 cm) sampling location^a

- Exceeds RAL
- Does not exceed RAL

Subsurface core location^a

- Exceeds RAL
- Does not exceed RAL

Intertidal (0-45 cm)

- Exceeds RAL
- Does not exceed RAL

Other sampling locations

- ∇ Vertical extent core^b
- ∇ Pre-PDI sample only analyzed for PCBs
- Core without appropriate RAL interval^c

Outfall classification^d

- ∇ Private storm drain
- ∇ Public storm drain
- ⊕ Stream, channel, or ditch

Bank types (approximate Superfund boundary = MHHW)

- Armored slope
- Unarmored slope
- Post-Phase I PDI bank construction activities

Other LDW features

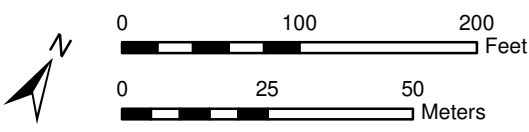
- Recovery Category 1
- Intertidal area
- Potential vessel scour area
- Shoal area
- Deeper than -18 ft MLLW

Dock/pier/marina

- King Co tax parcel
- Federal Navigation Channel
- River mile

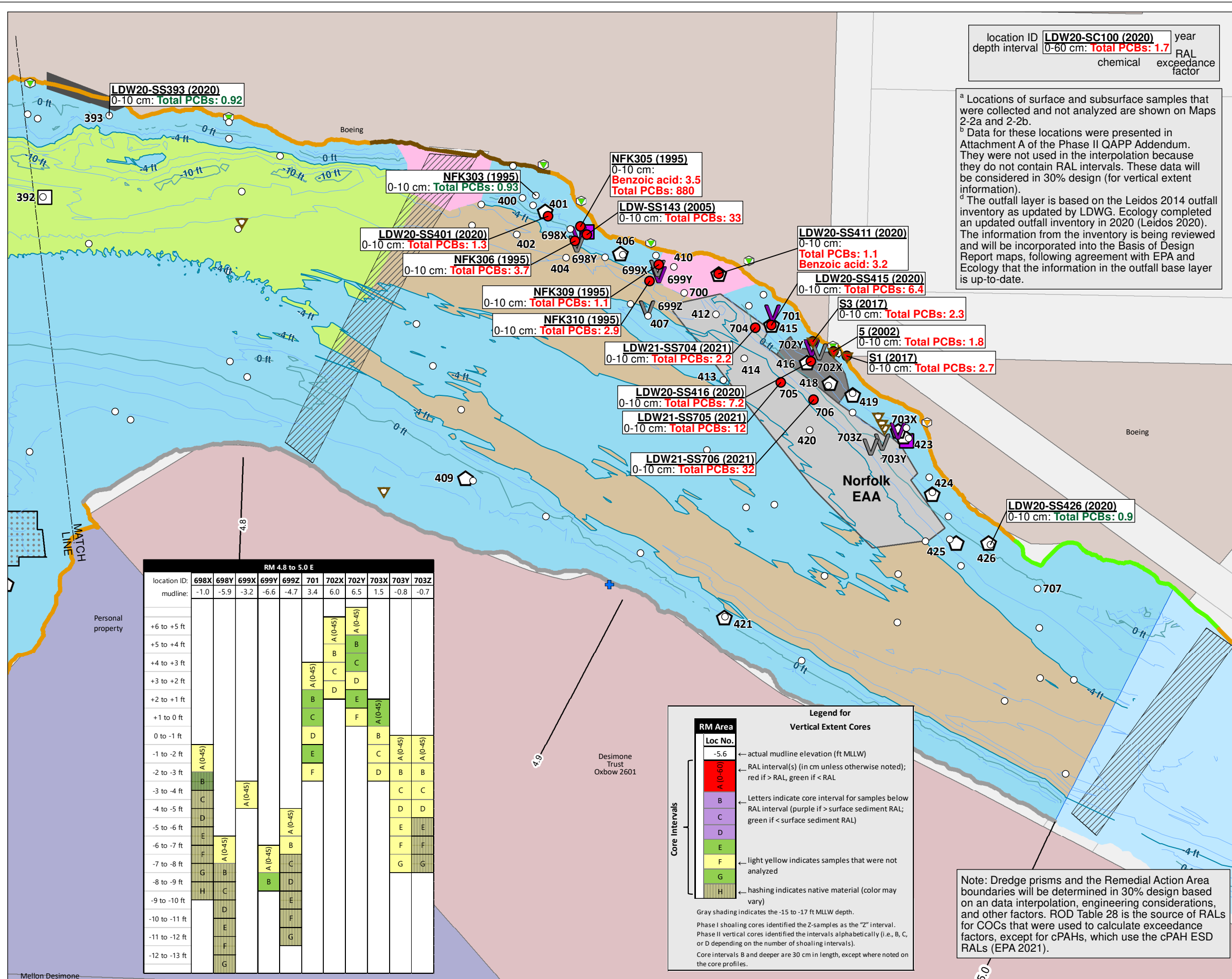
Bathymetry (feet MLLW)

- -4 ft MLLW
- 10 ft interval
- 2 ft interval



Prepared by craigh. 7/15/22. W:\Projects\Duwamish\AOC\GIS\Maps and Analyses\Phase II\Map 2-4i\7172 Upper Reach PDI Design Data - RM 4.6-4.8.mxd

Prepared by craigh, 7/15/22, W:\Projects\Duwamish ACC4\GIS\Maps and Analysis\Phase II Data Evaluation Report\Map 2-4j\1772 Upper Reach PH2 Design Data - RM 4.8-5.0.mxd



location ID	LDW20-SC100 (2020)	year	
depth interval	0-60 cm: Total PCBs: 1.7	RAL	chemical exceedance factor

^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.
^b Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).
^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.

Surface sediment (0-10 cm) sampling location^a

- Exceeds RAL
- Does not exceed RAL

Subsurface core location^a

Subtidal (0-60 cm)

- Does not exceed RAL

Intertidal (0-45 cm)

- ◻ Does not exceed RAL

Other sampling locations

- ∇ Vertical extent core^b
- ∇ Vertical archive
- ▽ Pre-PDI sample only analyzed for PCBs
- Core without appropriate RAL interval^b

Outfall classification^d

- CSO/storm drain
- ◇ Private storm drain
- ◇ Abandoned/inactive
- ⊕ Stream, channel, or ditch

Bank types (approximate Superfund boundary = MHHW)

- Bulkheaded
- Armored slope
- Unarmored slope
- Post-Phase I PDI bank construction activities

Other LDW features

- ▨ Recovery Category 1
- ▨ Bridge
- ▨ Dock/pier/marina
- ▨ Intertidal area
- ▨ Potential vessel scour area
- ▨ Subtidal with no subsurface RAL
- ▨ Area not covered by bathymetric survey
- ▨ Boeing South Storm Drain removal area
- ▨ EAA
- ▨ King Co tax parcel
- ▨ River mile

Bathymetry (feet MLLW)

- -4 ft MLLW
- 10 ft interval
- 2 ft interval

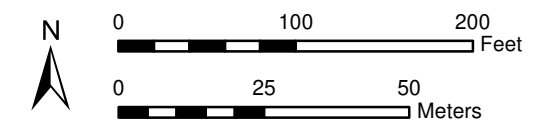
RM 4.8 to 5.0 E											
location ID:	698X	698Y	699X	699Y	699Z	701	702X	702Y	703X	703Y	703Z
mudline:	-1.0	-5.9	-3.2	-6.6	-4.7	3.4	6.0	6.5	1.5	-0.8	-0.7
+6 to +5 ft											
+5 to +4 ft											
+4 to +3 ft											
+3 to +2 ft											
+2 to +1 ft											
+1 to 0 ft											
0 to -1 ft											
-1 to -2 ft	A (0-45)										
-2 to -3 ft	B										
-3 to -4 ft	C										
-4 to -5 ft	D										
-5 to -6 ft	E										
-6 to -7 ft	F										
-7 to -8 ft	G										
-8 to -9 ft	H										
-9 to -10 ft	I										
-10 to -11 ft	J										
-11 to -12 ft	K										
-12 to -13 ft	L										

Legend for Vertical Extent Cores

RM Area	Loc No.	Description
-5.6		← actual mudline elevation (ft MLLW)
A (0-60)		← RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL
B		← Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; green if < surface sediment RAL)
C		
D		
E		
F		← light yellow indicates samples that were not analyzed
G		
H		← hashing indicates native material (color may vary)

