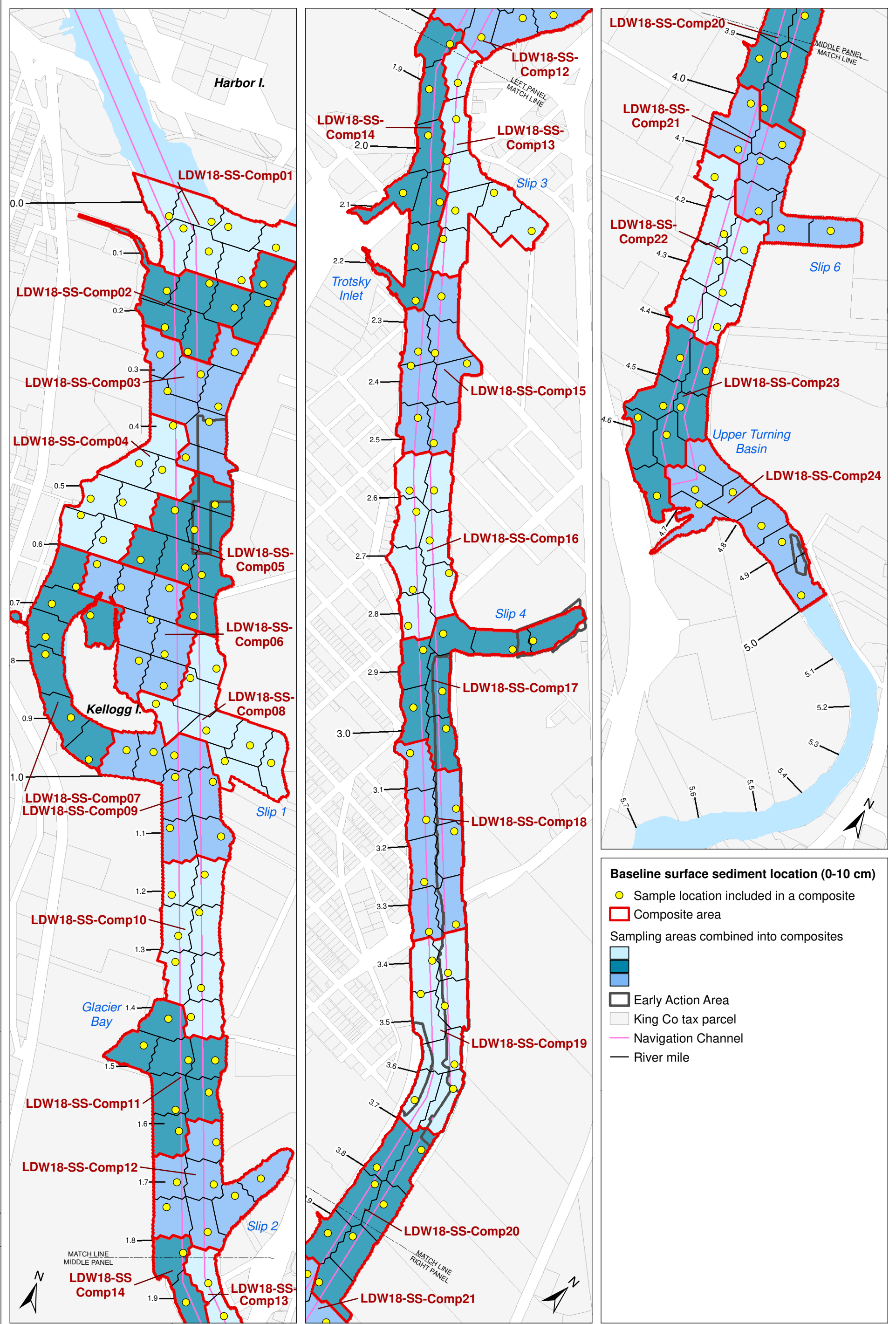
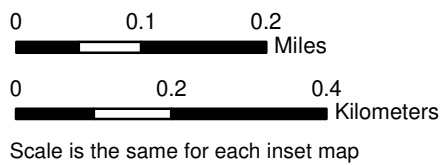


