

Chemical trend data in 0-10 cm sediment

Total PCBs Arsenic
 cPAHs BEHP

■ Neither sample detected above SCO or RAL
■ ≥ 50% concentration increase
■ ≥ 50% concentration decrease
■ < 50% change
■ No data

Surface sediment (0-10 cm) sampling location

● Exceeds RAL
○ Does not exceed RAL

Subsurface core location

Subtidal (0-60 cm)

□ Does not exceed RAL

Intertidal (0-45 cm)

◐ Exceeds RAL
◑ Does not exceed RAL

Other sampling locations

∇ Vertical extent core
∇ Vertical Archive
∇ Pre-PDI sample only analyzed for PCBs

▨ Revised to Recovery Category 1 from Recovery Category 2

Recovery Category^a

■ Category 1
■ Category 2
■ Category 3

▲ Dolphin^b
■ ENR/AC Pilot plot
■ LDW Superfund Boundary
■ King County tax parcel
--- Federal Navigation Channel

Difference between 2020 and 2003 bathymetry in feet

■ > -1.5 and < -1 2020 is deeper
■ > -1 and < -0.5
■ > -0.5 and < 0.5
■ > 0.5 and < 1
■ > 1 and < 1.5
■ > 1.5 and < 2
■ > 2 and < 3 2020 is shallower

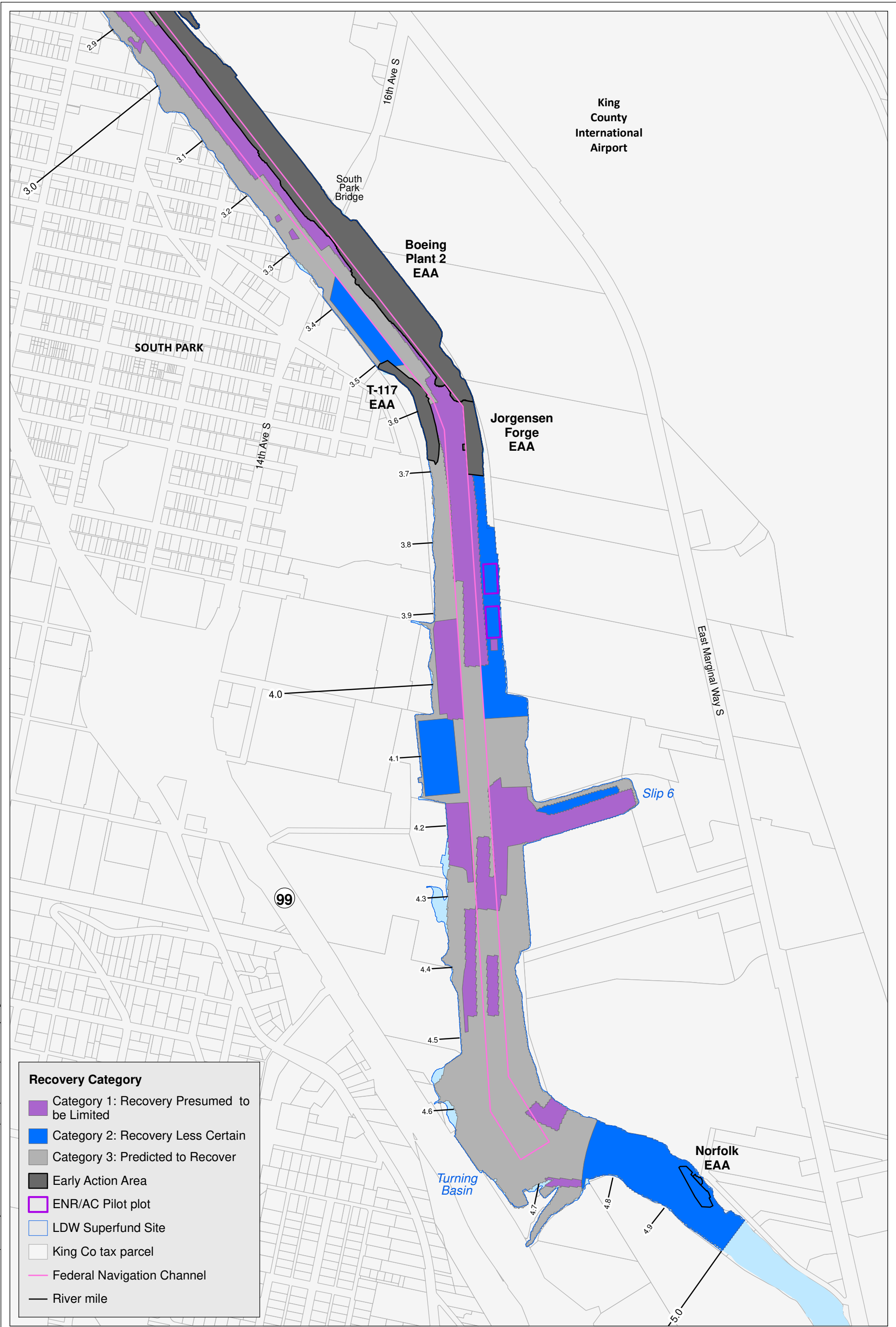
■ Area not covered by either 2020 or 2003 bathymetric survey

Bathymetry (feet MLLW)

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

^a Recovery category areas are based on criteria presented in the LDW ROD (2014).
^b Source: Lower Duwamish Waterway Final Feasibility Study (AECOM 2012)

Prepared by craigh. 7/15/22. W:\Projects\Duwamish\AOC4\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 3-1 7/15/22 Recommended recovery categories - A4.mxd

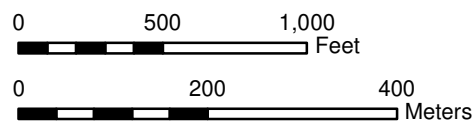


Recovery Category

- Category 1: Recovery Presumed to be Limited
- Category 2: Recovery Less Certain
- Category 3: Predicted to Recover
- Early Action Area
- ENR/AC Pilot plot
- LDW Superfund Site
- King Co tax parcel
- Federal Navigation Channel
- River mile



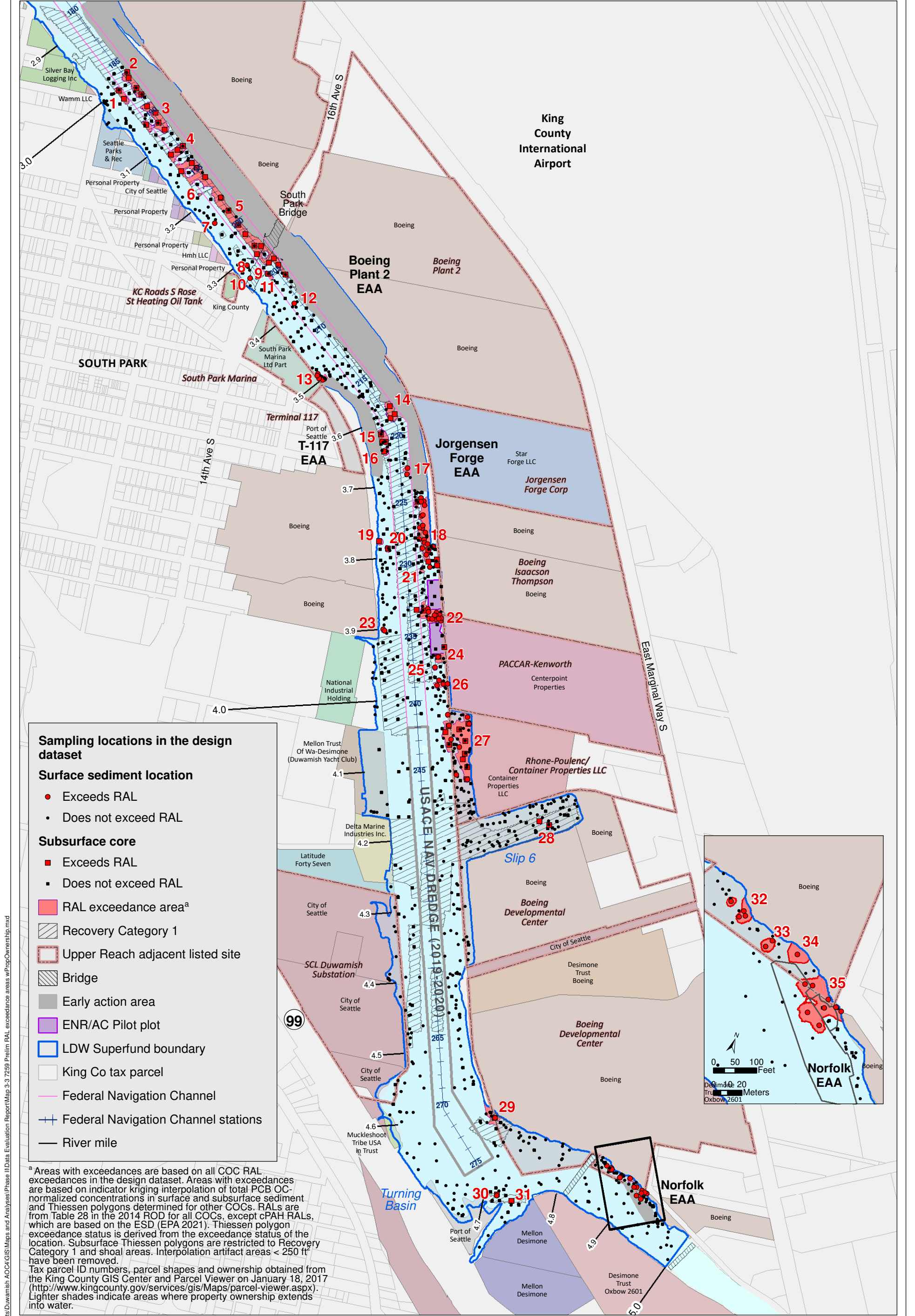
Lower Duwamish Waterway Group
 Port of Seattle / City of Seattle / King County / The Boeing Company



Map 3-2. Final recovery categories for the upper reach

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

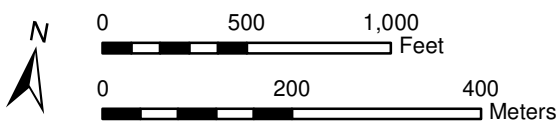
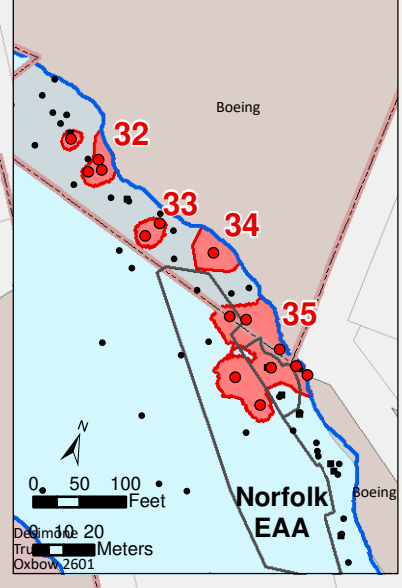
Prepared by craigh_7/15/22: W:\Projects\Duwamish\AOC4\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 3-2 7/15/22 Proposed recovery categories.mxd