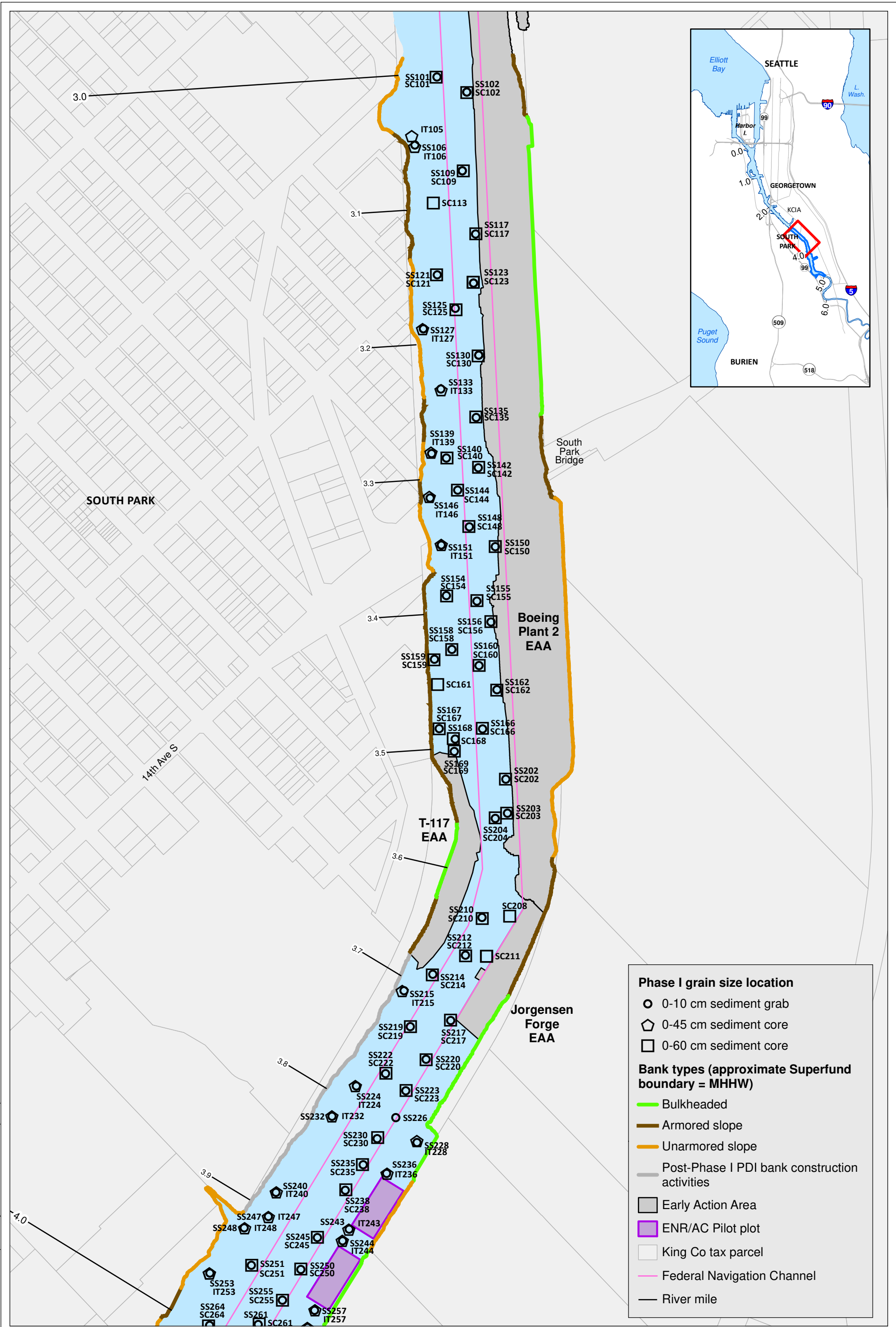
Gray shading indicates the -15 to -17 ft MLLW depth.
Phase I shoaling cores identified the Z-samples as the "Z" interval.
Phase II vertical cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).
Core intervals B and deeper are 30 cm in length, except where noted on the core profiles.

Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on a data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH ESD RALs (EPA 2021).



Map 2-4j. RAL exceedances and vertical extent core results in the design dataset, RM 4.8 to RM 5.0

PRE-DESIGN INVESTIGATION DATA EVALUATION REPORT FOR THE LDW UPPER REACH JULY 15, 2022



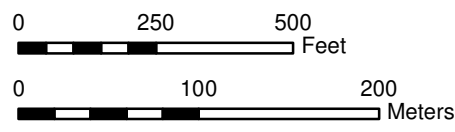
Phase I grain size location

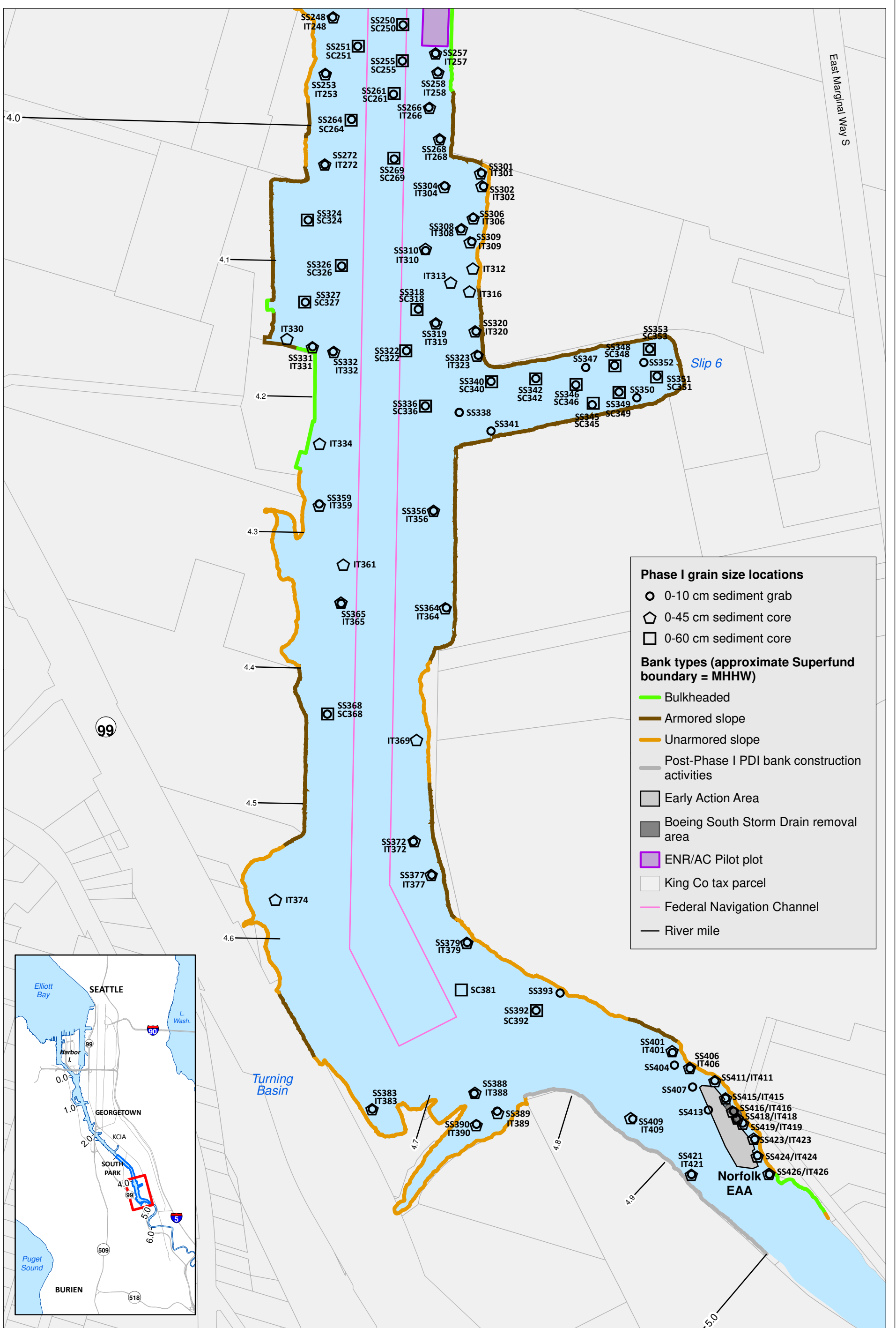
- 0-10 cm sediment grab
- ◡ 0-45 cm sediment core
- 0-60 cm sediment core

Bank types (approximate Superfund boundary = MHHW)

- Bulkheaded
- Armored slope
- Unarmored slope
- Post-Phase I PDI bank construction activities
- Early Action Area
- ENR/AC Pilot plot
- King Co tax parcel
- Federal Navigation Channel
- River mile

Prepared by craigh. 7/15/22. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase I\Map 2-5a 7281 Geotech locations PH1 RM3-4.mxd



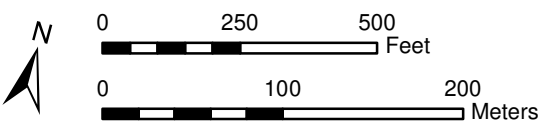
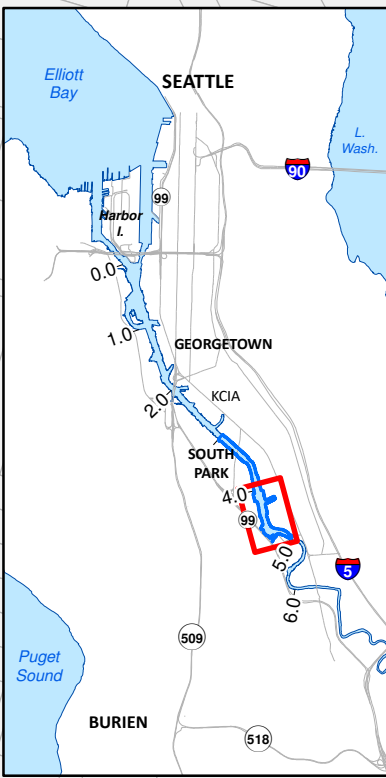


Phase I grain size locations

- 0-10 cm sediment grab
- ◡ 0-45 cm sediment core
- ◻ 0-60 cm sediment core

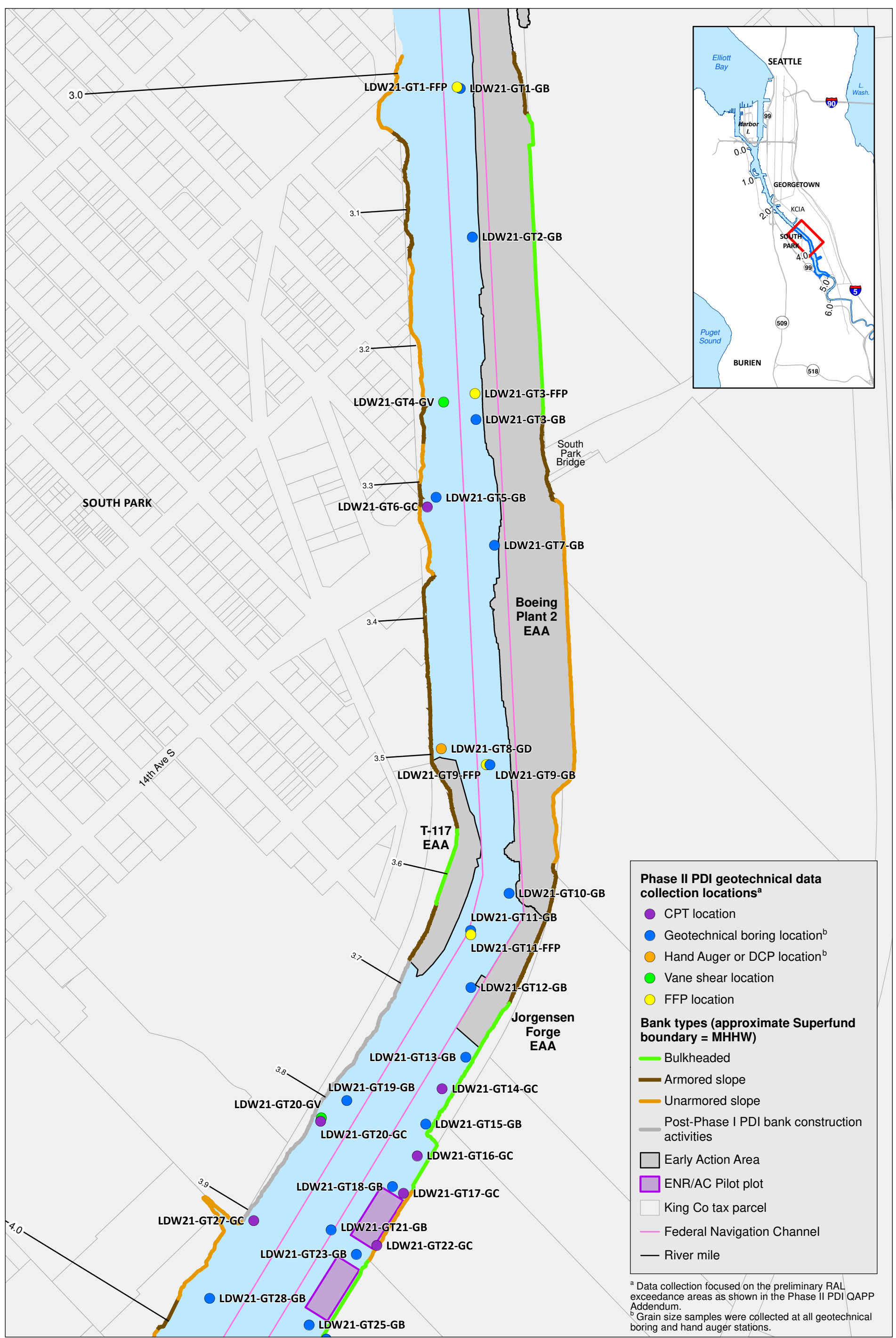
Bank types (approximate Superfund boundary = MHHW)