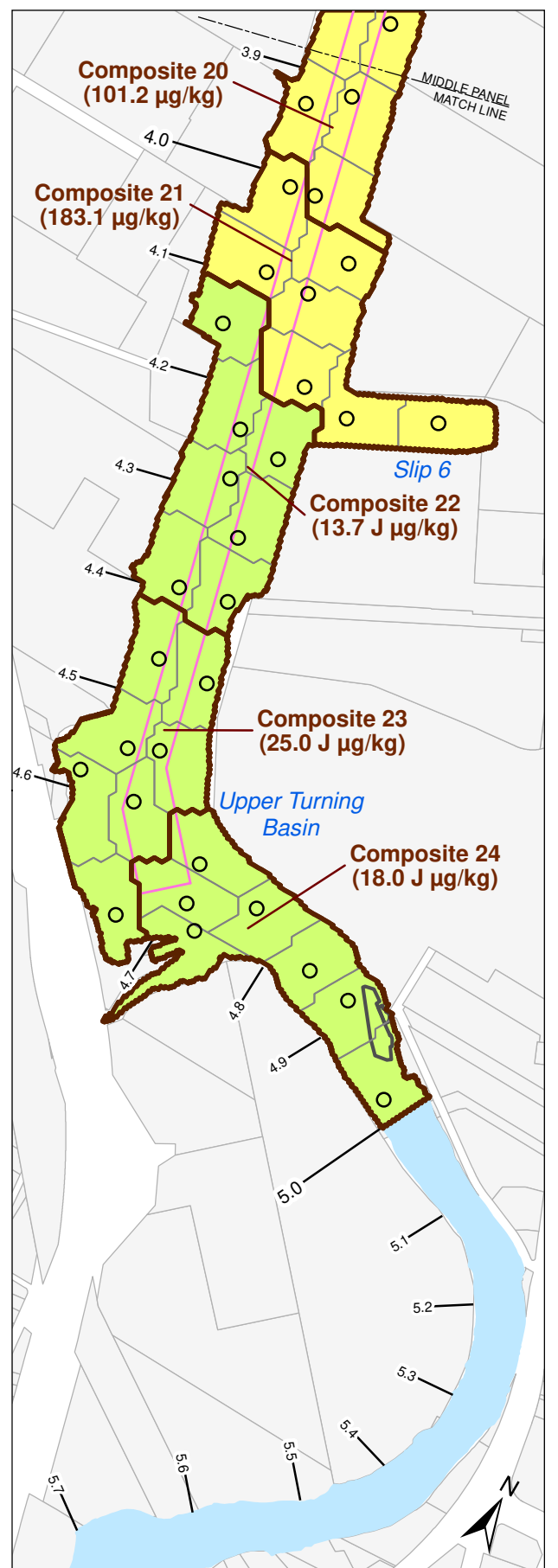
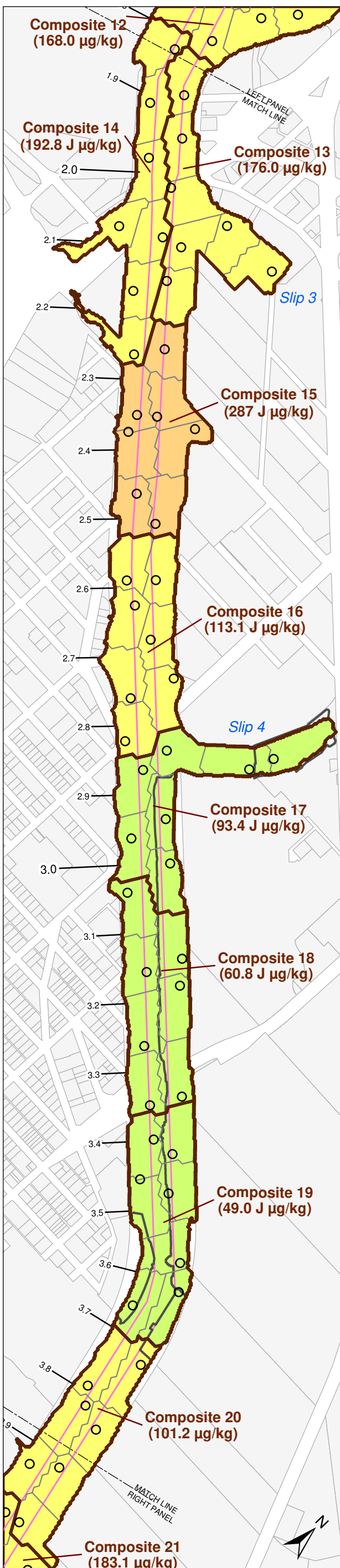
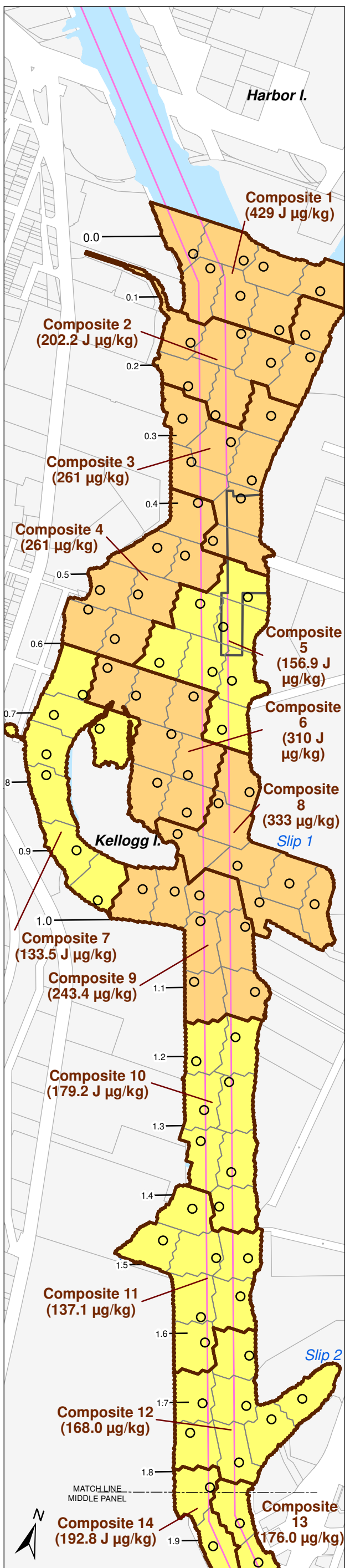
Prepared by craigh. 6/25/20. W:\Projects\Duwamish\ACS\GIS\Maps and Analyses\Task 06 Data Evaluation\Report\Map 2-01 6868 Surfied composites.mxd



- Baseline surface sediment location (0-10 cm)**
- Sample location included in a composite
 - Composite area
- Sampling areas combined into composites
- -
- Early Action Area
- King Co tax parcel
 - Navigation Channel
 - River mile

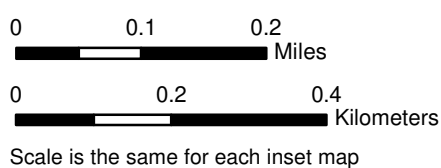
Map 2-1. Locations of baseline surface sediment composite samples