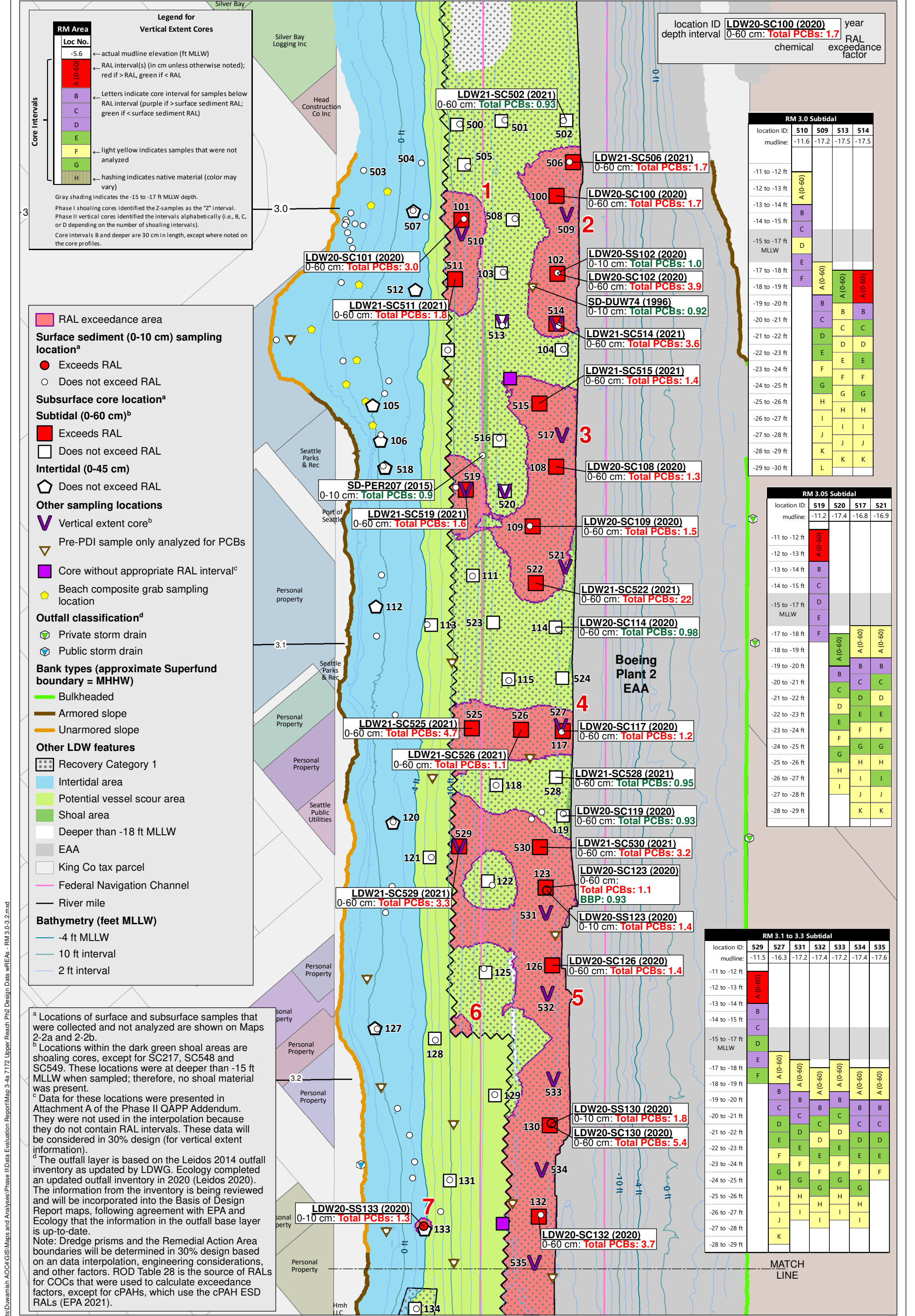
- Sampling locations in the design dataset**
- Surface sediment location**
- Exceeds RAL
 - Does not exceed RAL
- Subsurface core**
- Exceeds RAL
 - Does not exceed RAL
- RAL exceedance area^a
 - ▨ Recovery Category 1
 - ▨ Upper Reach adjacent listed site
 - ▨ Bridge
 - Early action area
 - ENR/AC Pilot plot
 - LDW Superfund boundary
 - King Co tax parcel
 - Federal Navigation Channel
 - Federal Navigation Channel stations
 - River mile

^a Areas with exceedances are based on all COC RAL exceedances in the design dataset. Areas with exceedances are based on indicator kriging interpolation of total PCB OC-normalized concentrations in surface and subsurface sediment and Thiessen polygons determined for other COCs. RALs are from Table 28 in the 2014 ROD for all COCs, except cPAH RALs, which are based on the ESD (EPA 2021). Thiessen polygon exceedance status is derived from the exceedance status of the location. Subsurface Thiessen polygons are restricted to Recovery Category 1 and shoal areas. Interpolation artifact areas < 250 ft have been removed.

Tax parcel ID numbers, parcel shapes and ownership obtained from the King County GIS Center and Parcel Viewer on January 18, 2017 (<http://www.kingcounty.gov/services/gis/Maps/parcel-viewer.aspx>). Lighter shades indicate areas where property ownership extends into water.



Prepared by craigh. 7/15/22. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 3-3 7259 Prelim RAL exceedance areas w/PropOwnership.mxd



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

| 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) | | A (0-60) |
| -18 to -19 ft | | B | B | |
| -19 to -20 ft | | C | C | |
| -20 to -21 ft | | D | D | |
| -21 to -22 ft | | E | E | |
| -22 to -23 ft | | F | F | |
| -23 to -24 ft | | G | G | |
| -24 to -25 ft | | H | H | |
| -25 to -26 ft | | I | I | |
| -26 to -27 ft | | J | J | |
| -27 to -28 ft | | K | K | |
| -28 to -29 ft | | L | L | |

| 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) | A (0-60) | A (0-60) |
| -18 to -19 ft | | B | B | |
| -19 to -20 ft | | C | C | |
| -20 to -21 ft | | D | D | |
| -21 to -22 ft | | E | E | |
| -22 to -23 ft | | F | F | |
| -23 to -24 ft | | G | G | |
| -24 to -25 ft | | H | H | |
| -25 to -26 ft | | I | I | |
| -26 to -27 ft | | J | J | |
| -27 to -28 ft | | K | K | |
| -28 to -29 ft | | | | |

| 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) | A (0-60) | A (0-60) | A (0-60) | A (0-60) | A (0-60) |
| -18 to -19 ft | | B | B | B | B | B | B |
| -19 to -20 ft | | C | C | C | C | C | C |
| -20 to -21 ft | | D | D | D | D | D | D |
| -21 to -22 ft | | E | E | E | E | E | E |
| -22 to -23 ft | | F | F | F | F | F | F |
| -23 to -24 ft | | G | G | G | G | G | G |
| -24 to -25 ft | | H | H | H | H | H | H |
| -25 to -26 ft | | I | I | I | I | I | I |
| -26 to -27 ft | | J | J | J | J | J | J |
| -27 to -28 ft | | K | K | K | K | K | K |
| -28 to -29 ft | | | | | | | |

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.

RAL exceedance area

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

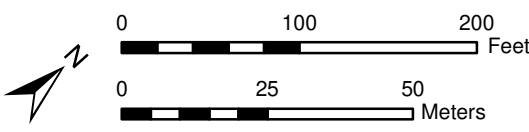
^a Locations of surface and subsurface samples that were collected and not analyzed are shown on Maps 2-2a and 2-2b.

^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.

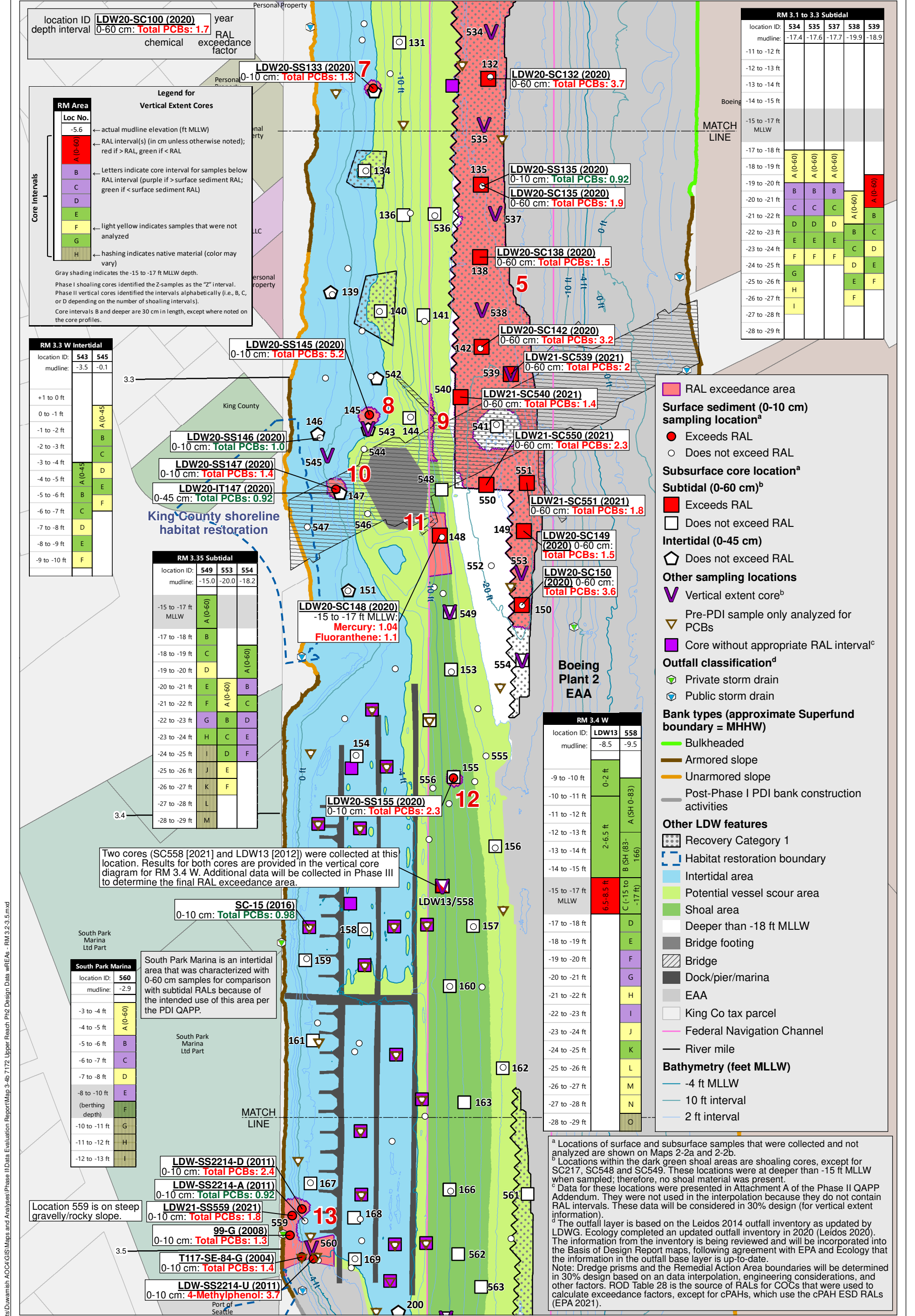
^c Data for these locations were presented in Attachment A of the Phase II QAPP Addendum. They were not used in the interpolation because they do not contain RAL intervals. These data will be considered in 30% design (for vertical extent information).

^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).



Map 3-4a. RAL exceedance areas from RM 3.0 to RM 3.2 with RAL exceedances and vertical extent data in the design dataset



location ID **LDW20-SC100 (2020)** year
 depth interval 0-60 cm: **Total PCBs: 1.7** RAL
 chemical chemical exceedance
 factor 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 (0-45) |
| 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 | | |
| -21 to -22 ft | F | | |
| -22 to -23 ft | G | | |
| -23 to -24 ft | H | | |
| -24 to -25 ft | I | | |
| -25 to -26 ft | J | | |
| -26 to -27 ft | K | | |
| -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 | |
| -12 to -13 ft | | |
| -13 to -14 ft | | |
| -14 to -15 ft | | |
| -15 to -17 ft MLLW | 6.5-9.5 ft | |
| -17 to -18 ft | | |
| -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 3.1 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 | | |
| -20 to -21 ft | C | C | C | | |
| -21 to -22 ft | D | D | D | | |
| -22 to -23 ft | E | E | E | | |
| -23 to -24 ft | F | F | F | | |
| -24 to -25 ft | G | | | | |
| -25 to -26 ft | H | | | | |
| -26 to -27 ft | I | | | | |
| -27 to -28 ft | | | | | |
| -28 to -29 ft | | | | | |

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
 location ID: 560
 mudline: -2.9

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.

South Park Marina Ltd Part

| location ID: | 560 |
|-------------------------------|----------|
| mudline: | -2.9 |
| -3 to -4 ft | A (0-60) |
| -4 to -5 ft | B |
| -5 to -6 ft | C |
| -6 to -7 ft | D |
| -7 to -8 ft | E |
| -8 to -10 ft (berthing depth) | F |
| -10 to -11 ft | G |
| -11 to -12 ft | H |
| -12 to -13 ft | |

Location 559 is on steep gravelly/rocky slope.