- Bulkheaded
- Armored slope
- Unarmored slope
- Post-Phase I PDI bank construction activities
- ◻ Early Action Area
- ◻ Boeing South Storm Drain removal area
- ◻ ENR/AC Pilot plot
- ◻ King Co tax parcel
- Federal Navigation Channel
- River mile



Prepared by craigh_7/15/22: W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase I\Map 2-5b_7281_GeotechLocations_PDI_RM4-5.mxd

Prepared by craigh, 7/15/22; W:\Projects\Duwamish\AOC4\GIS\Maps and Analyses\Phase II Data Evaluation\Report\Map 2-5c 7281 Geotech locations PH1\FM3-4.mxd



Phase II PDI geotechnical data collection locations^a

- CPT location
- Geotechnical boring location^b
- Hand Auger or DCP location^b
- Vane shear location
- FFP location

Bank types (approximate Superfund boundary = MHHW)

- Bulkheaded
- Armored slope
- Unarmored slope
- Post-Phase I PDI bank construction activities

■ Early Action Area

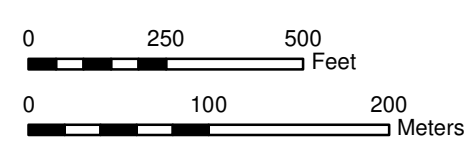
■ ENR/AC Pilot plot

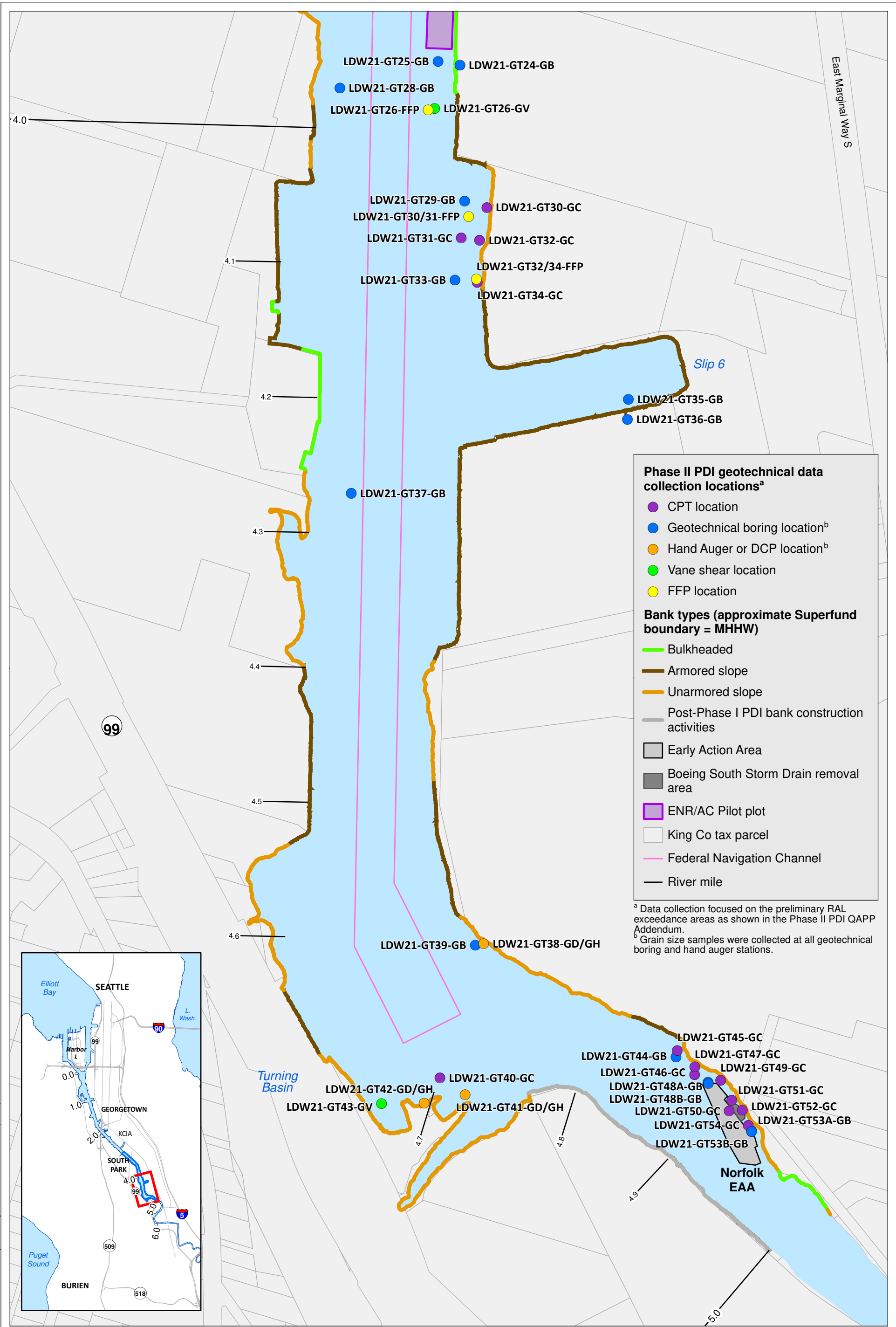
□ King Co tax parcel

— Federal Navigation Channel

— River mile

^a Data collection focused on the preliminary RAL exceedance areas as shown in the Phase II PDI QAPP Addendum.
^b Grain size samples were collected at all geotechnical boring and hand auger stations.

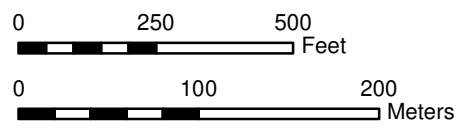




Prepared by craigh. 7/15/22. W:\Projects\Duwamish AOC4\GIS\Maps and Analyses\Phase II Data Evaluation\Report\Map 2-5d 7281_Geotech locations PHII RM4-5.mxd

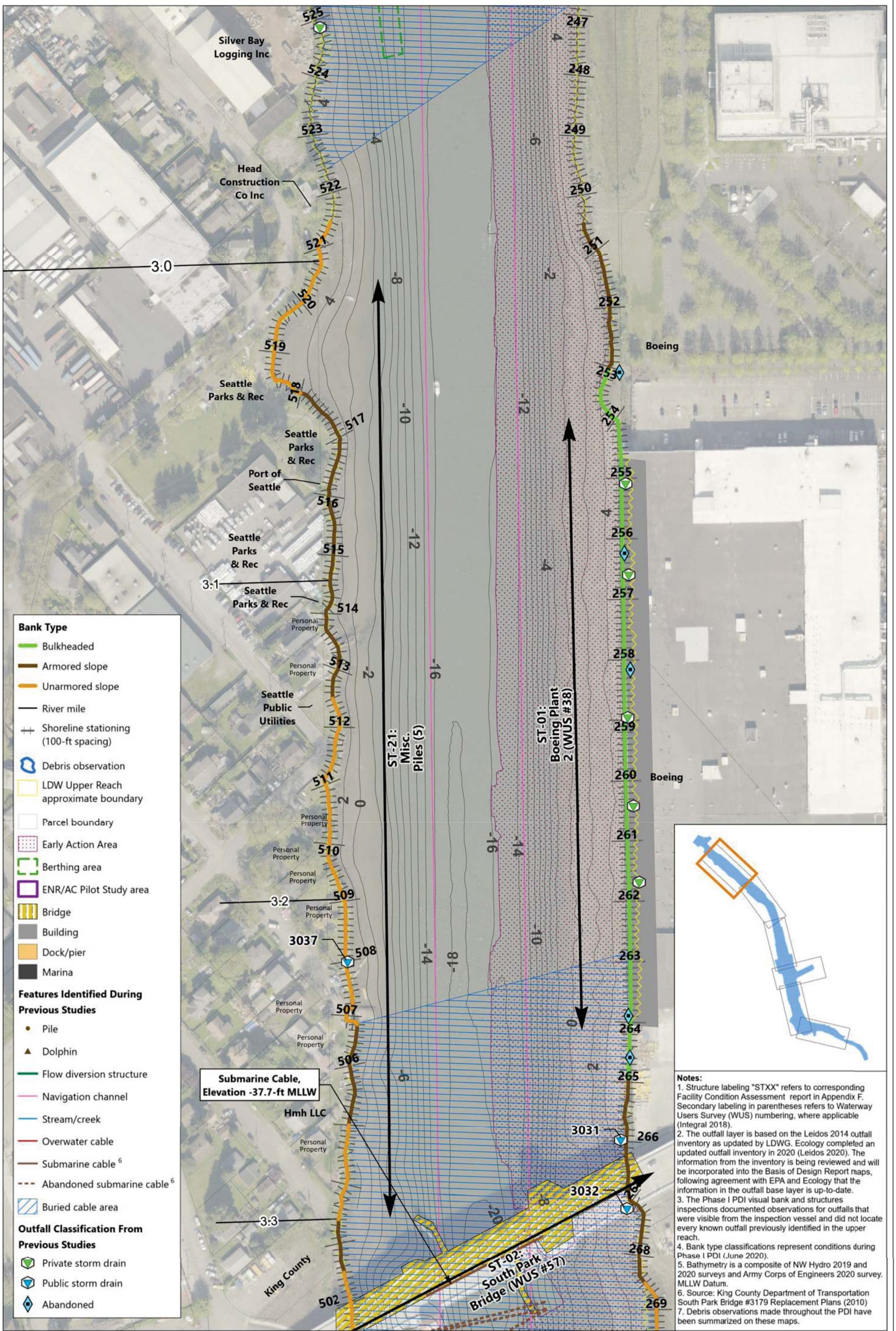


Lower Duwamish Waterway Group
 Port of Seattle / City of Seattle / King County / The Boeing Company