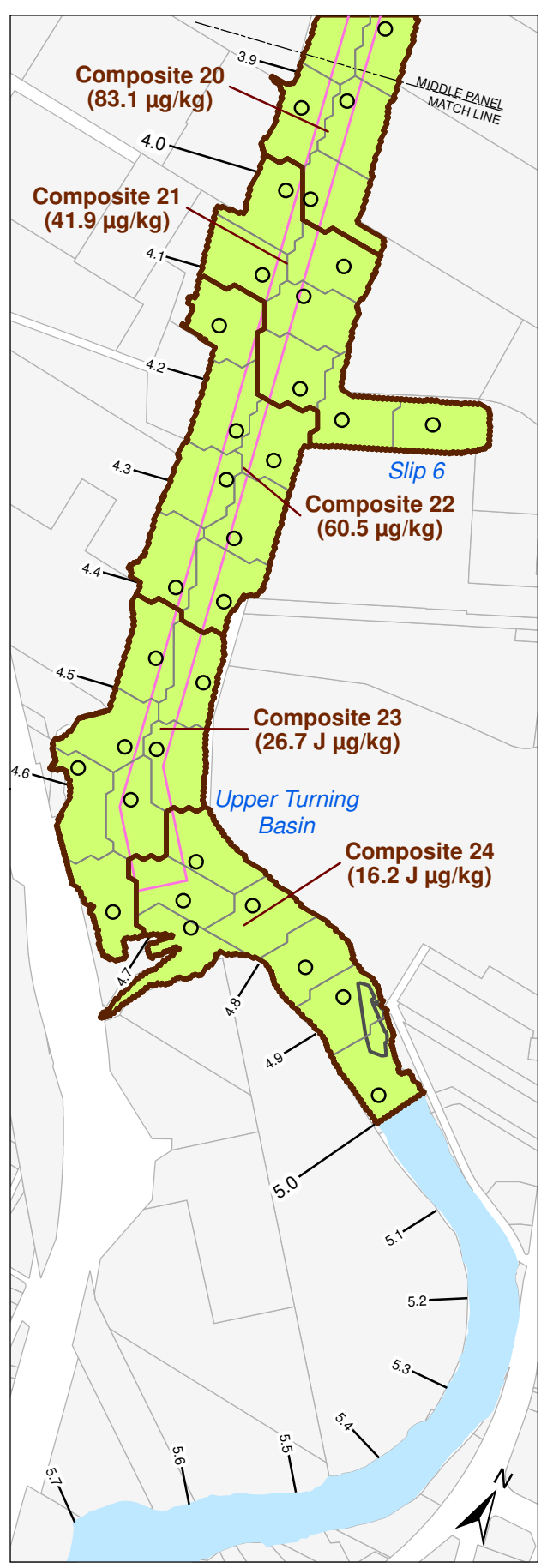
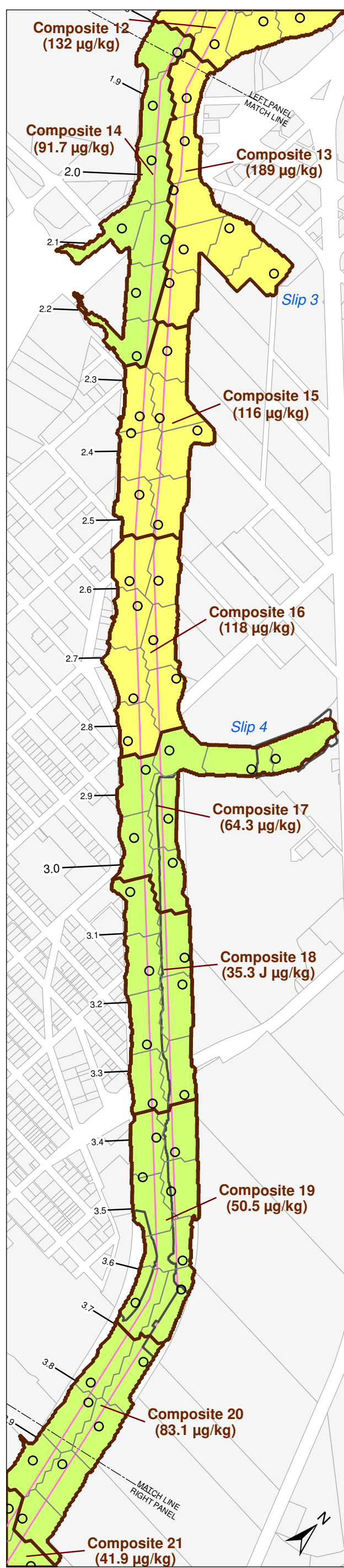
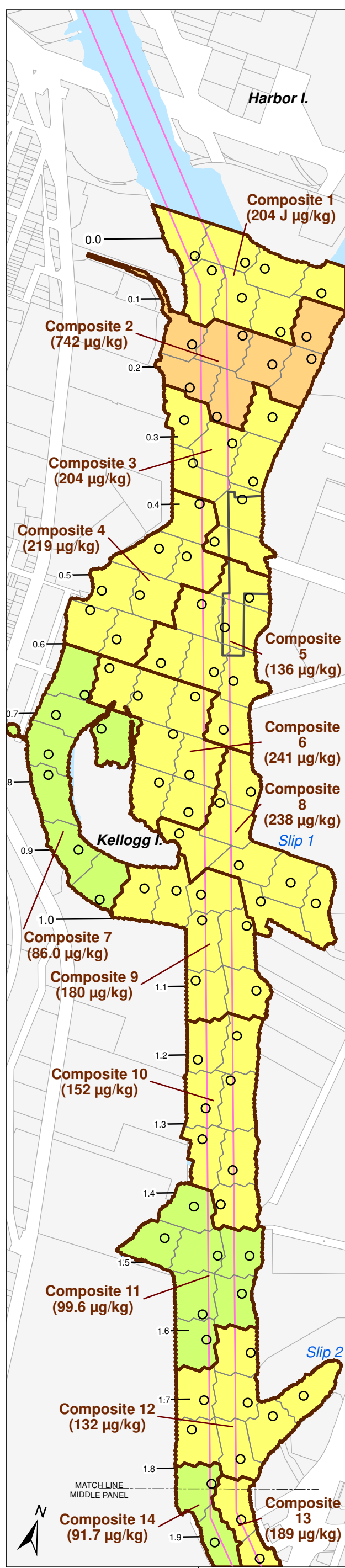
Total PCB Aroclors (µg/kg) in baseline surface sediment composite samples

- > 200
- > 100 and ≤ 200
- ≤ 100
- Sampling area
- Randomly located subsample for sediment composite samples
- Early Action Area
- King Co tax parcel
- Navigation Channel
- River mile



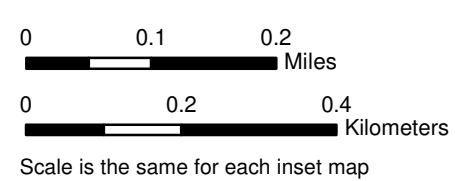
Map 2-2. Total PCB concentrations in Pre-Design Studies baseline surface sediment composite samples