LDW-SS2214-D (2011)
 0-10 cm: **Total PCBs: 2.4**

LDW-SS2214-A (2011)
 0-10 cm: **Total PCBs: 0.92**

LDW21-SS559 (2021)
 0-10 cm: **Total PCBs: 1.8**

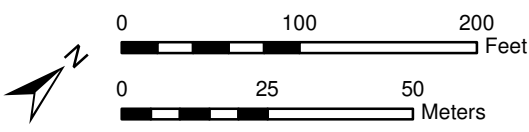
99-G (2008)
 0-10 cm: **Total PCBs: 1.3**

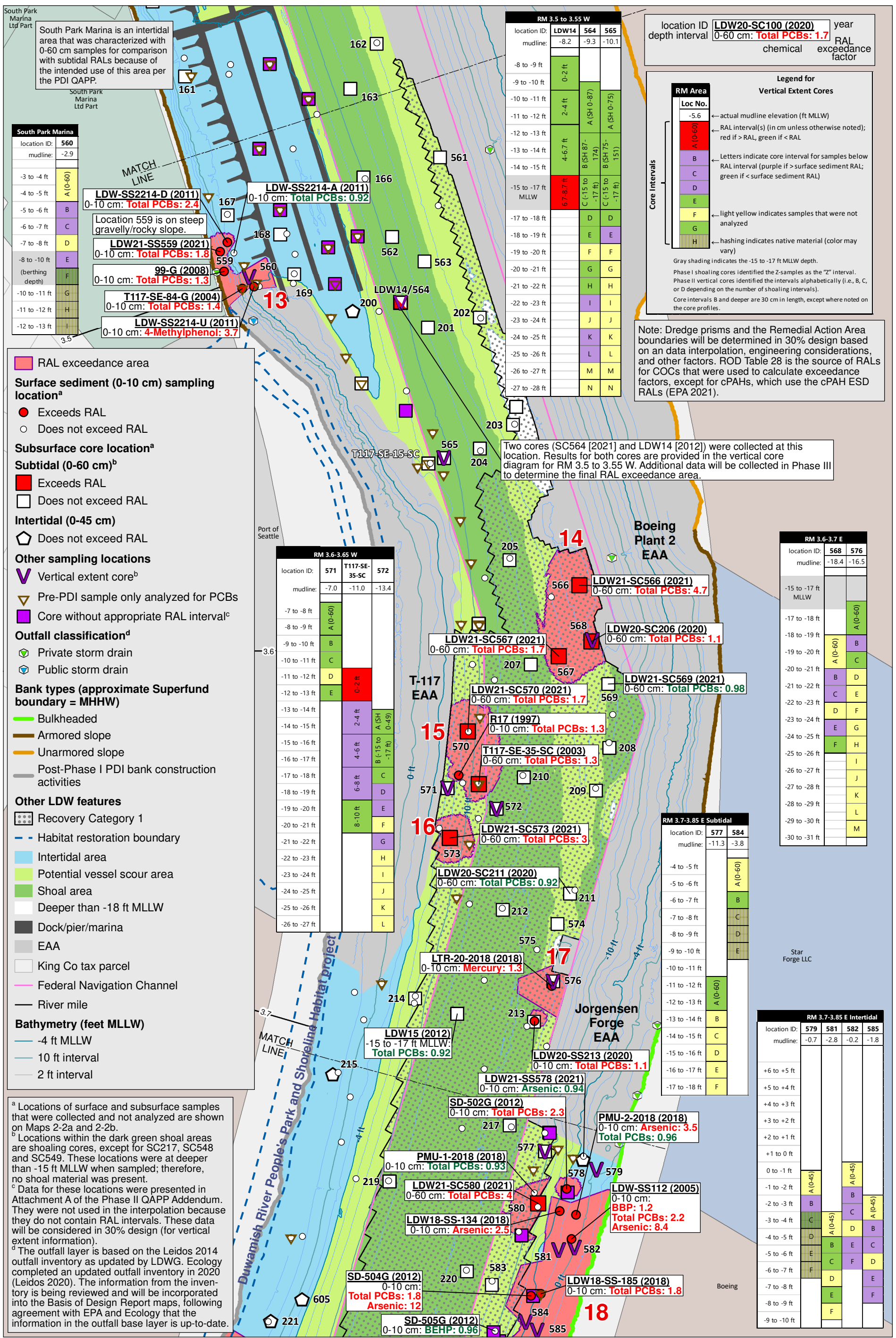
T117-SE-84-G (2004)
 0-10 cm: **Total PCBs: 1.4**

LDW-SS2214-U (2011)
 0-10 cm: **4-Methylphenol: 3.7**

- RAL exceedance area**
- 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)**
 - ◊ 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

^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).





South Park Marina Ltd Part

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 ID: | 560 |
|-------------------------------|----------|
| mudline: | -2.9 |
| -3 to -4 ft | A (0-60) |
| -4 to -5 ft | B |
| -5 to -6 ft | C |
| -6 to -7 ft | D |
| -7 to -8 ft | E |
| -8 to -10 ft (berthing depth) | F |
| -10 to -11 ft | G |
| -11 to -12 ft | H |
| -12 to -13 ft | I |

| location ID: | 561 | 562 | 563 | 564 | 565 |
|--------------------|------------|-------------------|-------------------|-----|-----|
| mudline: | -8.2 | -9.3 | -10.1 | | |
| -8 to -9 ft | 0-2 ft | | | | |
| -9 to -10 ft | 0-2 ft | | | | |
| -10 to -11 ft | 2-4 ft | A (SH 0-87) | A (SH 0-75) | | |
| -11 to -12 ft | | | | | |
| -12 to -13 ft | 4-6.7 ft | B (SH 87-174) | B (SH 75-151) | | |
| -13 to -14 ft | | | | | |
| -14 to -15 ft | 6.7-8.7 ft | C (-15 to -17 ft) | C (-15 to -17 ft) | | |
| -15 to -17 ft MLLW | | | | | |
| -17 to -18 ft | | D | D | | |
| -18 to -19 ft | | E | E | | |
| -19 to -20 ft | | F | F | | |
| -20 to -21 ft | | G | G | | |
| -21 to -22 ft | | H | H | | |
| -22 to -23 ft | | I | I | | |
| -23 to -24 ft | | J | J | | |
| -24 to -25 ft | | K | K | | |
| -25 to -26 ft | | L | L | | |
| -26 to -27 ft | | M | M | | |
| -27 to -28 ft | | N | N | | |

| location ID: | 568 | 576 |
|--------------------|----------|----------|
| mudline: | -18.4 | -16.5 |
| -15 to -17 ft MLLW | | A (0-60) |
| -17 to -18 ft | | A (0-60) |
| -18 to -19 ft | | B |
| -19 to -20 ft | A (0-60) | C |
| -20 to -21 ft | | D |
| -21 to -22 ft | | E |
| -22 to -23 ft | | F |
| -23 to -24 ft | | G |
| -24 to -25 ft | | H |
| -25 to -26 ft | | I |
| -26 to -27 ft | | J |
| -27 to -28 ft | | K |
| -28 to -29 ft | | L |
| -29 to -30 ft | | M |

| location ID: | 577 | 584 |
|---------------|-------|----------|
| mudline: | -11.3 | -3.8 |
| -4 to -5 ft | | A (0-60) |
| -5 to -6 ft | | B |
| -6 to -7 ft | | C |
| -7 to -8 ft | | D |
| -8 to -9 ft | | E |
| -9 to -10 ft | | F |
| -10 to -11 ft | | A (0-60) |
| -11 to -12 ft | | A (0-60) |
| -12 to -13 ft | | B |
| -13 to -14 ft | | C |
| -14 to -15 ft | | D |
| -15 to -16 ft | | E |
| -16 to -17 ft | | F |
| -17 to -18 ft | | F |

| location ID: | 571 | T117-SE-35-SC | 572 |
|---------------|----------|---------------|------------------------|
| mudline: | -7.0 | -11.0 | -13.4 |
| -7 to -8 ft | | | |
| -8 to -9 ft | A (0-60) | | |
| -9 to -10 ft | B | | |
| -10 to -11 ft | C | | |
| -11 to -12 ft | D | | |
| -12 to -13 ft | E | | |
| -13 to -14 ft | | 2-4 ft | A (SH 0-49) |
| -14 to -15 ft | | 4-6 ft | B (-15 to A SH -17 ft) |
| -15 to -16 ft | | 6-8 ft | C |
| -16 to -17 ft | | 8-10 ft | D |
| -17 to -18 ft | | | E |
| -18 to -19 ft | | | F |
| -19 to -20 ft | | | G |
| -20 to -21 ft | | | H |
| -21 to -22 ft | | | I |
| -22 to -23 ft | | | J |
| -23 to -24 ft | | | K |
| -24 to -25 ft | | | L |
| -25 to -26 ft | | | |
| -26 to -27 ft | | | |

| location ID: | 579 | 581 | 582 | 585 |
|--------------|----------|------|----------|------|
| mudline: | -0.7 | +2.8 | -0.2 | -1.8 |
| +6 to +5 ft | | | | |
| +5 to +4 ft | | | | |
| +4 to +3 ft | | | | |
| +3 to +2 ft | | | | |
| +2 to +1 ft | | | | |
| 0 to -1 ft | | | | |
| -1 to -2 ft | A (0-45) | | A (0-45) | |
| -2 to -3 ft | B | | B | |
| -3 to -4 ft | C | | C | |
| -4 to -5 ft | D | | D | |
| -5 to -6 ft | E | | E | |
| -6 to -7 ft | F | | F | |
| -7 to -8 ft | G | | G | |
| -8 to -9 ft | H | | H | |
| -9 to -10 ft | I | | I | |

| location ID: | 579 | 581 | 582 | 585 |
|--------------|----------|------|----------|------|
| mudline: | -0.7 | +2.8 | -0.2 | -1.8 |
| +6 to +5 ft | | | | |
| +5 to +4 ft | | | | |
| +4 to +3 ft | | | | |
| +3 to +2 ft | | | | |
| +2 to +1 ft | | | | |
| 0 to -1 ft | | | | |
| -1 to -2 ft | A (0-45) | | A (0-45) | |
| -2 to -3 ft | B | | B | |
| -3 to -4 ft | C | | C | |
| -4 to -5 ft | D | | D | |
| -5 to -6 ft | E | | E | |
| -6 to -7 ft | F | | F | |
| -7 to -8 ft | G | | G | |
| -8 to -9 ft | H | | H | |
| -9 to -10 ft | I | | I | |

| location ID: | 579 | 581 | 582 | 585 |
|--------------|----------|------|----------|------|
| mudline: | -0.7 | +2.8 | -0.2 | -1.8 |
| +6 to +5 ft | | | | |
| +5 to +4 ft | | | | |
| +4 to +3 ft | | | | |
| +3 to +2 ft | | | | |
| +2 to +1 ft | | | | |
| 0 to -1 ft | | | | |
| -1 to -2 ft | A (0-45) | | A (0-45) | |
| -2 to -3 ft | B | | B | |
| -3 to -4 ft | C | | C | |
| -4 to -5 ft | D | | D | |
| -5 to -6 ft | E | | E | |
| -6 to -7 ft | F | | F | |
| -7 to -8 ft | G | | G | |
| -8 to -9 ft | H | | H | |
| -9 to -10 ft | I | | I | |

| location ID: | 571 | T117-SE-35-SC | 572 |
|---------------|----------|---------------|------------------------|
| mudline: | -7.0 | -11.0 | -13.4 |
| -7 to -8 ft | | | |
| -8 to -9 ft | A (0-60) | | |
| -9 to -10 ft | B | | |
| -10 to -11 ft | C | | |
| -11 to -12 ft | D | | |
| -12 to -13 ft | E | | |
| -13 to -14 ft | | 2-4 ft | A (SH 0-49) |
| -14 to -15 ft | | 4-6 ft | B (-15 to A SH -17 ft) |
| -15 to -16 ft | | 6-8 ft | C |
| -16 to -17 ft | | 8-10 ft | D |
| -17 to -18 ft | | | E |
| -18 to -19 ft | | | F |
| -19 to -20 ft | | | G |
| -20 to -21 ft | | | H |
| -21 to -22 ft | | | I |
| -22 to -23 ft | | | J |
| -23 to -24 ft | | | K |
| -24 to -25 ft | | | L |
| -25 to -26 ft | | | |
| -26 to -27 ft | | | |