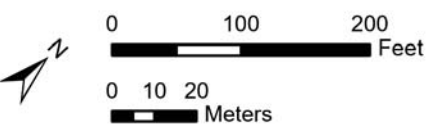
Map 2-5d. Phase II Geotechnical data locations, RM 4.0 to RM 5.0

PRE-DESIGN INVESTIGATION DATA EVALUATION REPORT FOR THE LDW UPPER REACH JULY 15, 2022

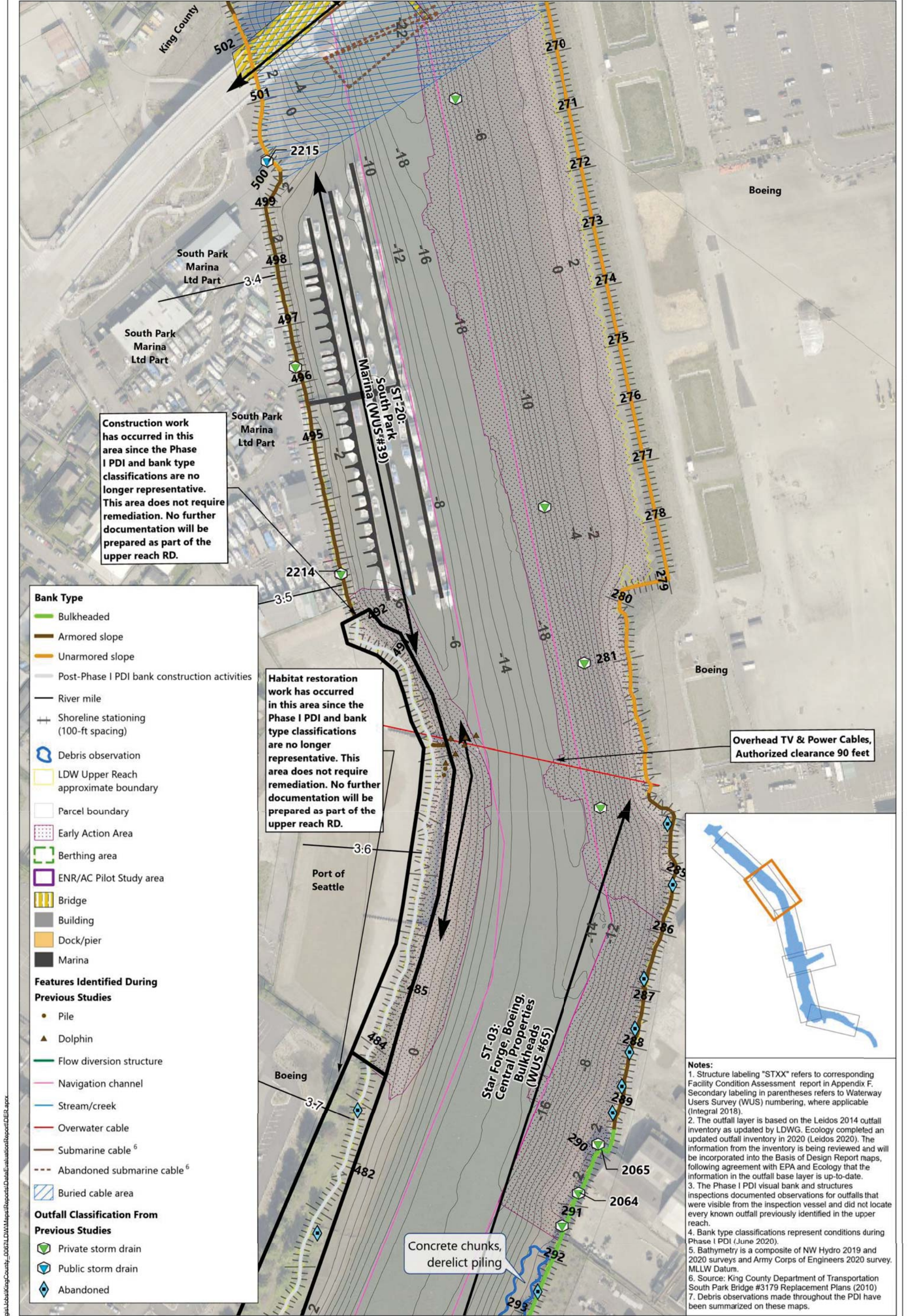


- Bank Type**
- █ Bulkheaded
 - █ Armored slope
 - █ Unarmored slope
 - River mile
 - ⊕ Shoreline stationing (100-ft spacing)
 - ⬢ Debris observation
 - LDW Upper Reach approximate boundary
 - Parcel boundary
 - Early Action Area
 - Berthing area
 - ENR/AC Pilot Study area
 - Bridge
 - Building
 - Dock/pier
 - Marina
- Features Identified During Previous Studies**
- Pile
 - ▲ Dolphin
 - Flow diversion structure
 - Navigation channel
 - Stream/creek
 - Overwater cable
 - Submarine cable ⁶
 - - - Abandoned submarine cable ⁶
 - Buried cable area
- Outfall Classification From Previous Studies**
- ⬢ Private storm drain
 - ⬢ Public storm drain
 - ⬢ Abandoned

- Notes:**
1. Structure labeling "STXX" refers to corresponding Facility Condition Assessment report in Appendix F. Secondary labeling in parentheses refers to Waterway Users Survey (WUS) numbering, where applicable (Integral 2018).
 2. The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.
 3. The Phase I PDI visual bank and structures inspections documented observations for outfalls that were visible from the inspection vessel and did not locate every known outfall previously identified in the upper reach.
 4. Bank type classifications represent conditions during Phase I PDI (June 2020).
 5. Bathymetry is a composite of NW Hydro 2019 and 2020 surveys and Army Corps of Engineers 2020 survey, MLLW Datum.
 6. Source: King County Department of Transportation South Park Bridge #3179 Replacement Plans (2010)
 7. Debris observations made throughout the PDI have been summarized on these maps.

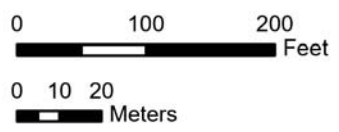


Prepared by: jowler, 7/15/2022, \\nrcs\gis\lobster\kingcounty_00671\DW\Map\Reports\Detail\EvaluationReport\DER.aprx



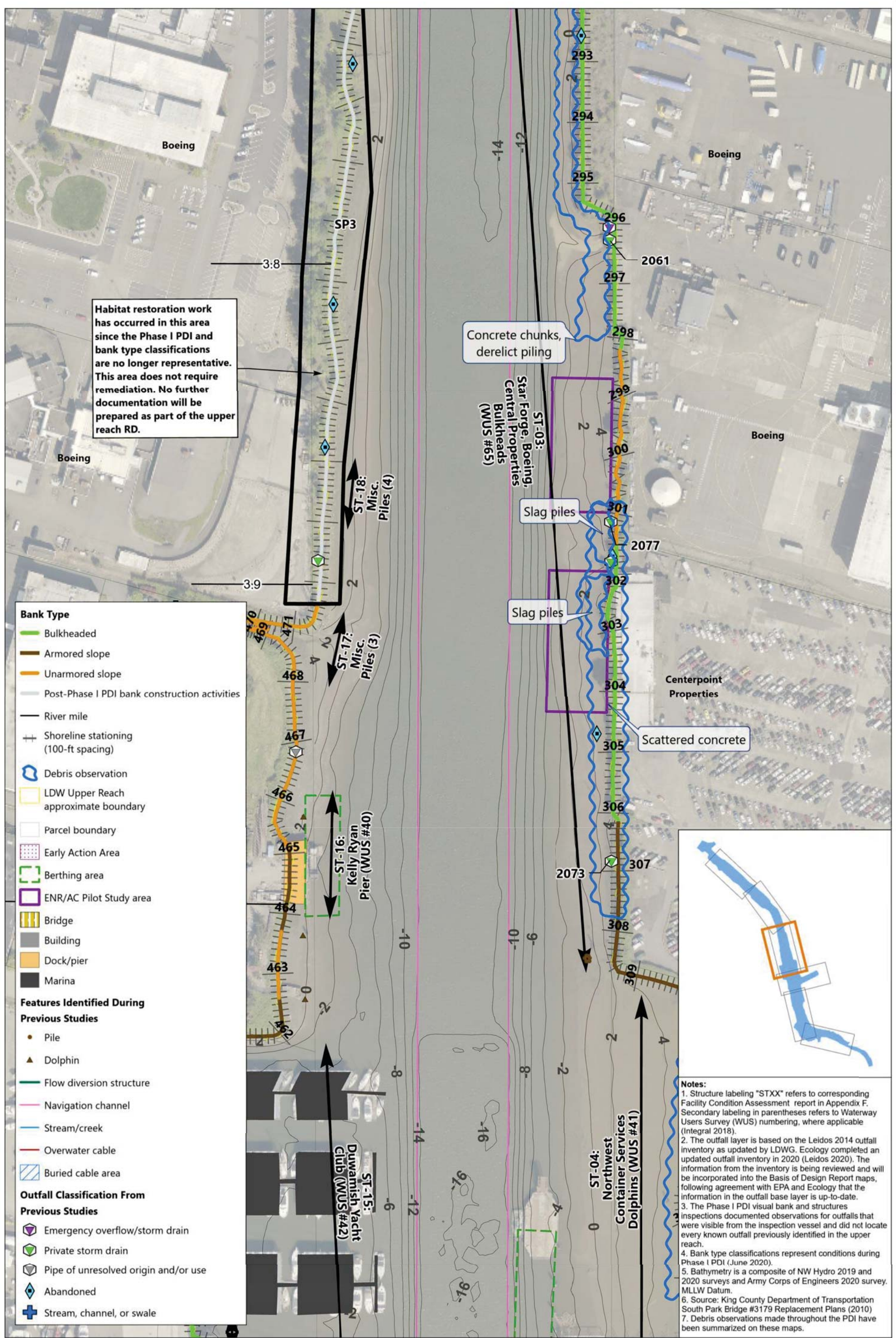
Notes:

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6. Source: King County Department of Transportation South Park Bridge #3179 Replacement Plans (2010)
7. Debris observations made throughout the PDI have been summarized on these maps.