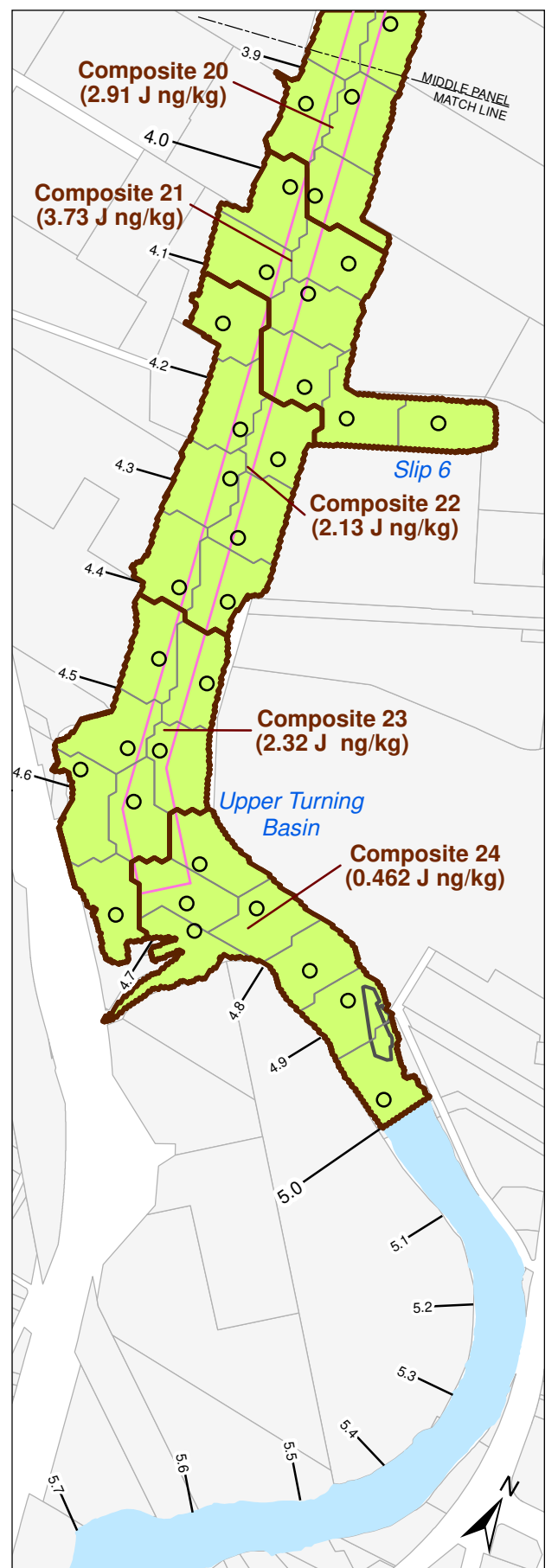
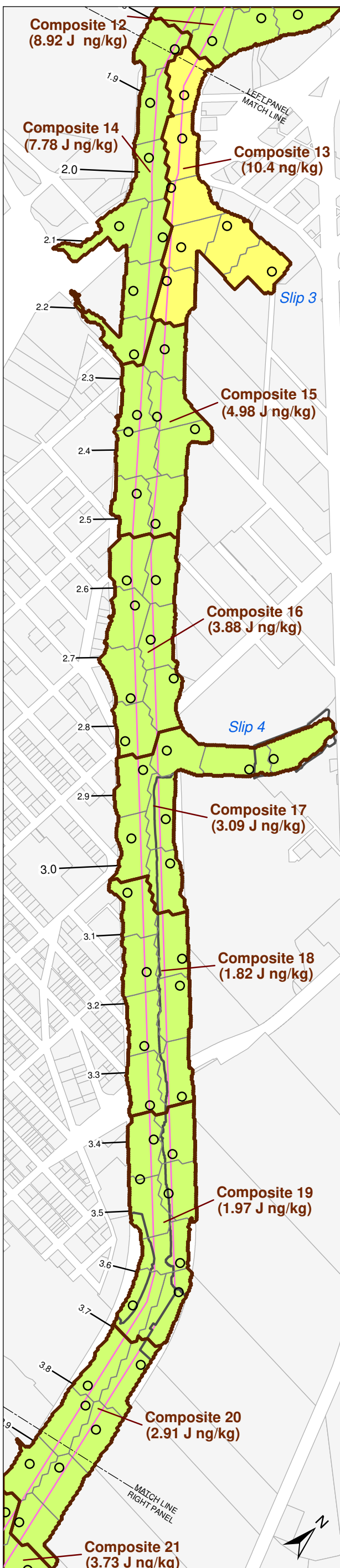
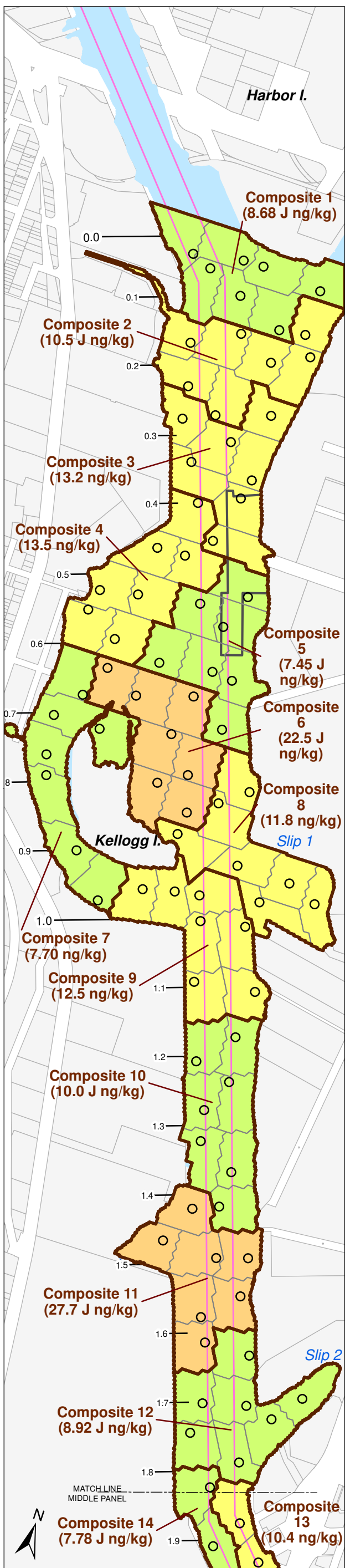
Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 2-03 6849 Surface sediment compositing data - cPAHs.mxd