| location ID: | 577 | 584 |
|---------------|-------|----------|
| mudline: | -11.3 | -3.8 |
| -4 to -5 ft | | A (0-60) |
| -5 to -6 ft | | B |
| -6 to -7 ft | | C |
| -7 to -8 ft | | D |
| -8 to -9 ft | | E |
| -9 to -10 ft | | F |
| -10 to -11 ft | | A (0-60) |
| -11 to -12 ft | | A (0-60) |
| -12 to -13 ft | | B |
| -13 to -14 ft | | C |
| -14 to -15 ft | | D |
| -15 to -16 ft | | E |
| -16 to -17 ft | | F |
| -17 to -18 ft | | F |

| location ID: | 579 | 581 | 582 | 585 |
|--------------|----------|------|----------|------|
| mudline: | -0.7 | +2.8 | -0.2 | -1.8 |
| +6 to +5 ft | | | | |
| +5 to +4 ft | | | | |
| +4 to +3 ft | | | | |
| +3 to +2 ft | | | | |
| +2 to +1 ft | | | | |
| 0 to -1 ft | | | | |
| -1 to -2 ft | A (0-45) | | A (0-45) | |
| -2 to -3 ft | B | | B | |
| -3 to -4 ft | C | | C | |
| -4 to -5 ft | D | | D | |
| -5 to -6 ft | E | | E | |
| -6 to -7 ft | F | | F | |
| -7 to -8 ft | G | | G | |
| -8 to -9 ft | H | | H | |
| -9 to -10 ft | I | | I | |

| location ID: | 579 | 581 | 582 | 585 |
|--------------|----------|------|----------|------|
| mudline: | -0.7 | +2.8 | -0.2 | -1.8 |
| +6 to +5 ft | | | | |
| +5 to +4 ft | | | | |
| +4 to +3 ft | | | | |
| +3 to +2 ft | | | | |
| +2 to +1 ft | | | | |
| 0 to -1 ft | | | | |
| -1 to -2 ft | A (0-45) | | A (0-45) | |
| -2 to -3 ft | B | | B | |
| -3 to -4 ft | C | | C | |
| -4 to -5 ft | D | | D | |
| -5 to -6 ft | E | | E | |
| -6 to -7 ft | F | | F | |
| -7 to -8 ft | G | | G | |
| -8 to -9 ft | H | | H | |
| -9 to -10 ft | I | | I | |

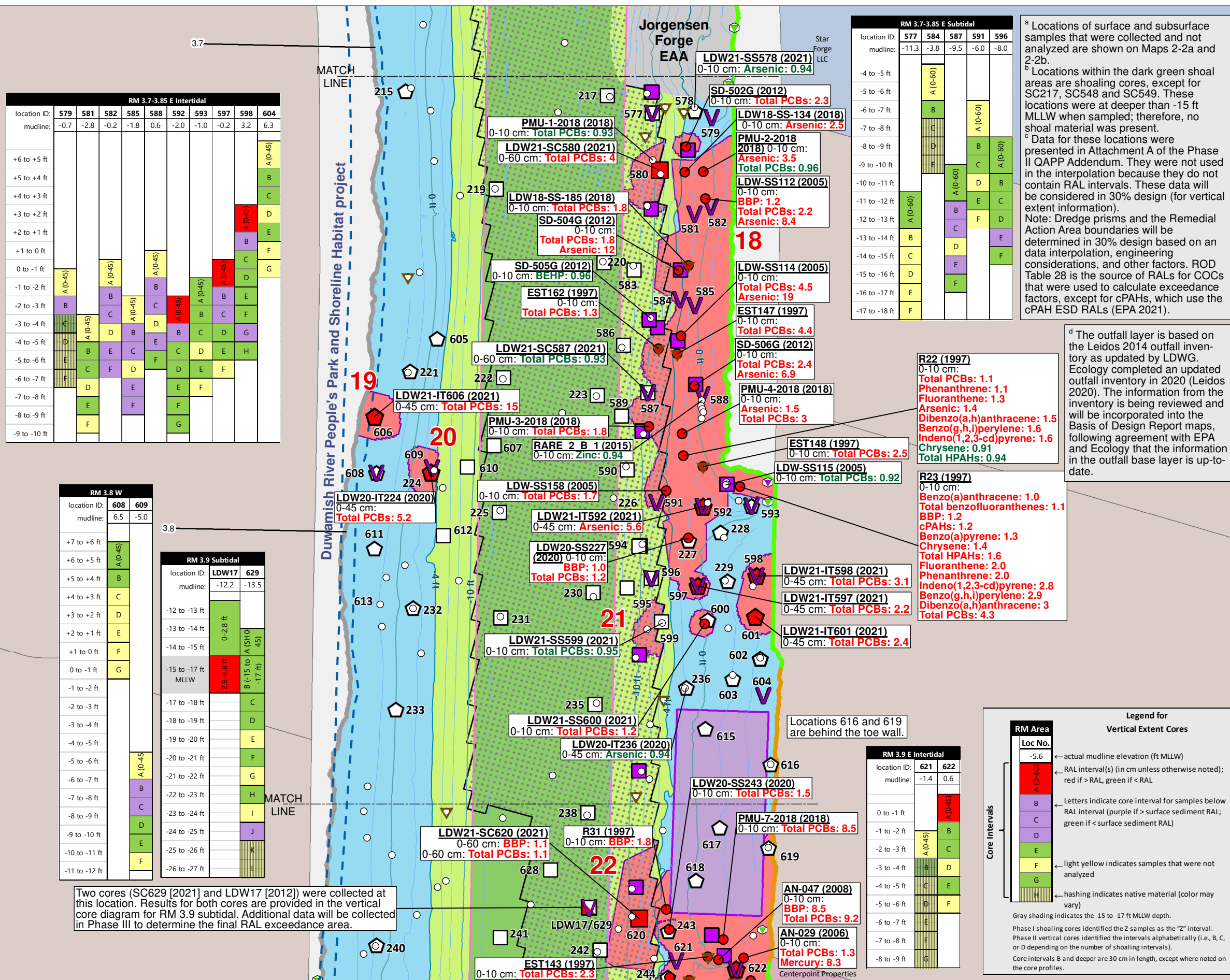
| location ID: | 571 | T117-SE-35-SC | 572 |
|---------------|----------|---------------|------------------------|
| mudline: | -7.0 | -11.0 | -13.4 |
| -7 to -8 ft | | | |
| -8 to -9 ft | A (0-60) | | |
| -9 to -10 ft | B | | |
| -10 to -11 ft | C | | |
| -11 to -12 ft | D | | |
| -12 to -13 ft | E | | |
| -13 to -14 ft | | 2-4 ft | A (SH 0-49) |
| -14 to -15 ft | | 4-6 ft | B (-15 to A SH -17 ft) |
| -15 to -16 ft | | 6-8 ft | C |
| -16 to -17 ft | | 8-10 ft | D |
| -17 to -18 ft | | | E |
| -18 to -19 ft | | | F |
| -19 to -20 ft | | | G |
| -20 to -21 ft | | | H |
| -21 to -22 ft | | | I |
| -22 to -23 ft | | | J |
| -23 to -24 ft | | | K |
| -24 to -25 ft | | | L |
| -25 to -26 ft | | | |
| -26 to -27 ft | | | |

| location ID: | 577 | 584 |
|---------------|-------|----------|
| mudline: | -11.3 | -3.8 |
| -4 to -5 ft | | A (0-60) |
| -5 to -6 ft | | B |
| -6 to -7 ft | | C |
| -7 to -8 ft | | D |
| -8 to -9 ft | | E |
| -9 to -10 ft | | F |
| -10 to -11 ft | | A (0-60) |
| -11 to -12 ft | | A (0-60) |
| -12 to -13 ft | | B |
| -13 to -14 ft | | C |
| -14 to -15 ft | | D |
| -15 to -16 ft | | E |
| -16 to -17 ft | | F |
| -17 to -18 ft | | F |

| location ID: | 579 | 581 | 582 | 585 |
|--------------|----------|------|----------|------|
| mudline: | -0.7 | +2.8 | -0.2 | -1.8 |
| +6 to +5 ft | | | | |
| +5 to +4 ft | | | | |
| +4 to +3 ft | | | | |
| +3 to +2 ft | | | | |
| +2 to +1 ft | | | | |
| 0 to -1 ft | | | | |
| -1 to -2 ft | A (0-45) | | A (0-45) | |
| -2 to -3 ft | B | | B | |
| -3 to -4 ft | C | | C | |
| -4 to -5 ft | D | | D | |
| -5 to -6 ft | E | | E | |
| -6 to -7 ft | F | | F | |
| -7 to -8 ft | G | | G | |
| -8 to -9 ft | H | | H | |
| -9 to -10 ft | I | | I | |

| location ID: | 579 | 581 | 582 | 585 |
|--------------|----------|------|----------|------|
| mudline: | -0.7 | +2.8 | -0.2 | -1.8 |
| +6 to +5 ft | | | | |
| +5 to +4 ft | | | | |
| +4 to +3 ft | | | | |
| +3 to +2 ft | | | | |
| +2 to +1 ft | | | | |
| 0 to -1 ft | | | | |
| -1 to -2 ft | A (0-45) | | A (0-45) | |
| -2 to -3 ft | B | | B | |
| -3 to -4 ft | C | | C | |
| -4 to -5 ft | D | | D | |
| -5 to -6 ft | E | | E | |
| -6 to -7 ft | F | | F | |
| -7 to -8 ft | G | | G | |
| -8 to -9 ft | H | | H | |
| -9 to -10 ft | I | | I | |

| location ID: | 571 | T117-SE-35-SC | 572 |
|---------------|----------|---------------|------------------------|
| mudline: | -7.0 | -11.0 | -13.4 |
| -7 to -8 ft | | | |
| -8 to -9 ft | A (0-60) | | |
| -9 to -10 ft | B | | |
| -10 to -11 ft | C | | |
| -11 to -12 ft | D | | |
| -12 to -13 ft | E | | |
| -13 to -14 ft | | 2-4 ft | A (SH 0-49) |
| -14 to -15 ft | | 4-6 ft | B (-15 to A SH -17 ft) |
| -15 to -16 ft | | 6-8 ft | C |
| -16 | | | |



| RM 3.7-3.85 E Intertidal | | | | | | | | | | |
|--------------------------|----------|------|------|------|-----|------|------|------|-----|----------|
| location ID: | 579 | 581 | 582 | 585 | 588 | 592 | 593 | 597 | 598 | 604 |
| mudline: | -0.7 | -2.8 | -0.2 | -1.8 | 0.6 | -2.0 | -1.0 | -0.2 | 3.2 | 6.3 |
| +6 to +5 ft | | | | | | | | | | A (0-45) |
| +5 to +4 ft | | | | | | | | | | B |
| +4 to +3 ft | | | | | | | | | | C |
| +3 to +2 ft | | | | | | | | | | D |
| +2 to +1 ft | | | | | | | | | | E |
| +1 to 0 ft | | | | | | | | | | F |
| 0 to -1 ft | | | | | | | | | | G |
| -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 | | | | | | | | | | |
| -9 to -10 ft | | | | | | | | | | |

| RM 3.7-3.85 E Subtidal | | | | | |
|------------------------|----------|------|------|------|------|
| location ID: | 577 | 584 | 587 | 591 | 596 |
| mudline: | -11.3 | -3.8 | -9.5 | -6.0 | -8.0 |
| -4 to -5 ft | | | | | |
| -5 to -6 ft | A (0-60) | | | | |
| -6 to -7 ft | B | | | | |
| -7 to -8 ft | C | | | | |
| -8 to -9 ft | D | | | | |
| -9 to -10 ft | E | | | | |
| -10 to -11 ft | | | | | |
| -11 to -12 ft | A (0-60) | | | | |
| -12 to -13 ft | B | | | | |
| -13 to -14 ft | C | | | | |
| -14 to -15 ft | D | | | | |
| -15 to -16 ft | E | | | | |
| -16 to -17 ft | F | | | | |
| -17 to -18 ft | F | | | | |

^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).