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Habitat restoration work has occurred in this area since the Phase I PDI and bank type classifications are no longer representative. This area does not require remediation. No further documentation will be prepared as part of the upper reach RD.

Concrete chunks, derelict piling

Star Forge, Boeing, Central Properties Bulkheads (WUS #65)

Slag piles

Slag piles

Scattered concrete

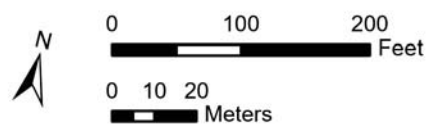
- Bank Type**
- Bulkheaded
 - Armored slope
 - Unarmored slope
 - Post-Phase I PDI bank construction activities

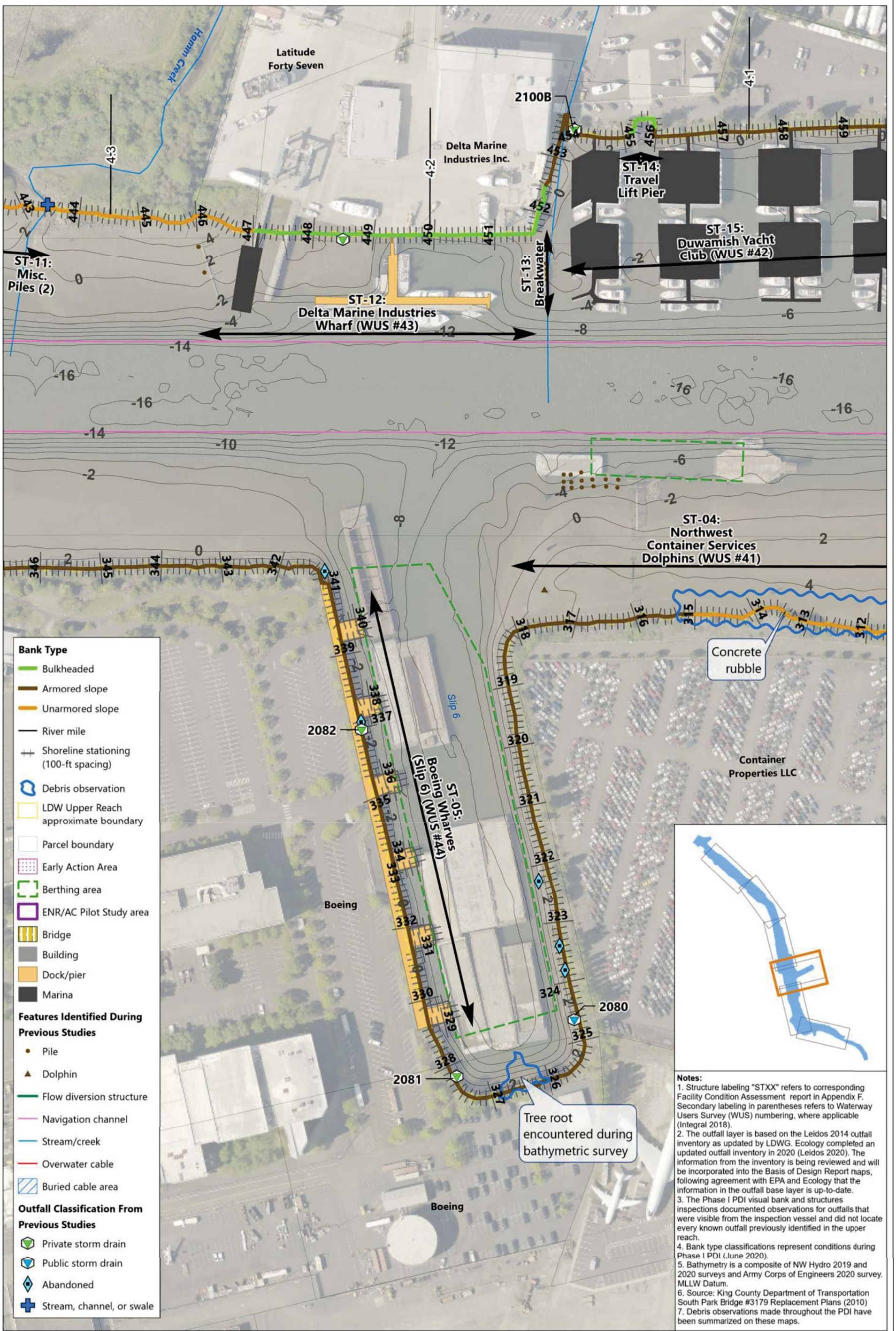
- River mile
- Shoreline stationing (100-ft spacing)
- Debris observation
- LDW Upper Reach approximate boundary
- Parcel boundary
- Early Action Area
- Berthing area
- ENR/AC Pilot Study area
- Bridge
- Building
- Dock/pier
- Marina

- Features Identified During Previous Studies**
- Pile
 - Dolphin
 - Flow diversion structure
 - Navigation channel
 - Stream/creek
 - Overwater cable
 - Buried cable area

- Outfall Classification From Previous Studies**
- Emergency overflow/storm drain
 - Private storm drain
 - Pipe of unresolved origin and/or use
 - Abandoned
 - Stream, channel, or swale

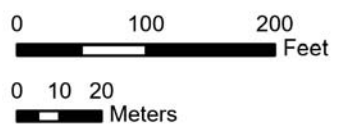
- Notes:**
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 - Debris observations made throughout the PDI have been summarized on these maps.



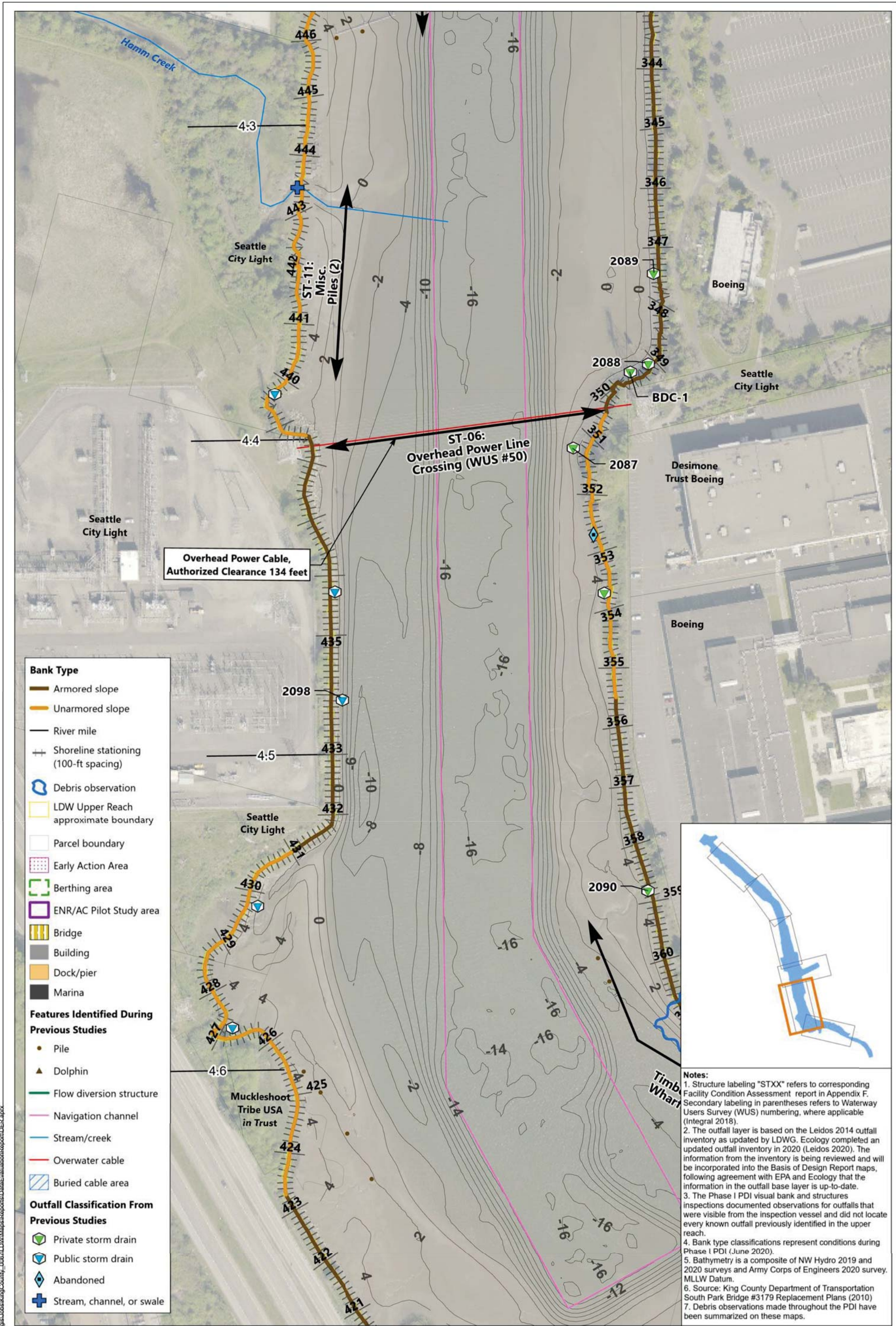


- Bank Type**
- Bulkheaded
 - Armored slope
 - Unarmored slope
 - River mile
 - + Shoreline stationing (100-ft spacing)
 - Debris observation
 - LDW Upper Reach approximate boundary
 - Parcel boundary
 - Early Action Area
 - Berthing area
 - ENR/AC Pilot Study area
 - Bridge
 - Building
 - Dock/pier
 - Marina
- Features Identified During Previous Studies**
- Pile
 - ▲ Dolphin
 - Flow diversion structure
 - Navigation channel
 - Stream/creek
 - Overwater cable
 - Buried cable area
- Outfall Classification From Previous Studies**
- Private storm drain
 - Public storm drain
 - ◇ Abandoned
 - + Stream, channel, or swale