cPAH TEQ (µg/kg) in baseline surface sediment composite samples

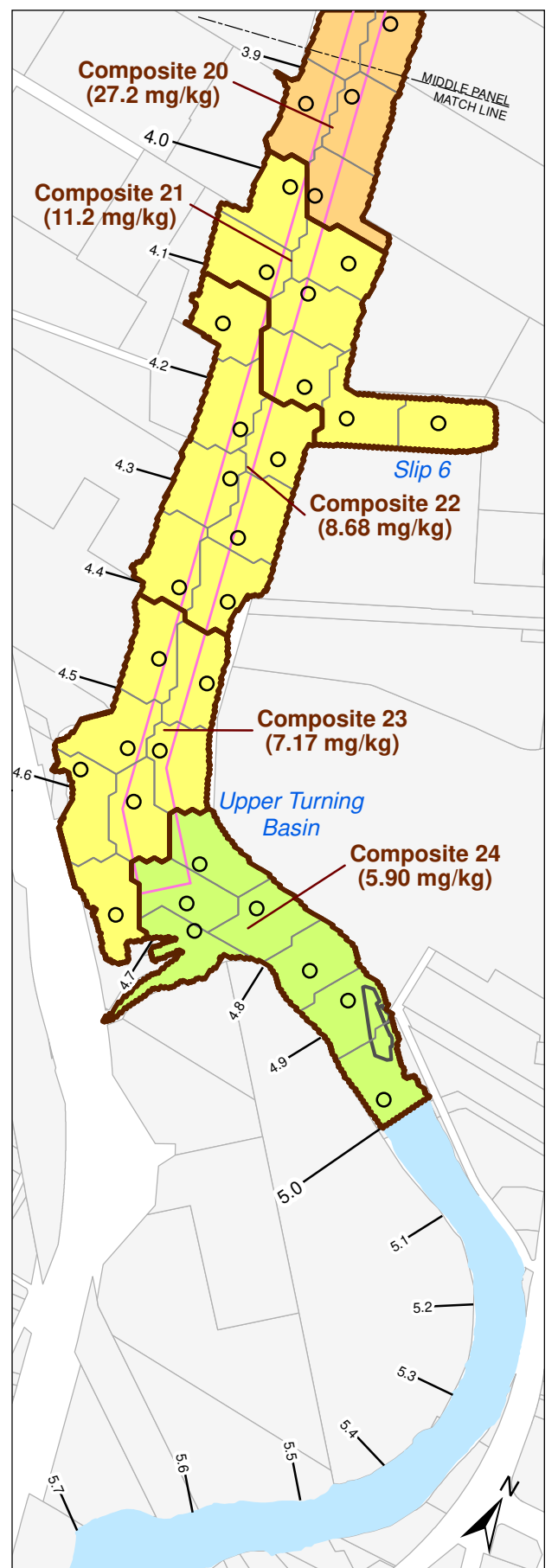
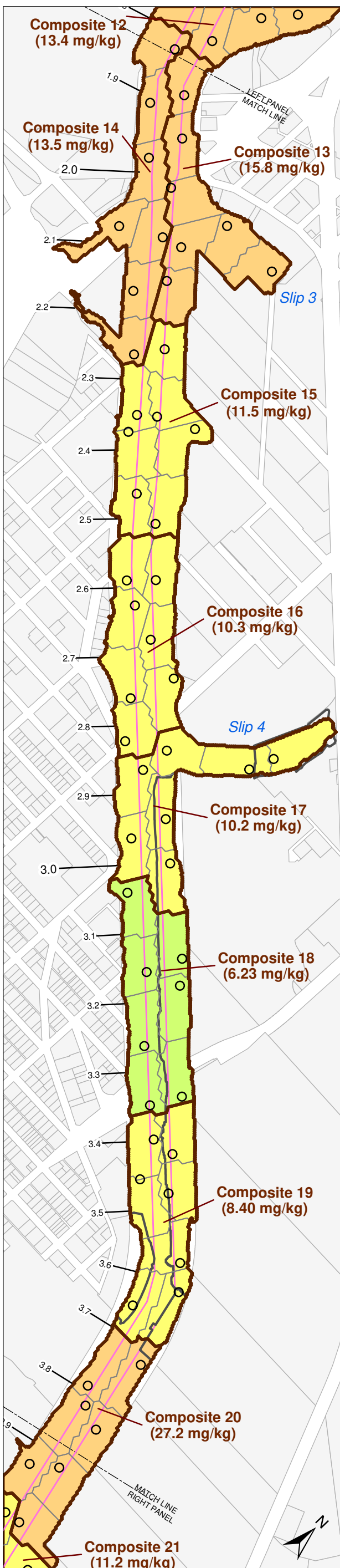
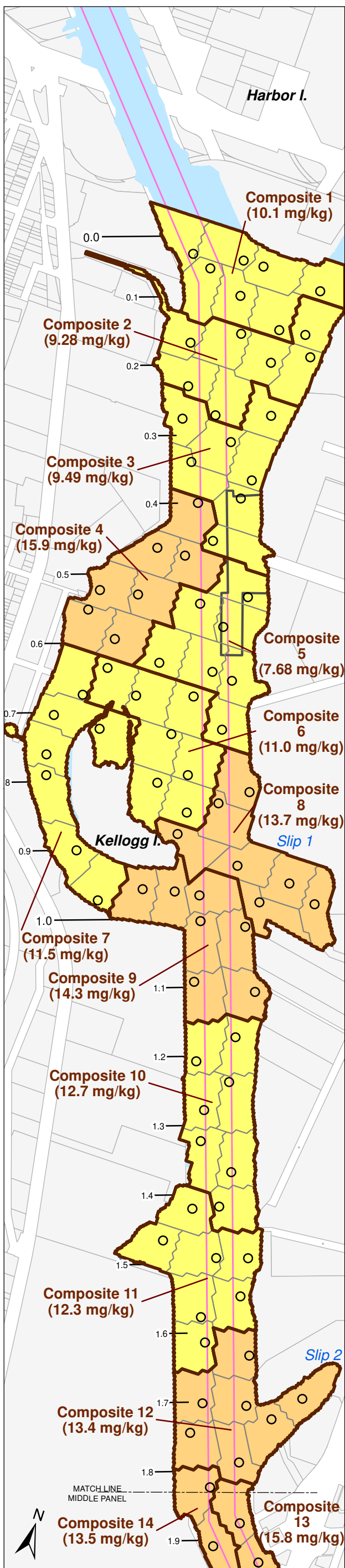
- > 380
- > 100 and ≤ 380
- ≤ 100
- Sampling area
- Randomly located subsample for sediment composite samples
- Early Action Area
- King Co tax parcel
- Navigation Channel
- River mile





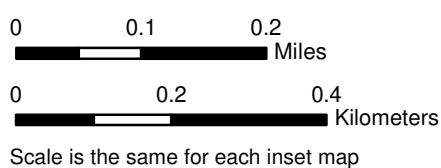
Dioxin/furan TEQ (ng/kg) in baseline surface sediment composite samples

- > 20
- > 10 and ≤ 20
- ≤ 10
- Sampling area
- Randomly located subsample for sediment composite samples
- Early Action Area
- King Co tax parcel
- Navigation Channel
- River mile