RAL exceedance area

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

- Exceeds RAL
- Does not exceed RAL

Subsurface core location

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

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

| RM 3.8 W | | |
|---------------|----------|------|
| location ID: | 608 | 609 |
| mudline: | 6.5 | -5.0 |
| +7 to +6 ft | | |
| +6 to +5 ft | A (0-45) | |
| +5 to +4 ft | B | |
| +4 to +3 ft | C | |
| +3 to +2 ft | D | |
| +2 to +1 ft | E | |
| +1 to 0 ft | F | |
| 0 to -1 ft | G | |
| -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 | | |

| RM 3.9 Subtidal | | |
|--------------------|------------|----------------------------|
| location ID: | LDW17 | 629 |
| mudline: | -12.2 | -13.5 |
| -12 to -13 ft | | |
| -13 to -14 ft | | |
| -14 to -15 ft | | |
| -15 to -17 ft MLLW | | |
| -17 to -18 ft | 2.8-4.8 ft | B (-15 to A (SH 0 -17 ft)) |
| -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 | | |

| RM 3.9 E Intertidal | | |
|---------------------|------|-----|
| location ID: | 621 | 622 |
| mudline: | -1.4 | 0.6 |
| 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 | | |

Legend for Vertical Extent Cores

RM Area

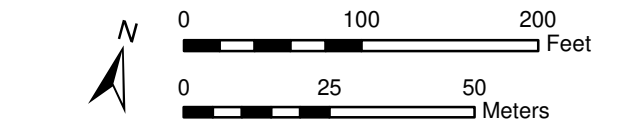
Loc No.

- ← 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.



Map 3-4d. RAL exceedance areas from RM 3.7 to RM 3.85 with RAL exceedances and vertical extent data in the design dataset

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

Windward environmental LLC

ANCHOR QEA

Lower Duwamish Waterway Group

Port of Seattle / City of Seattle / King County / The Boeing Company

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.

Locations 616 and 619 are behind the toe wall.

AN-047 (2008)
0-10 cm: BBP: 8.5
Total PCBs: 9.2

AN-029 (2006)
0-10 cm: Total PCBs: 1.3
Mercury: 8.3

LDW21-SC620 (2021)
0-60 cm: BBP: 1.1
0-60 cm: Total PCBs: 1.1

LDW21-SS600 (2021)
0-10 cm: Total PCBs: 1.2

LDW21-SS599 (2021)
0-10 cm: Total PCBs: 0.95

LDW21-IT592 (2021)
0-45 cm: Arsenic: 5.6

LDW21-SC587 (2021)
0-60 cm: Total PCBs: 0.93

EST162 (1997)
0-10 cm: Total PCBs: 1.3

LDW18-SS-185 (2018)
0-10 cm: Total PCBs: 1.8

LDW21-SS578 (2021)
0-10 cm: Arsenic: 0.94

LDW21-SS578 (2021)
0-10 cm: Arsenic: 0.94

LDW21-SC580 (2021)
0-60 cm: Total PCBs: 4

LDW18-SS-134 (2018)
0-10 cm: Arsenic: 2.5

LDW-SS112 (2005)
0-10 cm: BBP: 1.2
Total PCBs: 2.2
Arsenic: 8.4

LDW-SS114 (2005)
0-10 cm: Total PCBs: 4.5
Arsenic: 19

SD-506G (2012)
0-10 cm: Total PCBs: 2.4
Arsenic: 6.9

PMU-4-2018 (2018)
0-10 cm: Arsenic: 1.5
Total PCBs: 3

EST147 (1997)
0-10 cm: Total PCBs: 4.4

EST148 (1997)
0-10 cm: Total PCBs: 2.5

LDW-SS115 (2005)
0-10 cm: Total PCBs: 0.92

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT601 (2021)
0-45 cm: Total PCBs: 2.4

LDW21-IT599 (2021)
0-45 cm: Total PCBs: 2.2

LDW21-IT598 (2021)
0-45 cm: Total PCBs: 3.1

LDW21-IT597 (2021)
0-45 cm: Total PCBs: 2.2

^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).

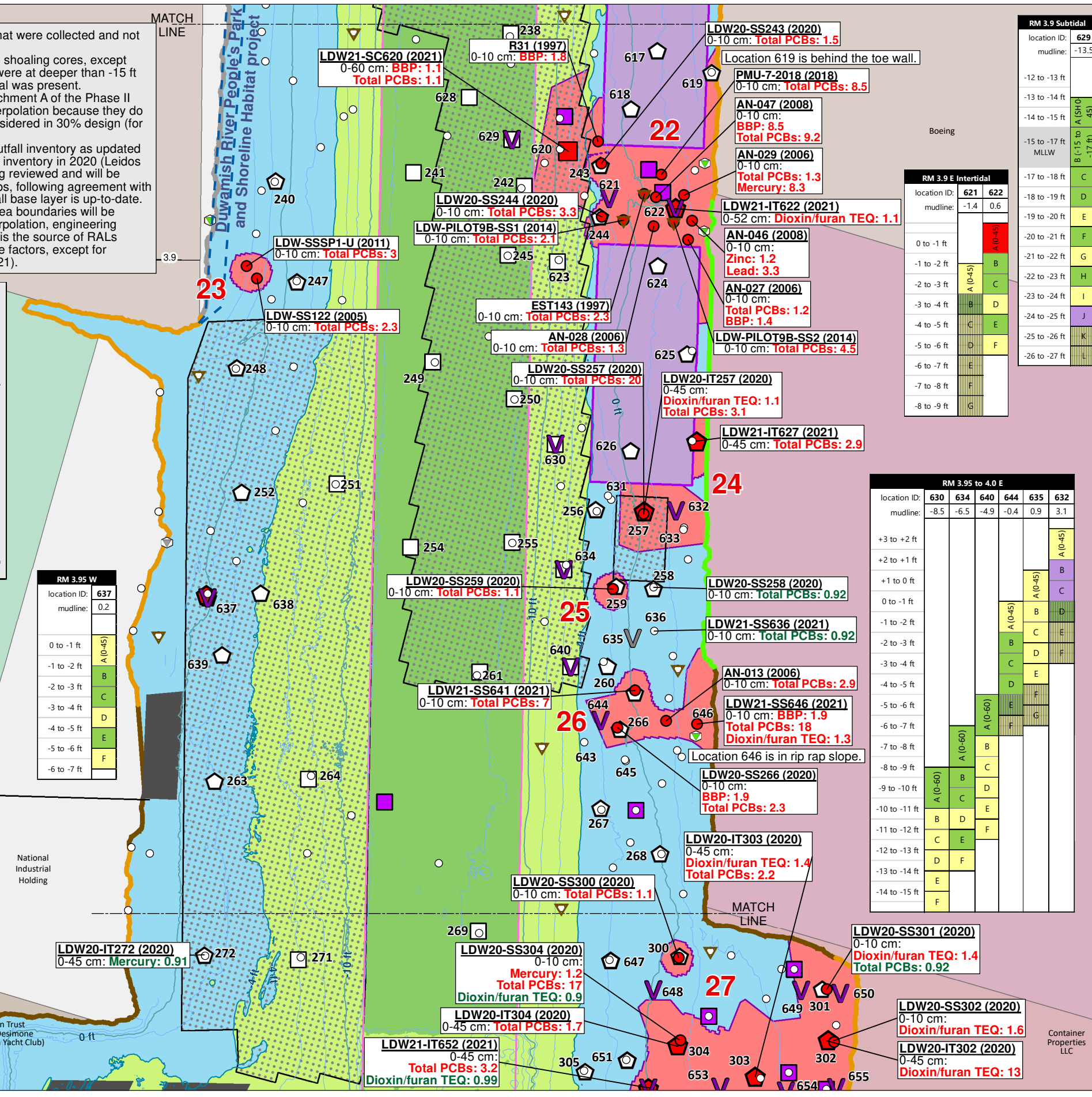
Legend for Vertical Extent Cores

| RM Area | Loc No. | Actual mudline elevation (ft MLLW) |
|----------|---------|---|
| -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 | | | | | | | |
| +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 | | | | | | | |
| -2 to -3 ft | | | | | | | |
| -3 to -4 ft | | | | | | | |
| -4 to -5 ft | | | | | | | |
| -5 to -6 ft | | | | | | | |
| -6 to -7 ft | | | | | | | |
| -7 to -8 ft | | | | | | | |

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



RM 3.9 Subtidal

| location ID: | 629 |
|--------------------|-------|
| mudline: | -13.5 |
| -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 | |
| -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 | |

RM 3.9 E Intertidal

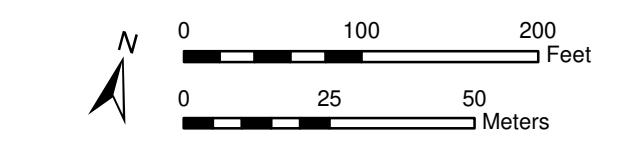
| location ID: | 621 | 622 |
|--------------|------|-----|
| mudline: | -1.4 | 0.6 |
| 0 to -1 ft | | |
| -1 to -2 ft | | |
| -2 to -3 ft | | |
| -3 to -4 ft | | |
| -4 to -5 ft | | |
| -5 to -6 ft | | |
| -6 to -7 ft | | |
| -7 to -8 ft | | |
| -8 to -9 ft | | |

RM 3.95 to 4.0 E

| 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 | | | | | | |

Legend

- RAL exceedance area
- 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
 - ∇ 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 =)
 - Bulkheaded
 - Armored slope
 - Unarmored slope
 - Post-Phase I PDI bank construction
- 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

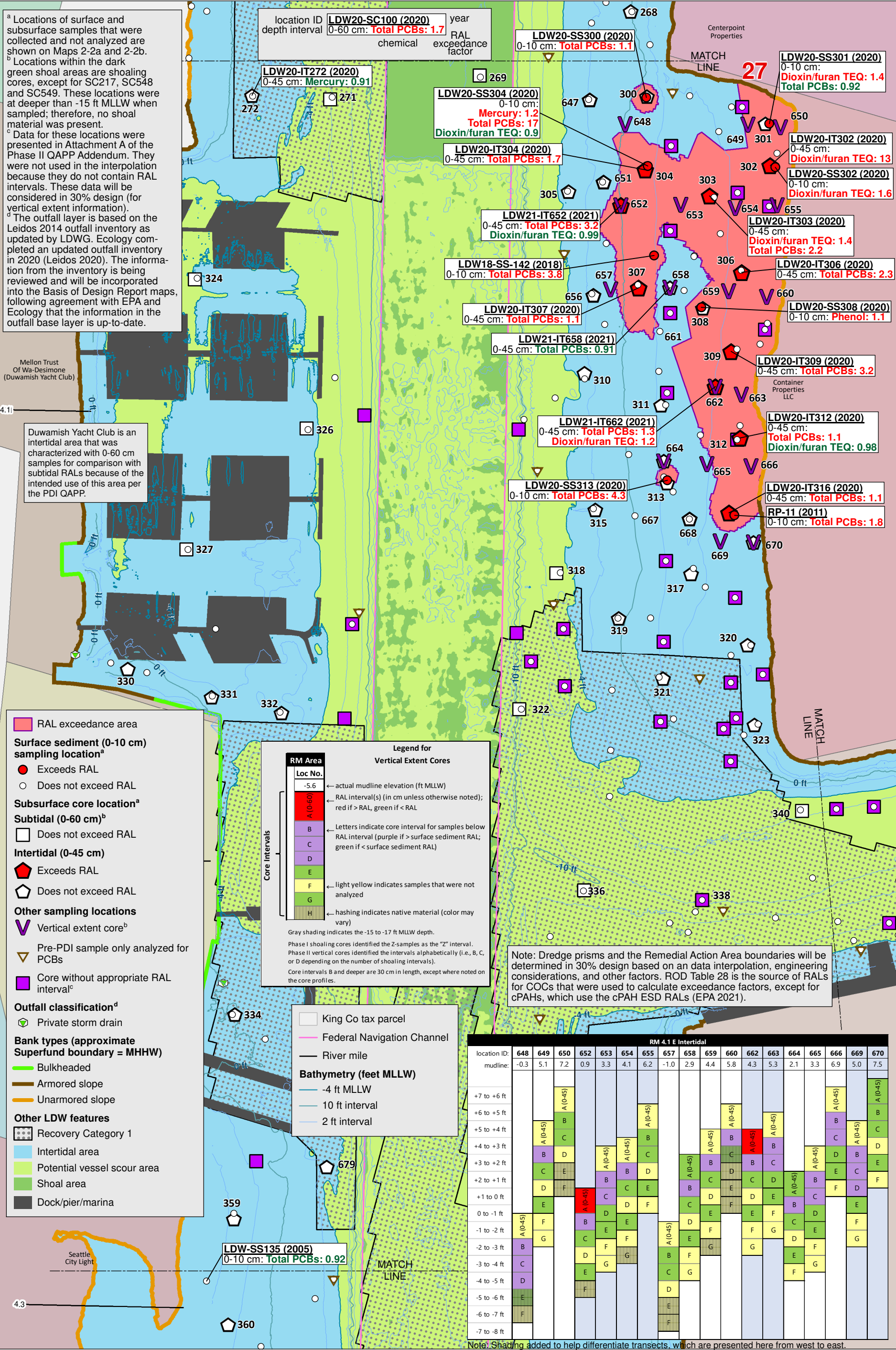


Map 3-4e. RAL exceedance areas from RM 3.85 to RM 4.05 with RAL exceedances and vertical extent data in the design dataset

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



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



^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.