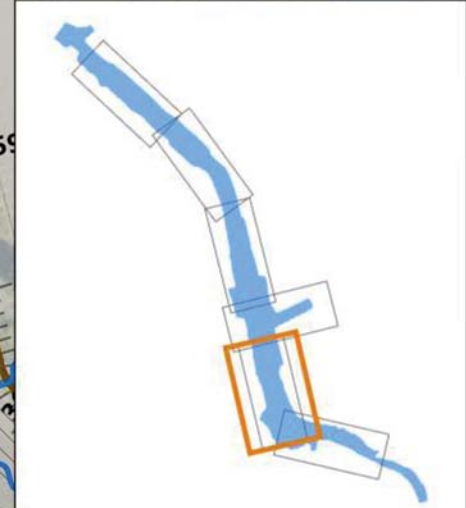
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1. Structure labeling "STXX" refers to corresponding Facility Condition Assessment report in Appendix F. Secondary labeling in parentheses refers to Waterway Users Survey (WUS) numbering, where applicable (Integral 2018).
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 5. Bathymetry is a composite of NW Hydro 2019 and 2020 surveys and Army Corps of Engineers 2020 survey, MLLW Datum.
 6. Source: King County Department of Transportation South Park Bridge #3179 Replacement Plans (2010)
 7. Debris observations made throughout the PDI have been summarized on these maps.



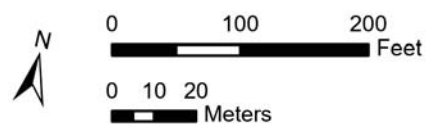
Prepared by: jowler, 7/15/2022, \\nrcs\gis\lob\kingcounty_00671\LDW\Map\Reports\Detail\EvaluationReport\DER.aprx



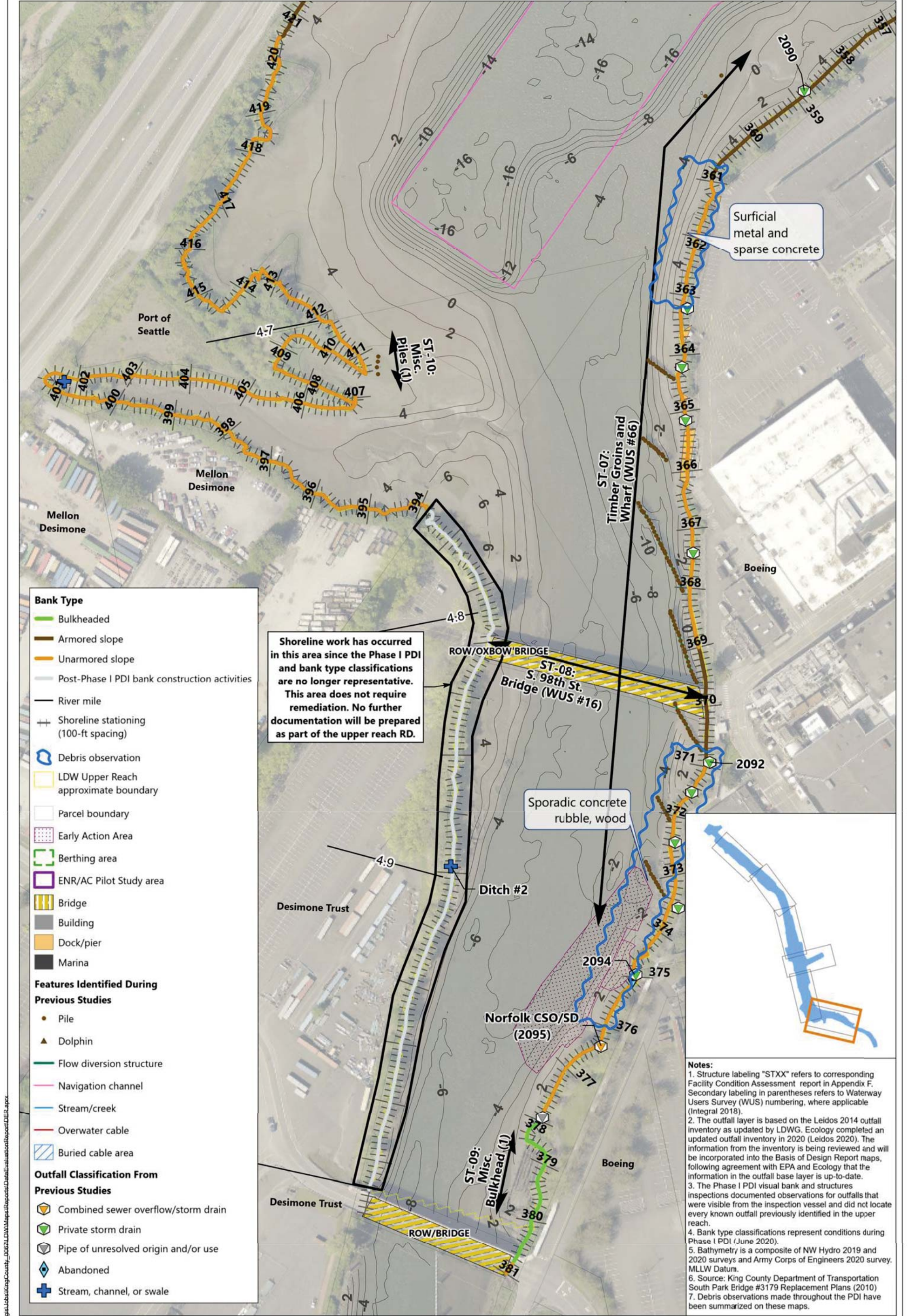
- Bank Type**
- Armored slope
 - Unarmored slope
 - River mile
 - Shoreline stationing (100-ft spacing)
 - Debris observation
 - LDW Upper Reach approximate boundary
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- Features Identified During Previous Studies**
- Pile
 - Dolphin
 - Flow diversion structure
 - Navigation channel
 - Stream/creek
 - Overwater cable
 - Buried cable area
- Outfall Classification From Previous Studies**
- Private storm drain
 - Public storm drain
 - Abandoned
 - Stream, channel, or swale



- Notes:**
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 - The Phase I PDI visual bank and structures inspections documented observations for outfalls that were visible from the inspection vessel and did not locate every known outfall previously identified in the upper reach.
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 - Bathymetry is a composite of NW Hydro 2019 and 2020 surveys and Army Corps of Engineers 2020 survey, MLLW Datum.
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 - Debris observations made throughout the PDI have been summarized on these maps.



Prepared by: jplw, 7/15/2022, \\scc\gis\lob\kingcounty_00671\LDW\Map\Reports\Detail\EvaluationReport\DER.aprx



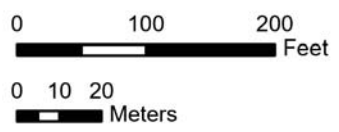
Shoreline work has occurred in this area since the Phase I PDI and bank type classifications are no longer representative. This area does not require remediation. No further documentation will be prepared as part of the upper reach RD.

Sporadic concrete rubble, wood

Surficial metal and sparse concrete

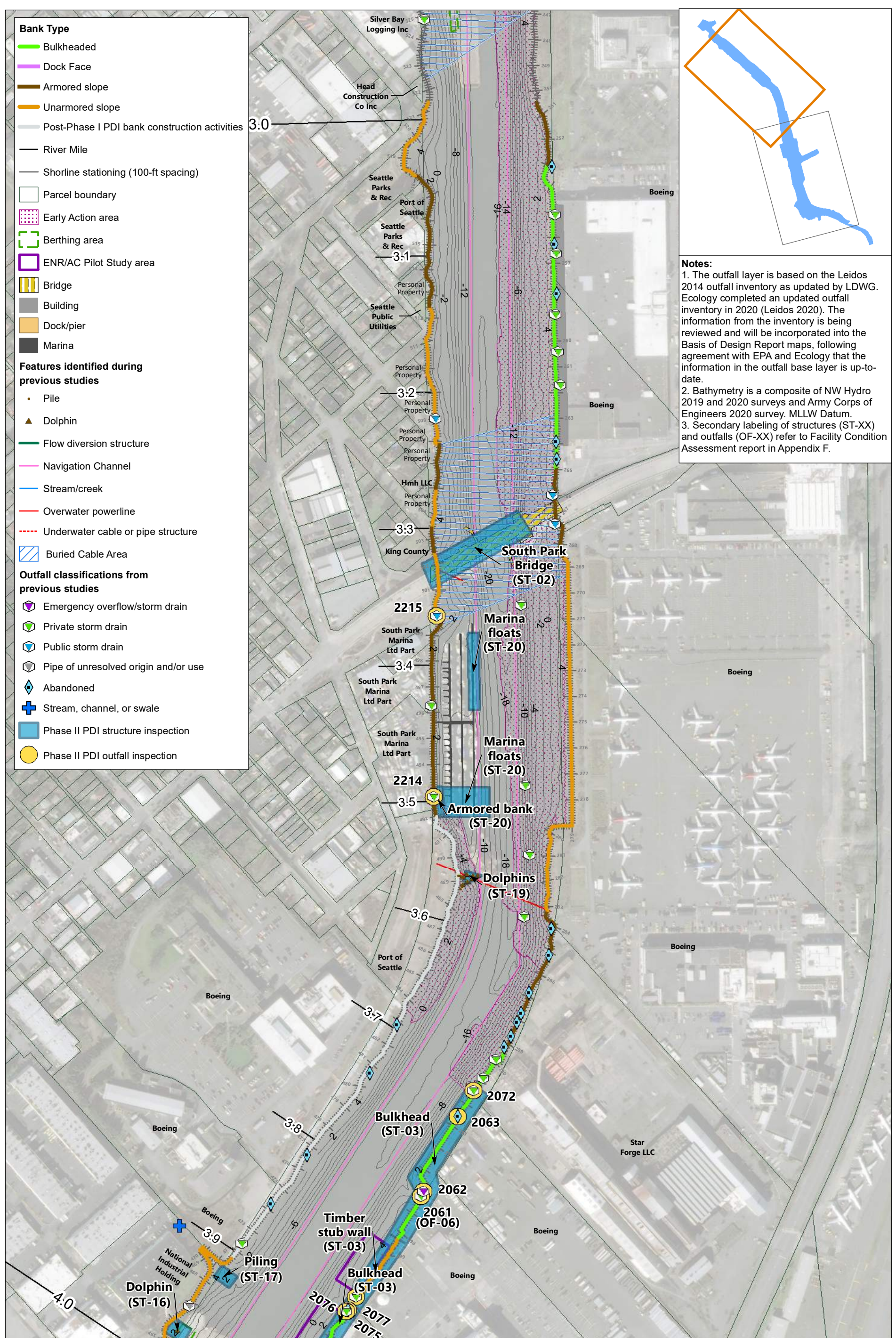
- Notes:**
1. Structure labeling "STXX" refers to corresponding Facility Condition Assessment report in Appendix F. Secondary labeling in parentheses refers to Waterway Users Survey (WUS) numbering, where applicable (Integral 2018).
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 4. Bank type classifications represent conditions during Phase I PDI (June 2020).
 5. Bathymetry is a composite of NW Hydro 2019 and 2020 surveys and Army Corps of Engineers 2020 survey, MLLW Datum.
 6. Source: King County Department of Transportation South Park Bridge #3179 Replacement Plans (2010)
 7. Debris observations made throughout the PDI have been summarized on these maps.