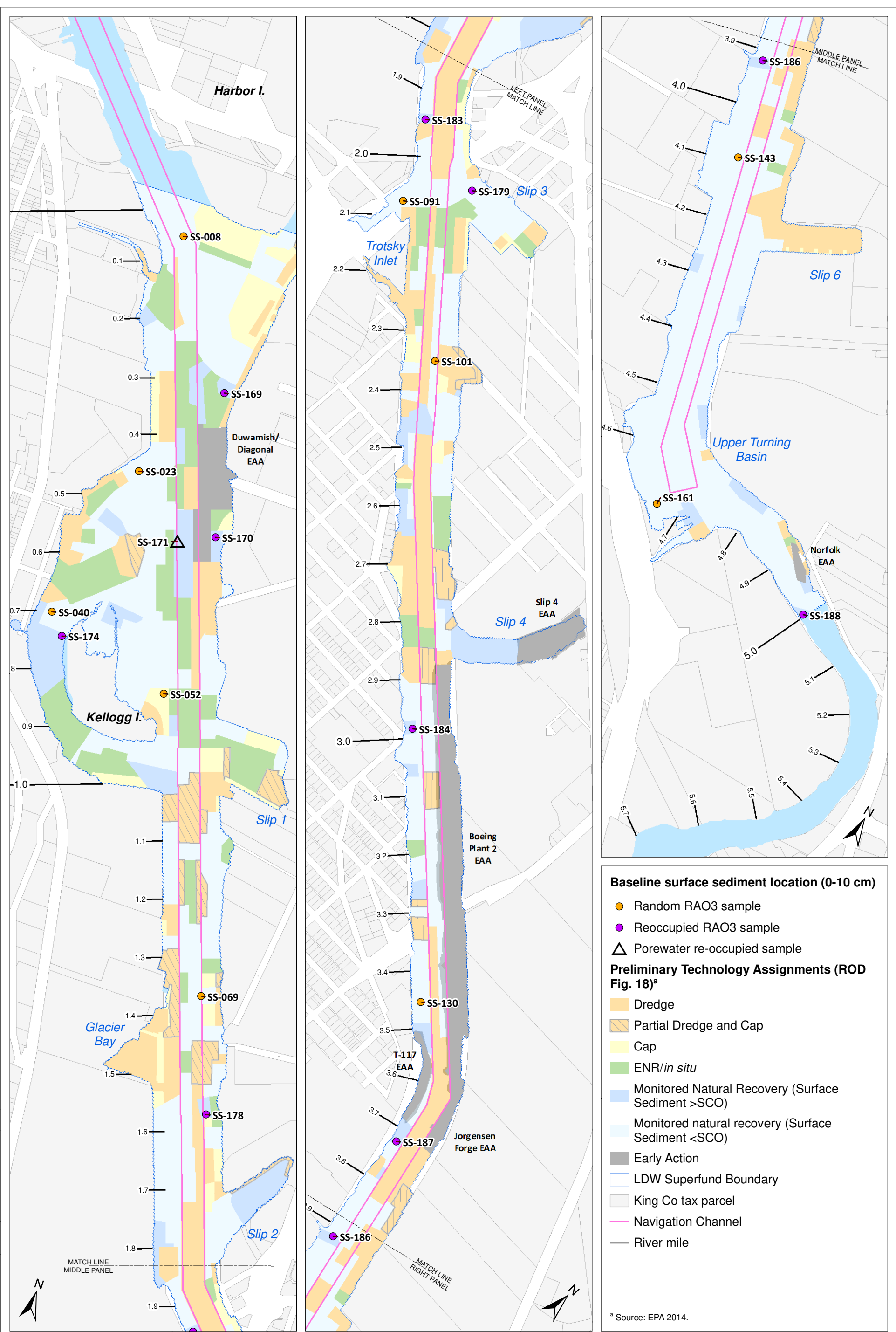
Arsenic (mg/kg) in baseline surface sediment composite samples

- > 13
- > 7 and ≤ 13
- ≤ 7
- Sampling area
- Randomly located subsample for sediment composite samples
- Early Action Area
- King Co tax parcel
- Navigation Channel
- River mile



Map 2-5. Arsenic concentrations in Pre-Design Studies baseline surface sediment composite samples

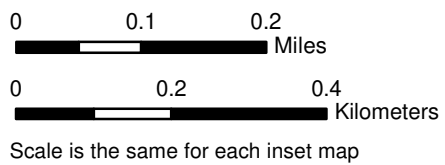
Prepared by craigh. 6/25/20. W:\Projects\Duwamish\ACS\GIS\Maps and Analyses\Task 06 Data Evaluation\Report\Map 2 06 6868 Surfied SMS.mxd



Baseline surface sediment location (0-10 cm)

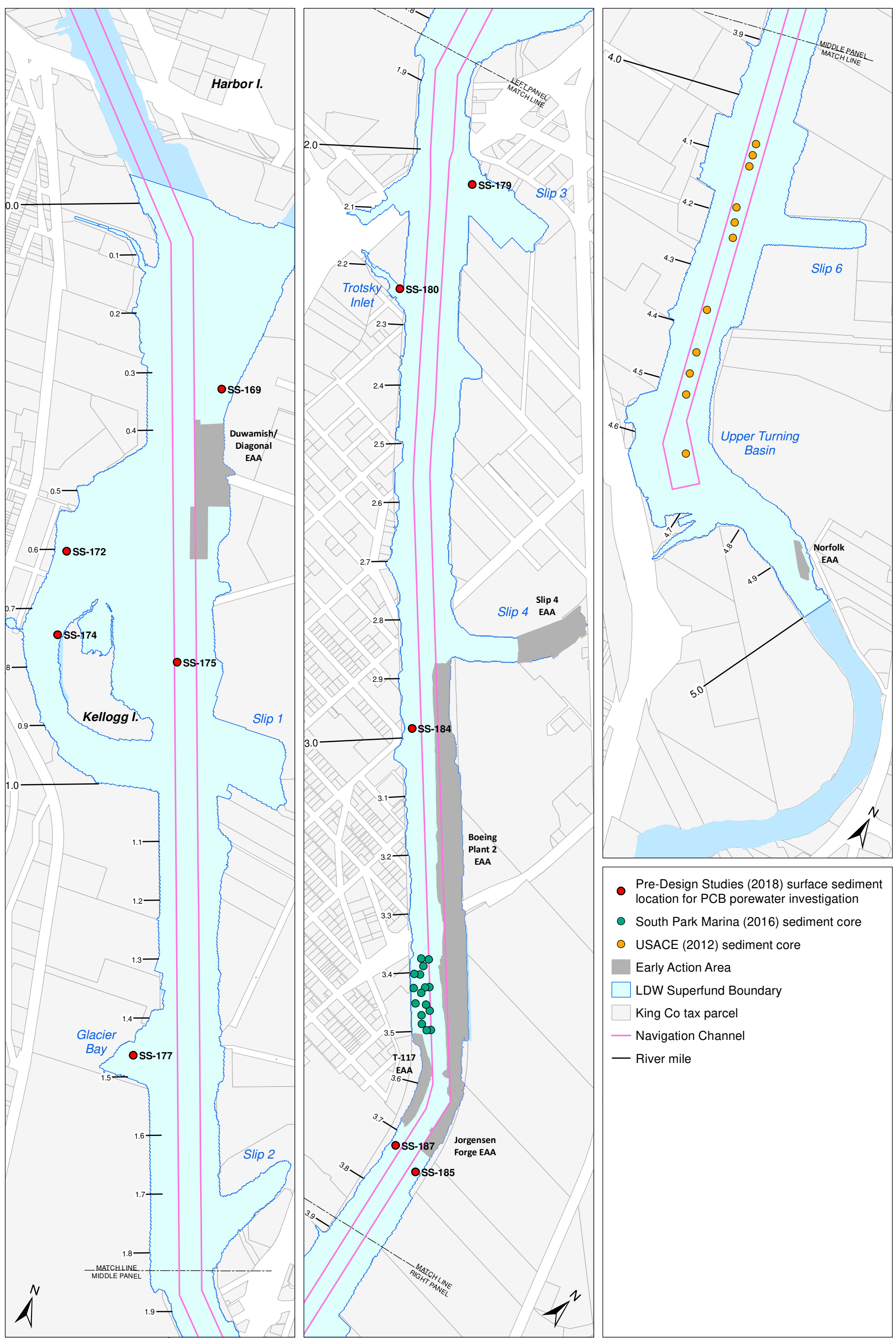
- Random RAO3 sample
 - Reoccupied RAO3 sample
 - △ Porewater re-occupied sample
- Preliminary Technology Assignments (ROD Fig. 18)^a**
- Dredge
 - Partial Dredge and Cap
 - Cap
 - ENR/*in situ*
 - Monitored Natural Recovery (Surface Sediment >SCO)
 - Monitored natural recovery (Surface Sediment <SCO)
 - Early Action
 - LDW Superfund Boundary
 - King Co tax parcel
 - Navigation Channel
 - River mile