- RAL exceedance area
- Surface sediment (0-10 cm) sampling location^a**
 - Exceeds RAL
 - Does not exceed RAL
- Subsurface core location^a**
 - 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 surface 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

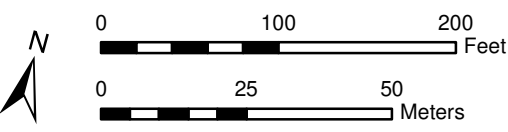
| RM Area | Loc No. | Notes |
|----------|---------|---|
| -5.6 | | actual mudline elevation (ft MLLW) |
| A (0-60) | | RAL interval(s) (in cm unless otherwise noted); red if > RAL, green if < RAL |
| B | | Letters indicate core interval for samples below RAL interval (purple if > surface sediment RAL; 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.

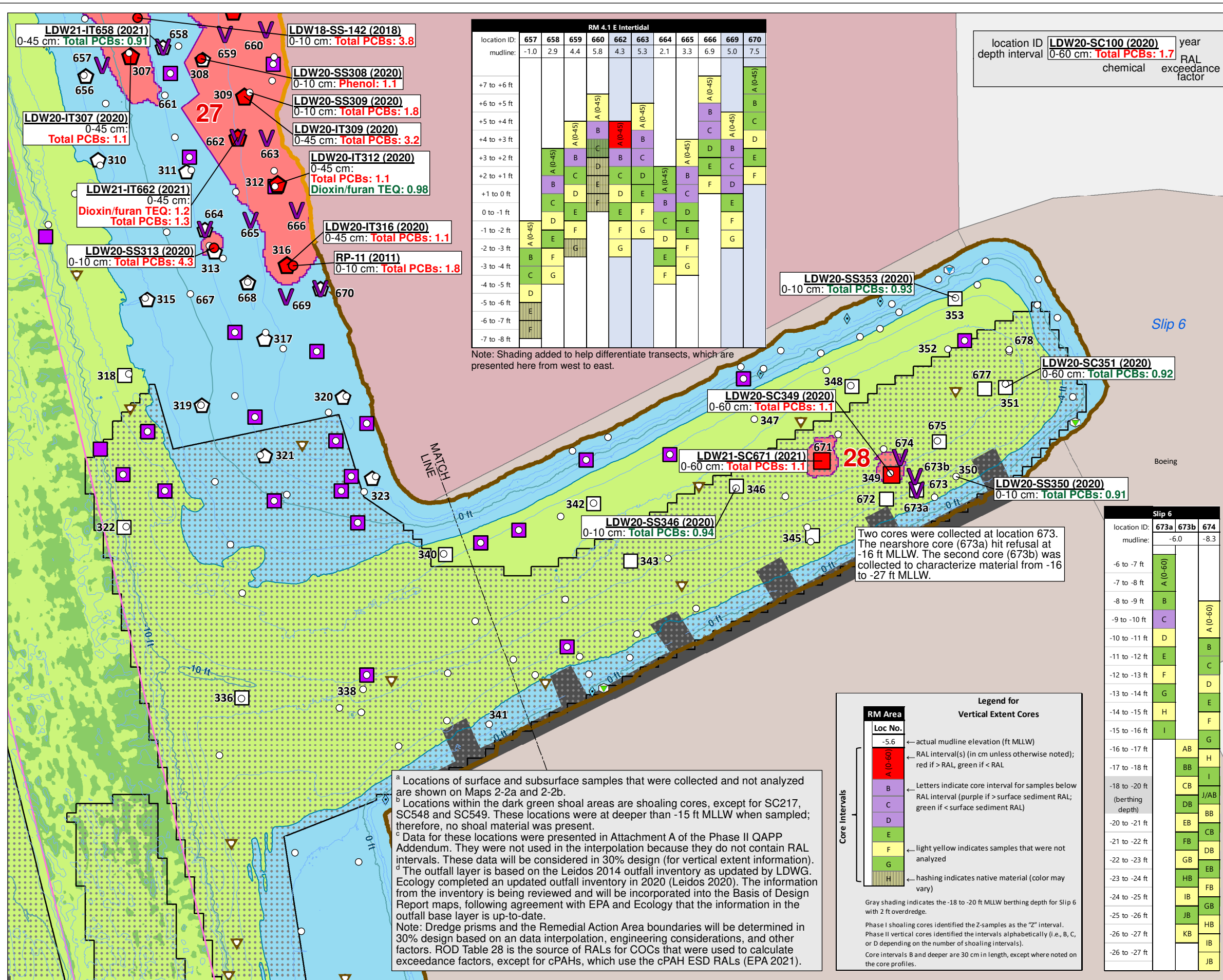
RM 4.1 E Intertidal

| location ID: | 648 | 649 | 650 | 652 | 653 | 654 | 655 | 657 | 658 | 659 | 660 | 662 | 663 | 664 | 665 | 666 | 669 | 670 |
|--------------|------|-----|----------|-----|-----|-----|----------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| mudline: | -0.3 | 5.1 | 7.2 | 0.9 | 3.3 | 4.1 | 6.2 | -1.0 | 2.9 | 4.4 | 5.8 | 4.3 | 5.3 | 2.1 | 3.3 | 6.9 | 5.0 | 7.5 |
| +7 to +6 ft | | | A (0-45) | | | | | | | | | | | | | | | |
| +6 to +5 ft | | | A (0-45) | B | | | A (0-45) | | | | | | | | | | | |
| +5 to +4 ft | | | A (0-45) | C | | | A (0-45) | | | | | | | | | | | |
| +4 to +3 ft | | | B | D | | | A (0-45) | | | | | | | | | | | |
| +3 to +2 ft | | | C | | B | | A (0-45) | | | | | | | | | | | |
| +2 to +1 ft | | | D | | C | | A (0-45) | | | | | | | | | | | |
| 0 to -1 ft | | | E | | D | | A (0-45) | | | | | | | | | | | |
| -1 to -2 ft | | | F | | E | | A (0-45) | | | | | | | | | | | |
| -2 to -3 ft | | | G | | F | | A (0-45) | | | | | | | | | | | |
| -3 to -4 ft | | | | | G | | | | | | | | | | | | | |
| -4 to -5 ft | | | | | | | | | | | | | | | | | | |
| -5 to -6 ft | | | | | | | | | | | | | | | | | | |
| -6 to -7 ft | | | | | | | | | | | | | | | | | | |
| -7 to -8 ft | | | | | | | | | | | | | | | | | | |

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



Prepared by craigh, 7/15/22, W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II Data Evaluation\Report\Map 3-4f 7172 Upper Reach PDI Design Data wREAs - RM 4.05-4.3.mxd



Legend

- RAL exceedance area
- 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

Slip 6

| location ID: | 673a | 673b | 674 |
|--------------------------------|----------|------|----------|
| mudline: | -6.0 | -8.3 | |
| -6 to -7 ft | | | |
| -7 to -8 ft | A (0-60) | | |
| -8 to -9 ft | B | | |
| -9 to -10 ft | C | | A (0-60) |
| -10 to -11 ft | D | | |
| -11 to -12 ft | E | | |
| -12 to -13 ft | F | | |
| -13 to -14 ft | G | | |
| -14 to -15 ft | H | | |
| -15 to -16 ft | I | | |
| -16 to -17 ft | AB | H | |
| -17 to -18 ft | BB | 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 | |

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.

^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.

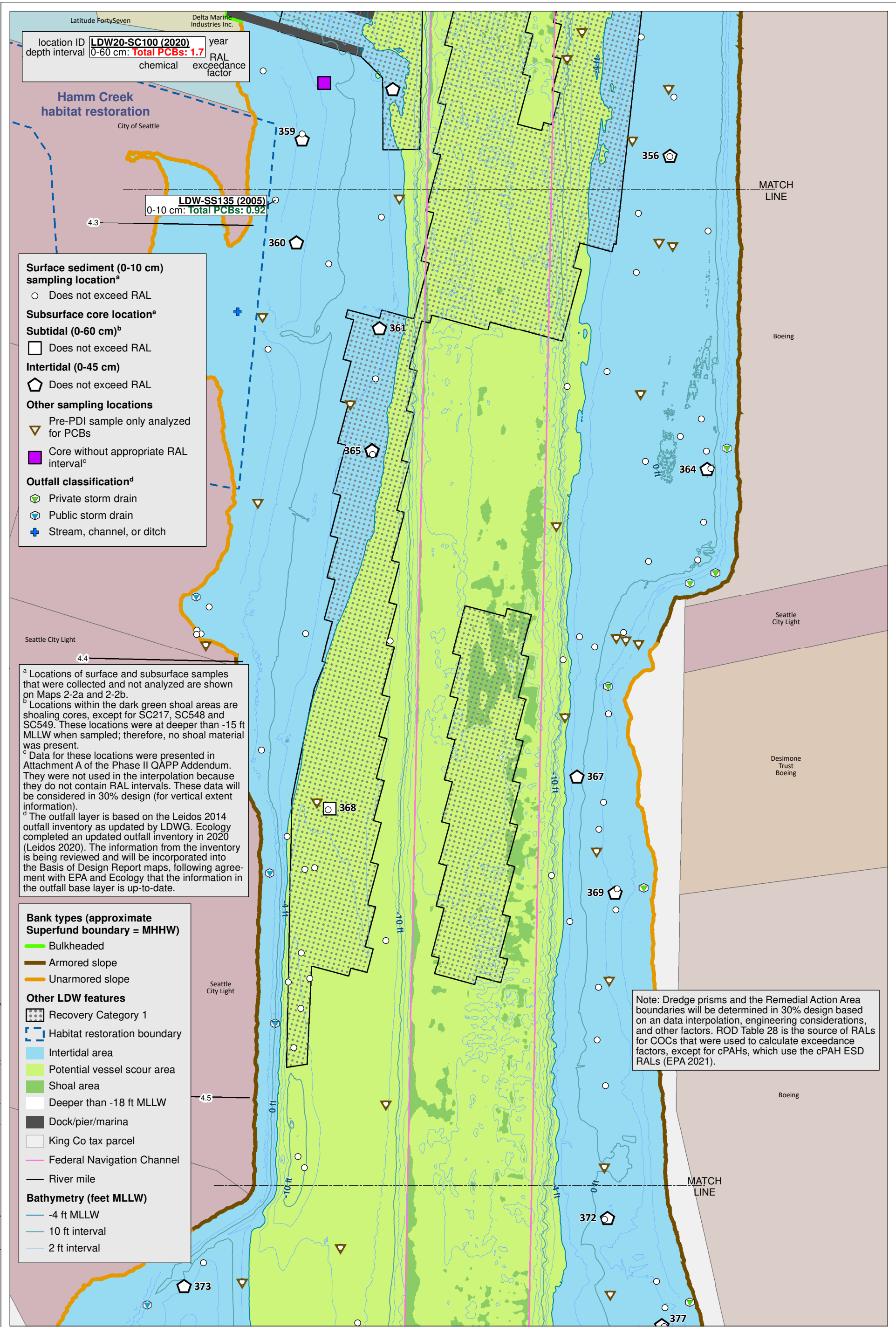
Note: Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an data interpolation, engineering considerations, and other factors. ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors, except for cPAHs, which use the cPAH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

Map 3-4g. RAL exceedance areas in Slip 6 with RAL exceedances and vertical extent data in the design dataset

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

Windward environmental LLC **ANCHOR QEA**

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



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.

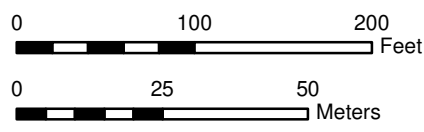
^b Locations within the dark green shoal areas are shoaling cores, except for SC217, SC548 and SC549. These locations were at deeper than -15 ft MLLW when sampled; therefore, no shoal material was present.