- Bank Type**
- Bulkheaded
 - Armored slope
 - Unarmored slope
 - Post-Phase I PDI bank construction activities
 - River mile
 - Shoreline stationing (100-ft spacing)
 - Debris observation
 - LDW Upper Reach approximate boundary
 - Parcel boundary
 - Early Action Area
 - Berthing area
 - ENR/AC Pilot Study area
 - Bridge
 - Building
 - Dock/pier
 - Marina
- Features Identified During Previous Studies**
- Pile
 - Dolphin
 - Flow diversion structure
 - Navigation channel
 - Stream/creek
 - Overwater cable
 - Buried cable area
- Outfall Classification From Previous Studies**
- Combined sewer overflow/storm drain
 - Private storm drain
 - Pipe of unresolved origin and/or use
 - Abandoned
 - Stream, channel, or swale

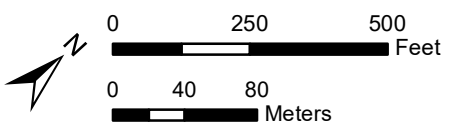


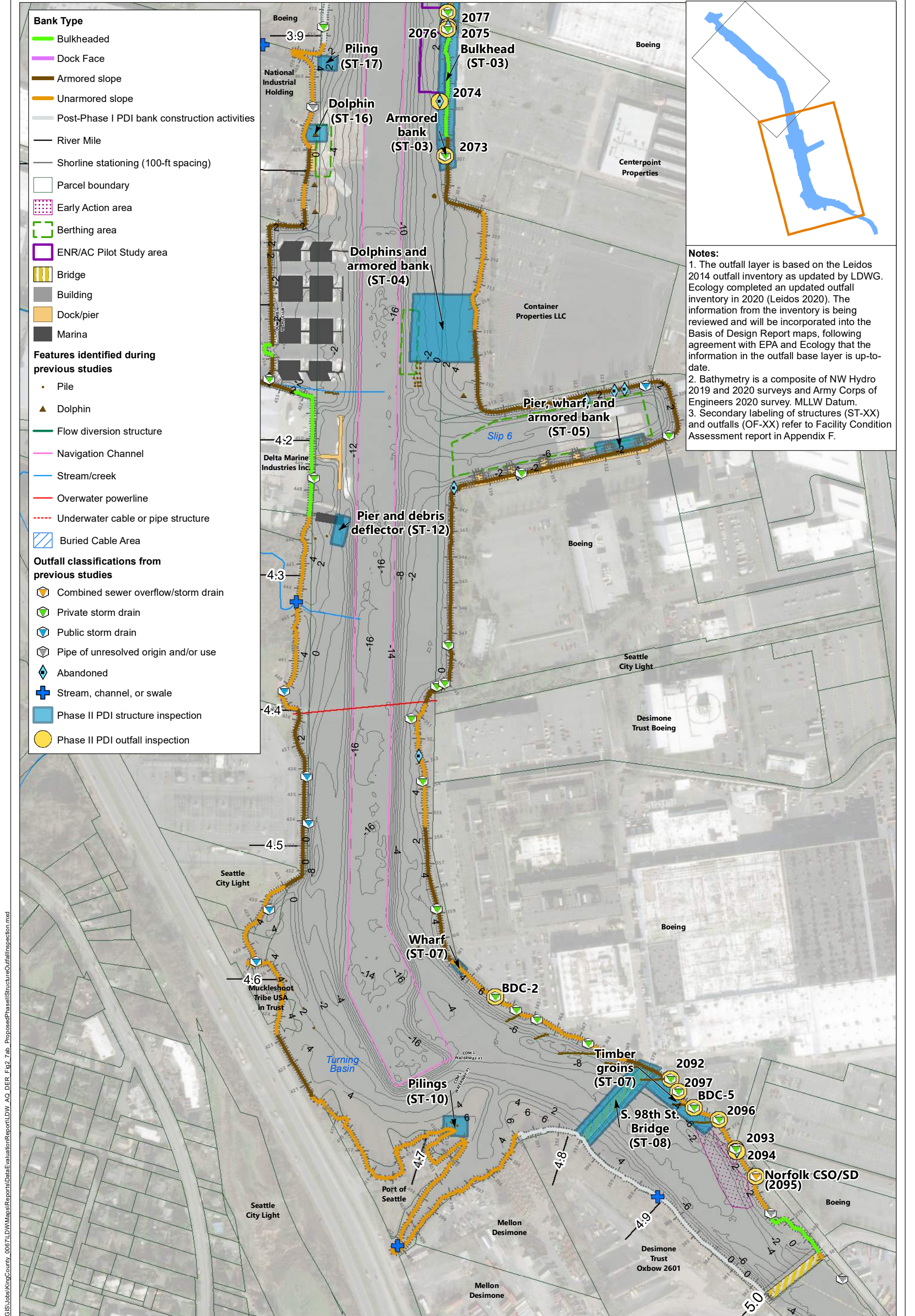
Prepared by: jowler, 7/15/2022, \\\\corporate\slab\king\county_00671\LDW\Map\Reports\Detail\EvaluationReport\DER.aprx

Prepared by jolive, 7/15/2022, \\nrcasGIS\Jobs\KingCounty_0067\LDW\Mapa\Reports\Data\Evaluation\Report\LDW_AQ_DER_Fig2_7ab_ProposedPhaseII\Structure\Outfall\Inspection.mxd



Notes:
 1. The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.
 2. Bathymetry is a composite of NW Hydro 2019 and 2020 surveys and Army Corps of Engineers 2020 survey, MLLW Datum.
 3. Secondary labeling of structures (ST-XX) and outfalls (OF-XX) refer to Facility Condition Assessment report in Appendix F.

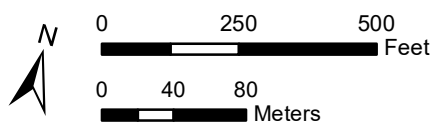


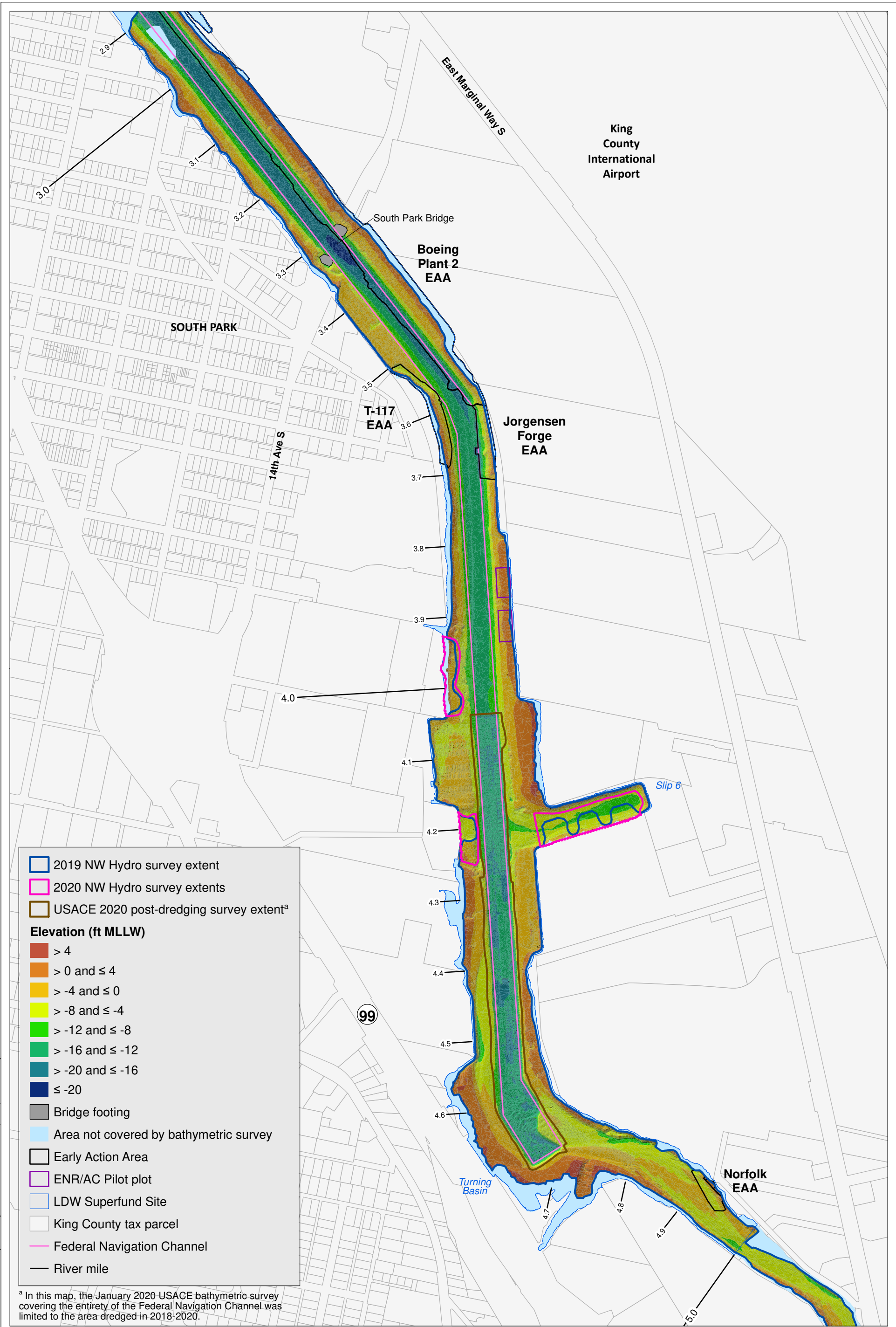


Notes:

1. The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA and Ecology that the information in the outfall base layer is up-to-date.
2. Bathymetry is a composite of NW Hydro 2019 and 2020 surveys and Army Corps of Engineers 2020 survey, MLLW Datum.
3. Secondary labeling of structures (ST-XX) and outfalls (OF-XX) refer to Facility Condition Assessment report in Appendix F.