^a Source: EPA 2014.



Map 2-6. Locations of baseline individual surface sediment samples in MNR areas

Prepared by craigh_6/25/20: W:\Projects\Duwamish ACCS\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 2-07 6995 PCB Aroclors and congeners.mxd



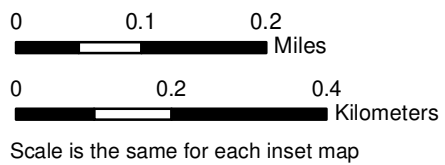
- Pre-Design Studies (2018) surface sediment location for PCB porewater investigation
- South Park Marina (2016) sediment core
- USACE (2012) sediment core
- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

Map 2-7. Locations of baseline sediment samples analyzed for PCB Aroclors and congeners

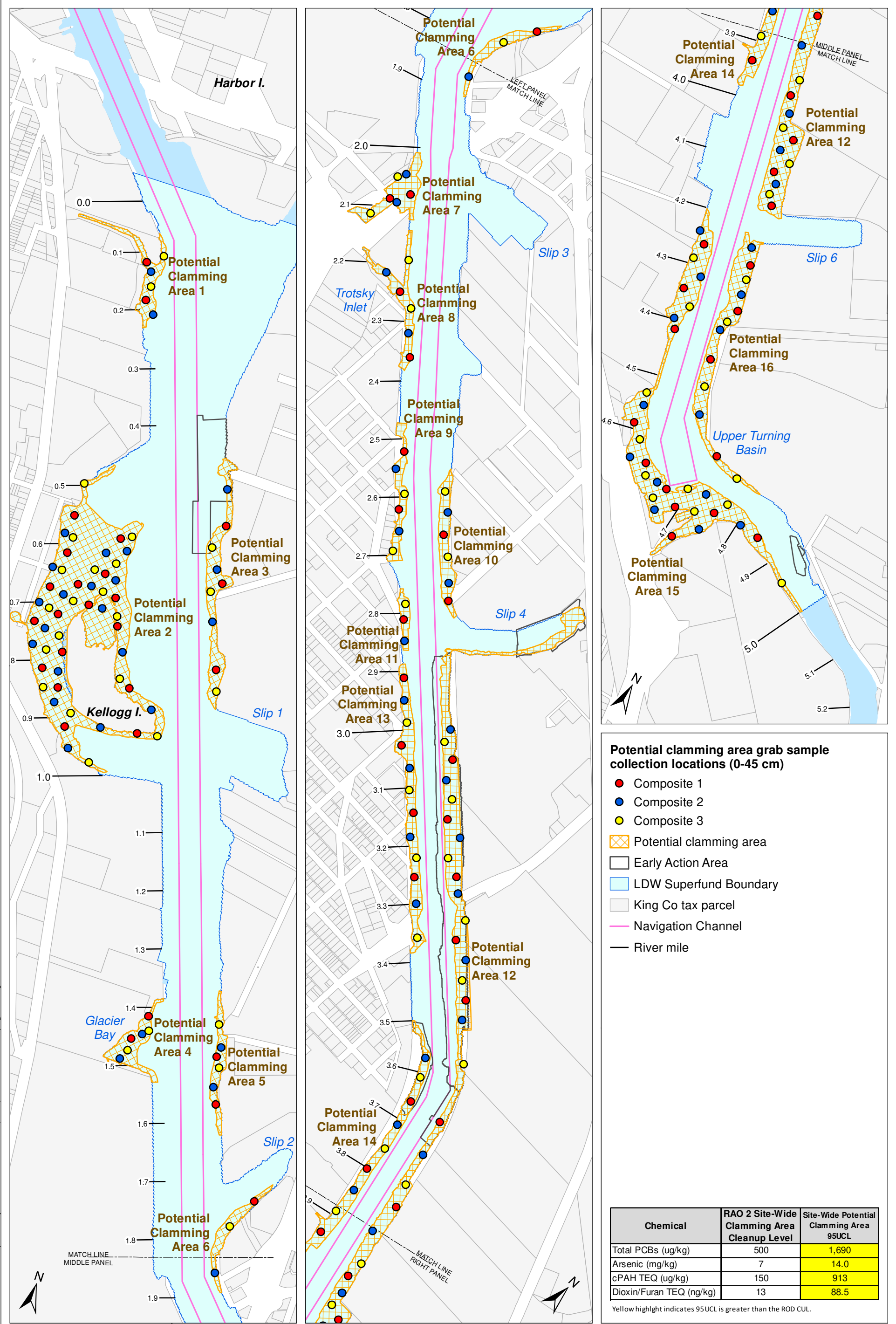
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Prepared by craigh_6/25/20; W:\Projects\Duwamish ACC's\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 2-08 6517 Interstitial sampling - clamming areas.mxd