^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).

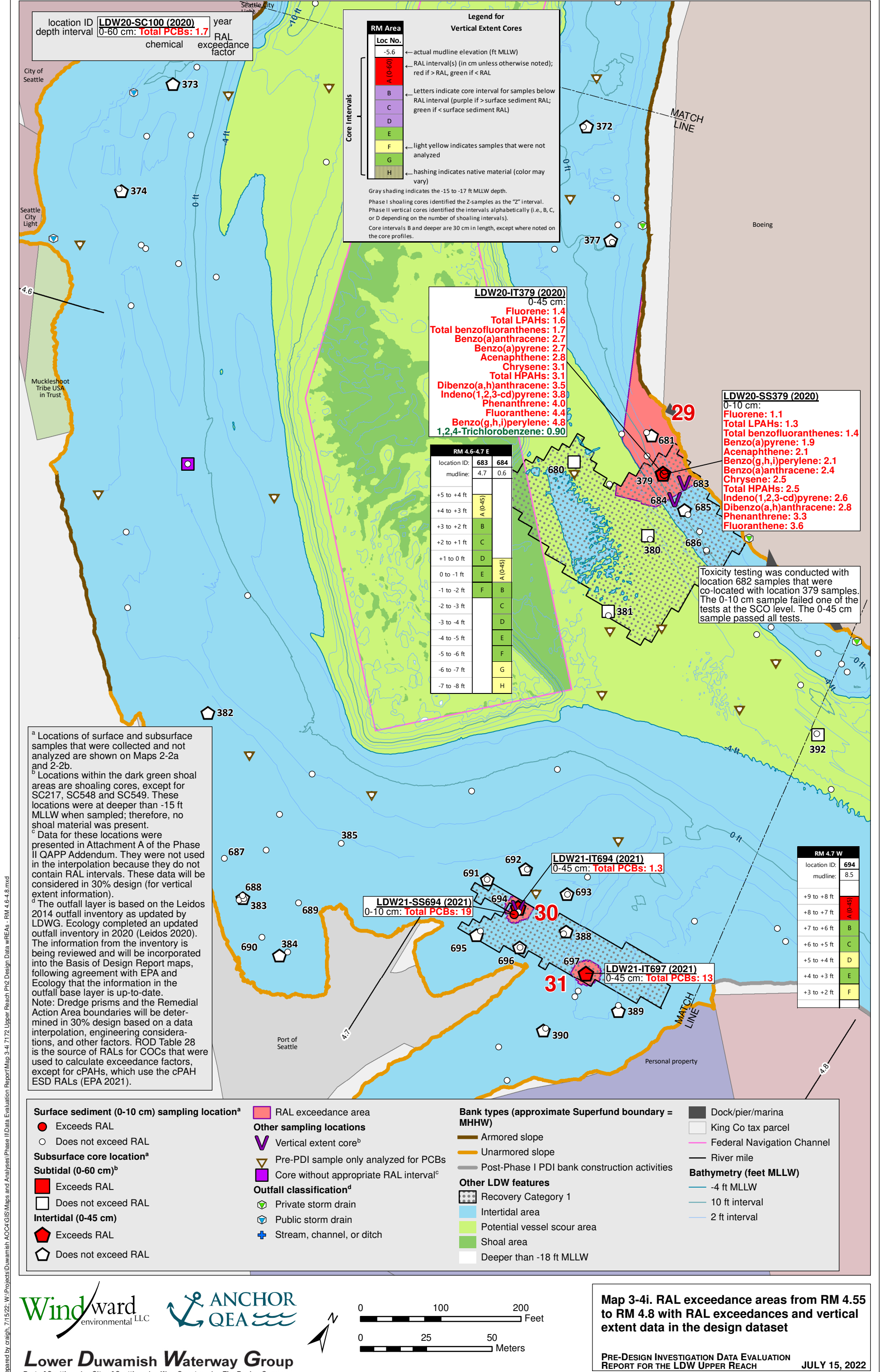
^d The outfall layer is based on the Leidos 2014 outfall inventory as updated by LDWG. Ecology completed an updated outfall inventory in 2020 (Leidos 2020). The information from the inventory is being reviewed and will be incorporated into the Basis of Design Report maps, following agreement with EPA 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\AOC4\GIS\Maps and Analyses\Phase II\Map 3-4h\7172 Upper Reach Pl2 Design Data wrEAs - 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 | ← 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.

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 | A (0-45) |
| +8 to +7 ft | B |
| +7 to +6 ft | C |
| +6 to +5 ft | D |
| +5 to +4 ft | E |
| +4 to +3 ft | F |
| +3 to +2 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
- ∇ 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

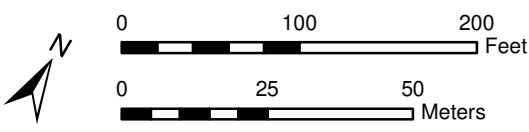
- Recovery Category 1
- Intertidal area
- Potential vessel scour area
- Shoal area
- Deeper than -18 ft MLLW

Dock/pier/marina

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

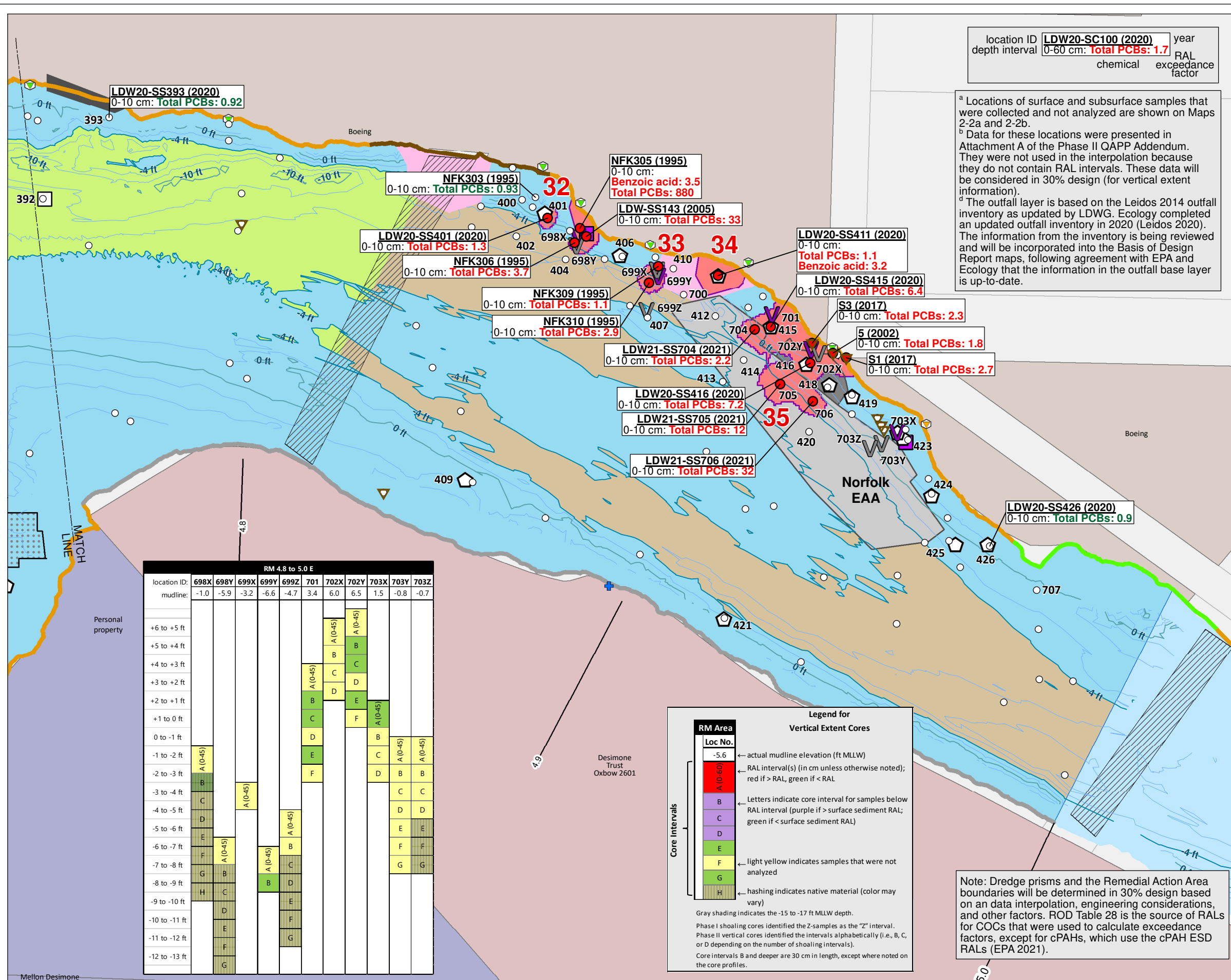
Bathymetry (feet MLLW)

- -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 Data Evaluation\Report\Map 3-4i 7/15/22 Upper Reach PDI Design Data wREAs - 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 3-4j 7172 Upper Reach PH2 Design Data wREAs - 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.

RAL exceedance area

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
- ◻ 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

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 | | | | | | | | | | |

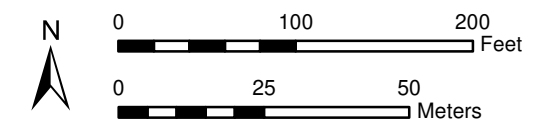
Legend for Vertical Extent Cores

| 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).

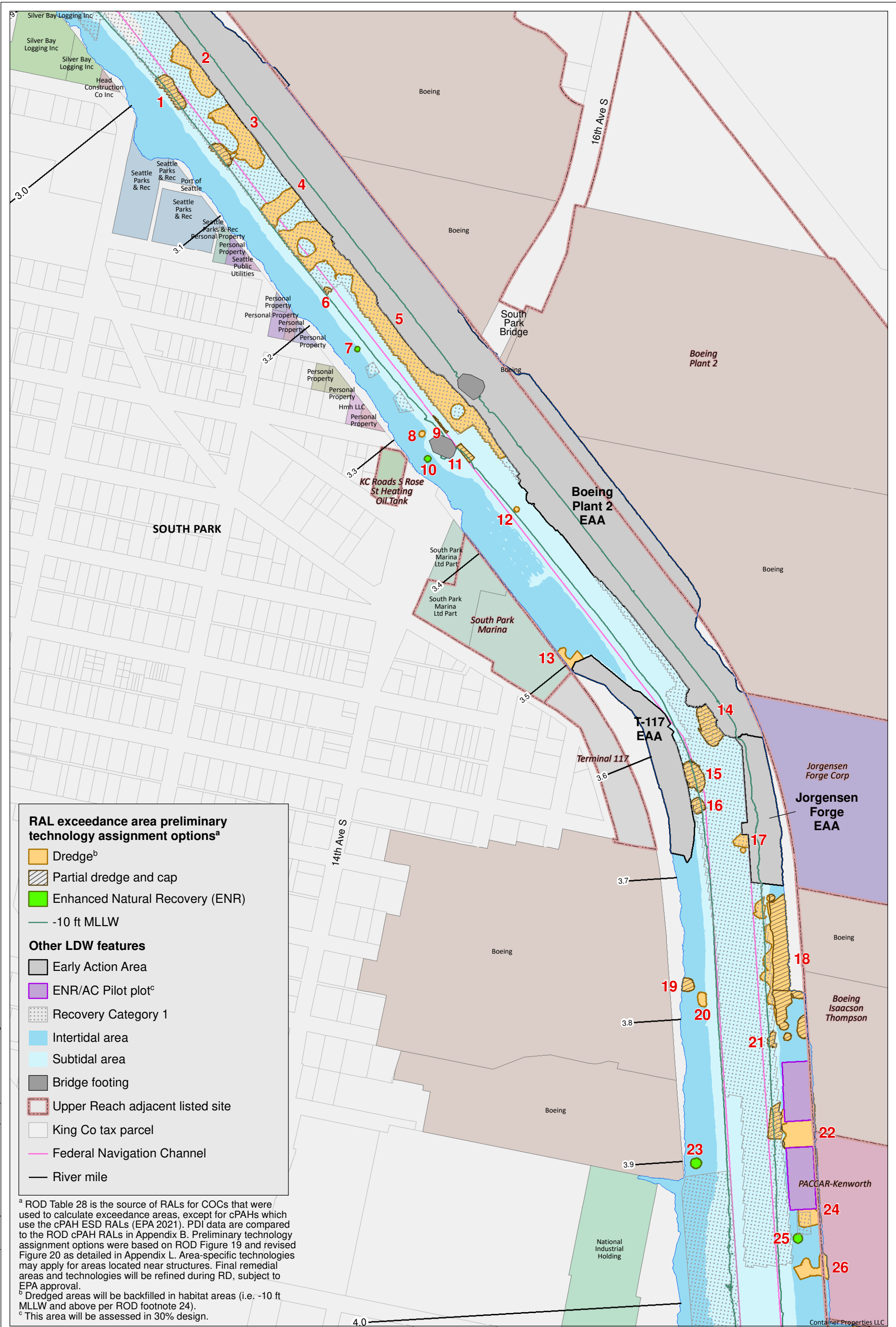


Map 3-4j. RAL exceedance areas from RM 4.8 to RM 5.0 with RAL exceedances and vertical extent data in the design dataset