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- 2019 NW Hydro survey extent
- 2020 NW Hydro survey extents
- USACE 2020 post-dredging survey extent^a

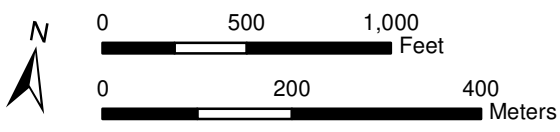
Elevation (ft MLLW)

- > 4
- > 0 and ≤ 4
- > -4 and ≤ 0
- > -8 and ≤ -4
- > -12 and ≤ -8
- > -16 and ≤ -12
- > -20 and ≤ -16
- ≤ -20

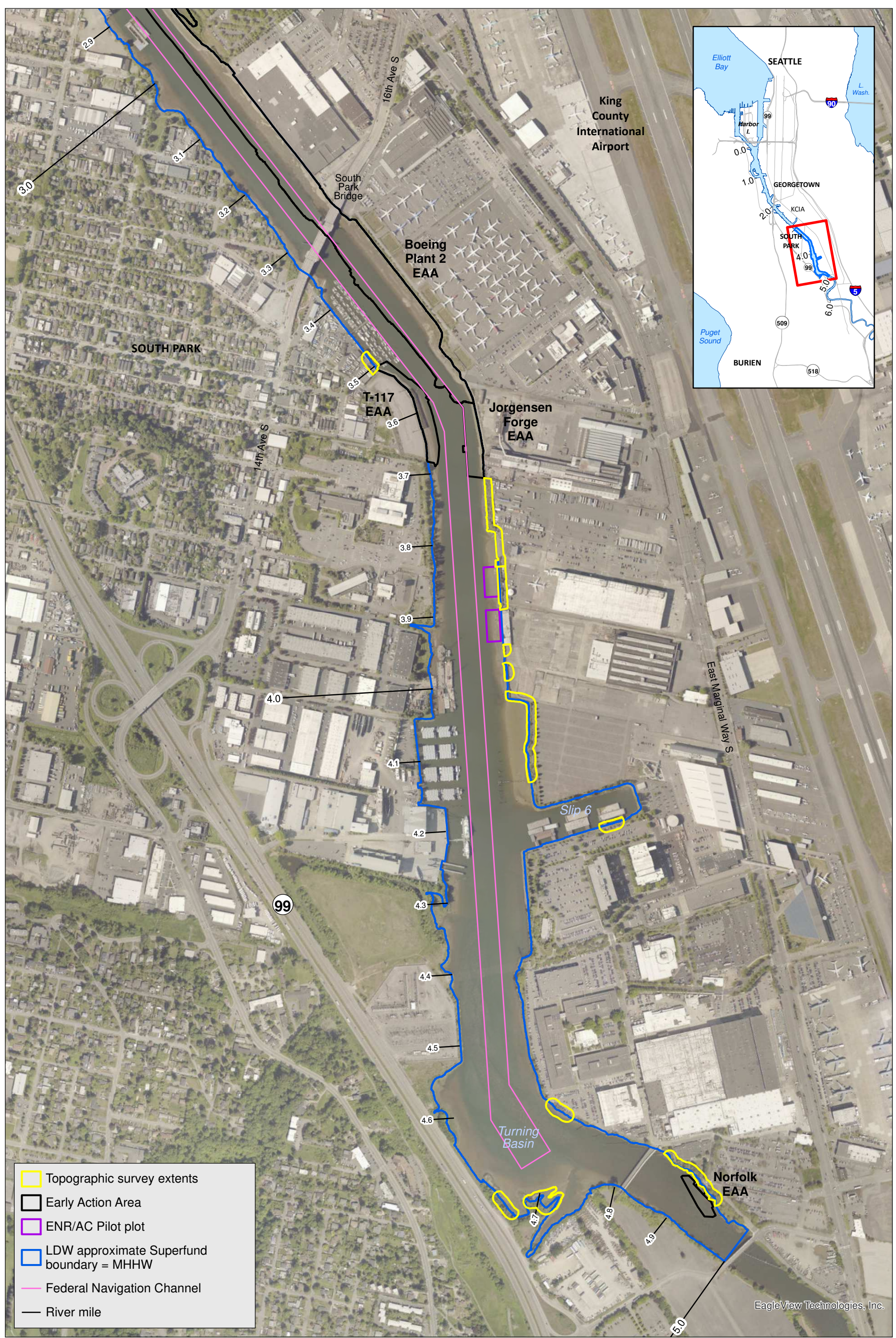
- Bridge footing
- Area not covered by bathymetric survey
- Early Action Area
- ENR/AC Pilot plot
- LDW Superfund Site
- King County tax parcel
- Federal Navigation Channel
- River mile

^a In this map, the January 2020 USACE bathymetric survey covering the entirety of the Federal Navigation Channel was limited to the area dredged in 2018-2020.

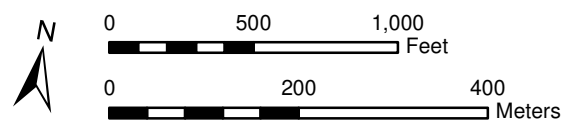
Prepared by craigh, 7/15/22; W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 2-8 7260 Bathy with contours.mxd



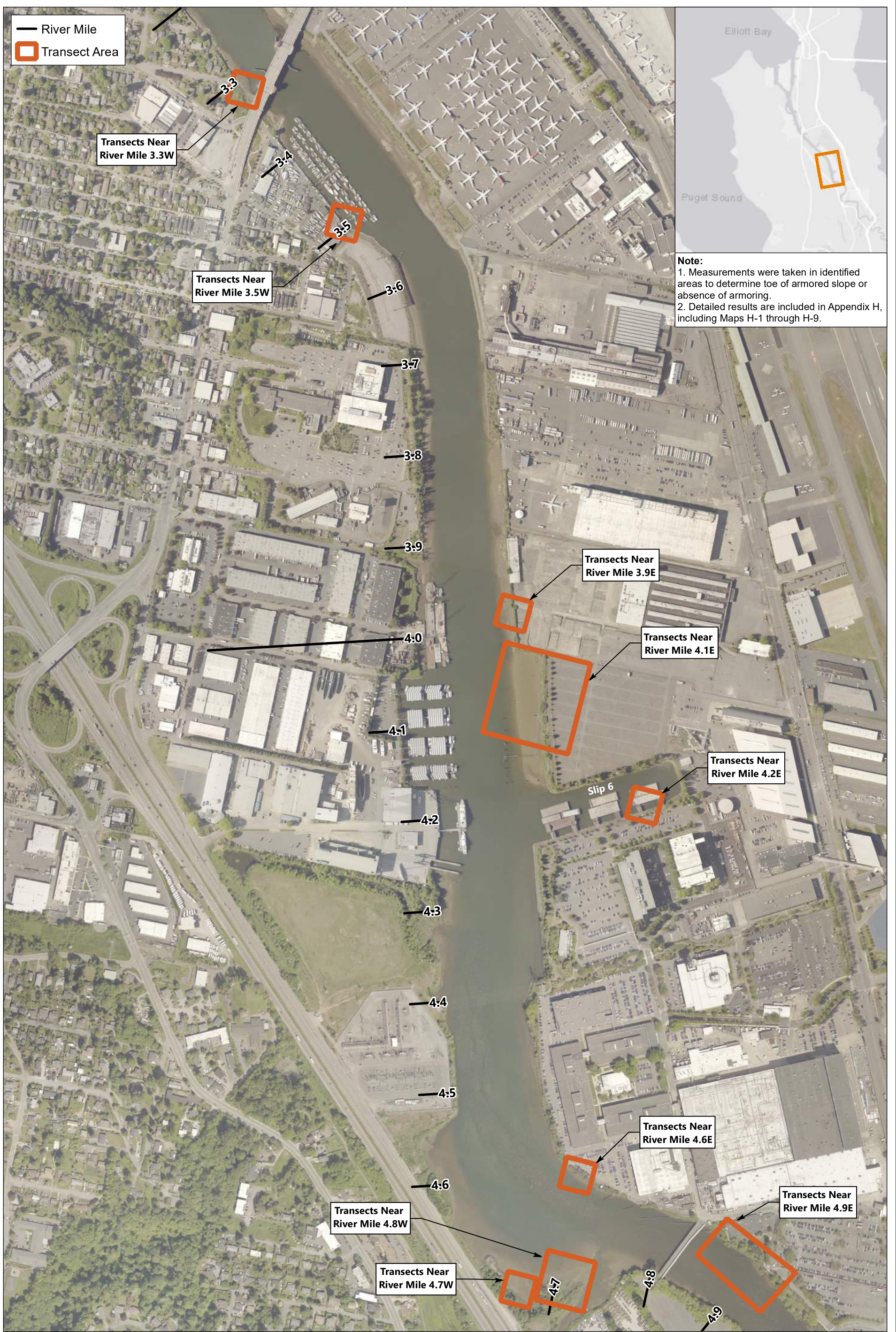
Prepared by: craigh_7/15/22: W:\Projects\Duwamish\AOC4\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 2-9 7266 Topo Survey extents.mxd



- Topographic survey extents
- Early Action Area
- ENR/AC Pilot plot
- LDW approximate Superfund boundary = MHHW
- Federal Navigation Channel
- River mile



EagleView Technologies, Inc.



Note:
 1. Measurements were taken in identified areas to determine toe of armored slope or absence of armoring.
 2. Detailed results are included in Appendix H, including Maps H-1 through H-9.

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