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



Lower Duwamish Waterway Group
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RAL exceedance area preliminary technology assignment options^a

- Dredge^b
- Partial dredge and cap
- Enhanced Natural Recovery (ENR)
- 10 ft MLLW

Other LDW features

- Early Action Area
- ENR/AC Pilot plot^c
- Recovery Category 1
- Intertidal area
- Subtidal area
- Bridge footing
- Upper Reach adjacent listed site
- King Co tax parcel
- Federal Navigation Channel
- River mile

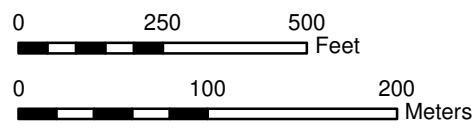
^a ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance areas, except for cPAHs which use the cPAH ESD RALs (EPA 2021). PDI data are compared to the ROD cPAH RALs in Appendix B. Preliminary technology assignment options were based on ROD Figure 19 and revised Figure 20 as detailed in Appendix L. Area-specific technologies may apply for areas located near structures. Final remedial areas and technologies will be refined during RD, subject to EPA approval.

^b Dredged areas will be backfilled in habitat areas (i.e. -10 ft MLLW and above per ROD footnote 24).

^c This area will be assessed in 30% design.



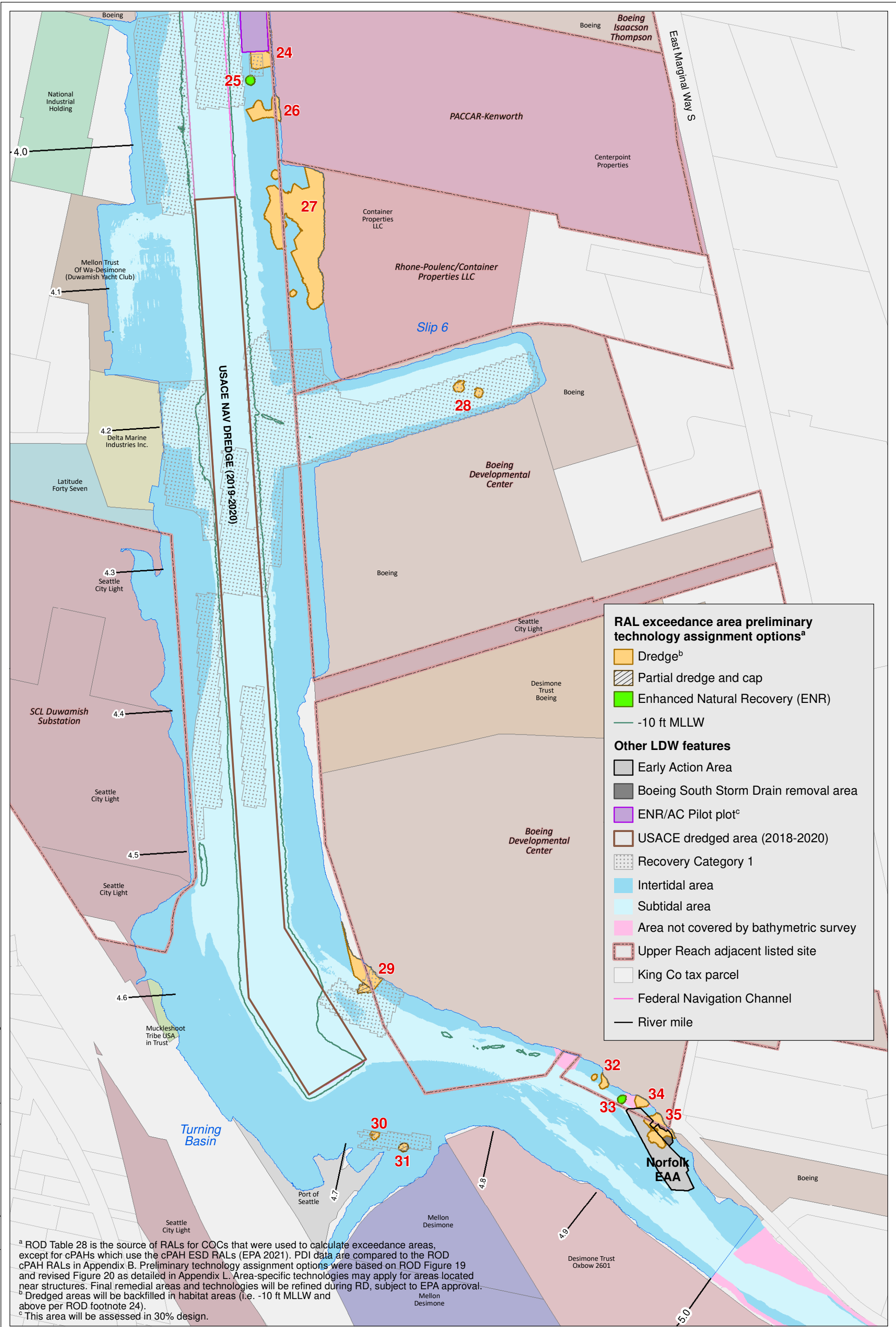
Lower Duwamish Waterway Group
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Map 3-5a. Preliminary technology assignment options by RAL exceedance area, RM 3.0 to RM 4.0

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

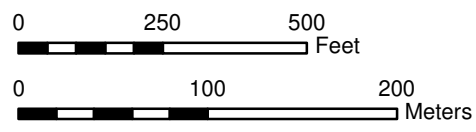
Prepared by craigh. 7/15/22: W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 3-5a 7/9/22 REA Tech assignments RM 3-4.mxd



^a ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance areas, except for cPAHs which use the cPAH ESD RALs (EPA 2021). PDI data are compared to the ROD cPAH RALs in Appendix B. Preliminary technology assignment options were based on ROD Figure 19 and revised Figure 20 as detailed in Appendix L. Area-specific technologies may apply for areas located near structures. Final remedial areas and technologies will be refined during RD, subject to EPA approval.

^b Dredged areas will be backfilled in habitat areas (i.e. -10 ft MLLW and above per ROD footnote 24).

^c This area will be assessed in 30% design.



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Map 3-5b. Preliminary technology assignment options by RAL exceedance area, RM 4.0 to RM 5.0
 PRE-DESIGN INVESTIGATION DATA EVALUATION REPORT FOR THE LDW UPPER REACH JULY 15, 2022

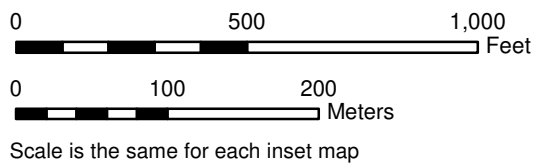
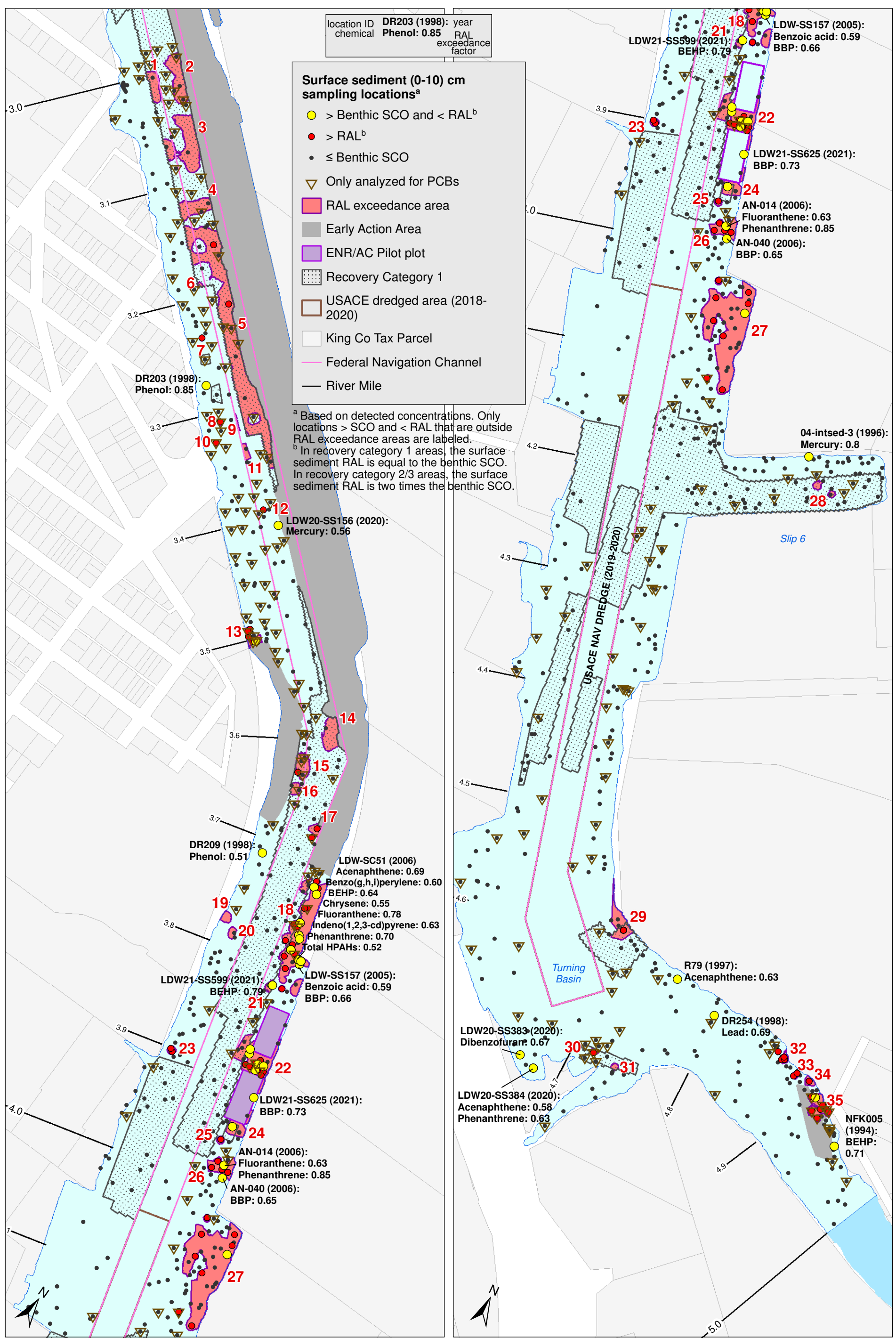
Prepared by craigh_7/15/22: W:\Projects\Duwamish\AOC\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 3-5b-7892-REA_tech_assignments_RM 4-5.mxd

| | | | |
|-------------|---------------|------|-----------------------|
| location ID | DR203 (1998): | year | |
| chemical | Phenol: | 0.85 | RAL exceedance factor |

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

- > Benthic SCO and < RAL^b
- > RAL^b
- ≤ Benthic SCO
- ▽ Only analyzed for PCBs
- RAL exceedance area
- Early Action Area
- ENR/AC Pilot plot
- Recovery Category 1
- USACE dredged area (2018-2020)
- King Co Tax Parcel
- Federal Navigation Channel
- River Mile

^a Based on detected concentrations. Only locations > SCO and < RAL that are outside RAL exceedance areas are labeled.
^b In recovery category 1 areas, the surface sediment RAL is equal to the benthic SCO. In recovery category 2/3 areas, the surface sediment RAL is two times the benthic SCO.



Prepared by craigh_7/15/22: W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Phase II\Data Evaluation\Report\Map 4-1 7305 Phil SCO vs RAL exceedances.mxd