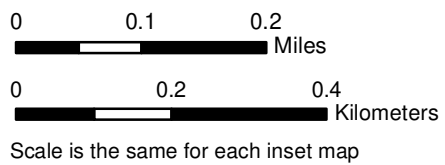
- Potential clamming area grab sample collection locations (0-45 cm)**
- Composite 1
 - Composite 2
 - Composite 3
 - Potential clamming area
 - Early Action Area
 - LDW Superfund Boundary
 - King Co tax parcel
 - Navigation Channel
 - River mile

Chemical	RAO 2 Site-Wide Clamming Area Cleanup Level	Site-Wide Potential Clamming Area 95UCL
Total PCBs (ug/kg)	500	1,690
Arsenic (mg/kg)	7	14.0
cPAH TEQ (ug/kg)	150	913
Dioxin/Furan TEQ (ng/kg)	13	88.5

Yellow highlight indicates 95UCL is greater than the ROD CUL.

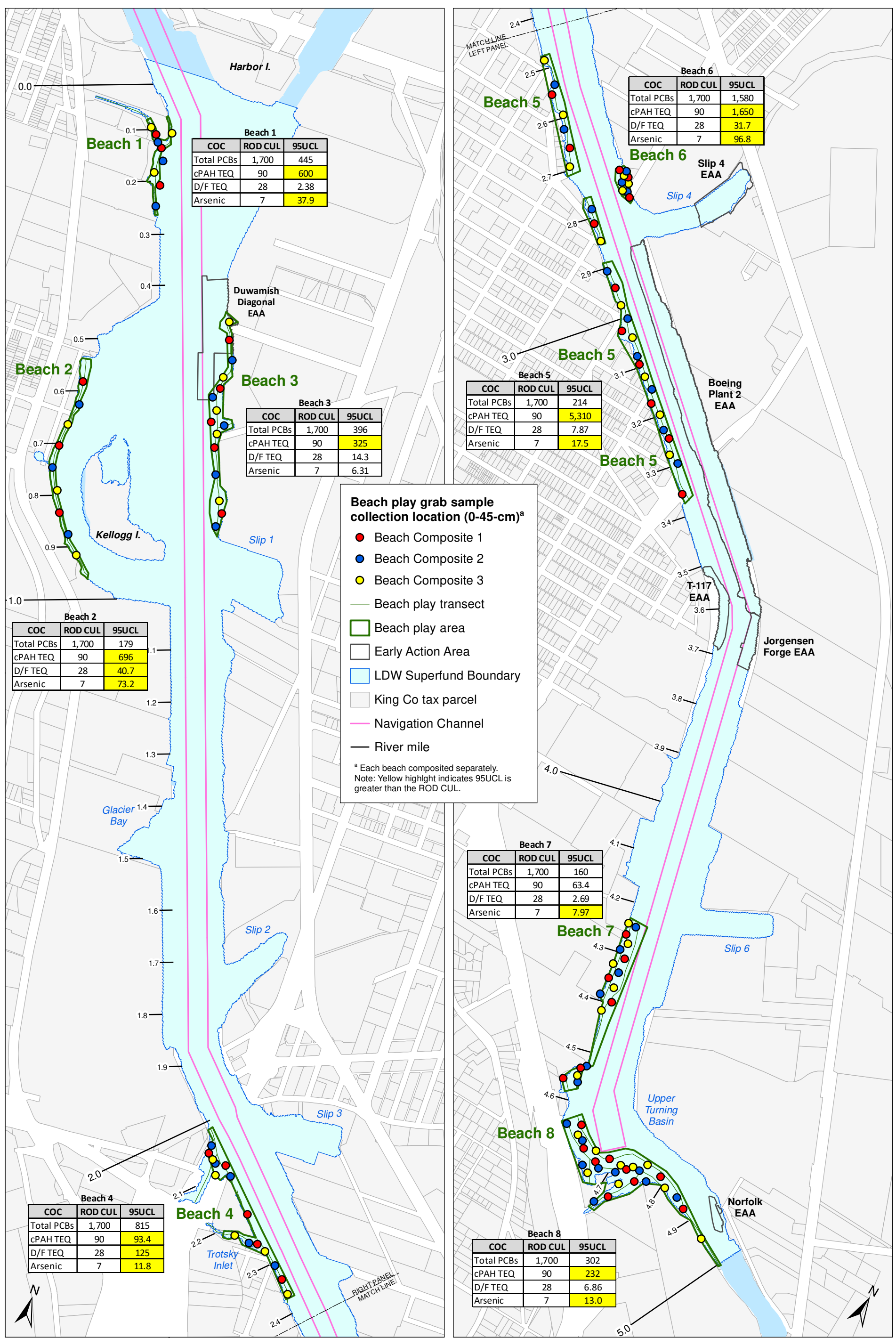


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Map 2-8. Locations of 0-45-cm grab samples collected for the baseline potential clamming area sediment composite samples

Prepared by craigh_6/25/20; W:\Projects\Duwamish ACC's\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 2-09 6517 Interficial sampling_beach play areas.mxd



Beach 1

COC	ROD CUL	95UCL
Total PCBs	1,700	445
cPAH TEQ	90	600
D/F TEQ	28	2.38
Arsenic	7	37.9

Beach 3

COC	ROD CUL	95UCL
Total PCBs	1,700	396
cPAH TEQ	90	325
D/F TEQ	28	14.3
Arsenic	7	6.31

Beach 2

COC	ROD CUL	95UCL
Total PCBs	1,700	179
cPAH TEQ	90	696
D/F TEQ	28	40.7
Arsenic	7	73.2

Beach 4

COC	ROD CUL	95UCL
Total PCBs	1,700	815
cPAH TEQ	90	93.4
D/F TEQ	28	125
Arsenic	7	11.8

Beach 5

COC	ROD CUL	95UCL
Total PCBs	1,700	214
cPAH TEQ	90	5,310
D/F TEQ	28	7.87
Arsenic	7	17.5

Beach 6

COC	ROD CUL	95UCL
Total PCBs	1,700	1,580
cPAH TEQ	90	1,650
D/F TEQ	28	31.7
Arsenic	7	96.8

Beach 7

COC	ROD CUL	95UCL
Total PCBs	1,700	160
cPAH TEQ	90	63.4
D/F TEQ	28	2.69
Arsenic	7	7.97

Beach 8

COC	ROD CUL	95UCL
Total PCBs	1,700	302
cPAH TEQ	90	232
D/F TEQ	28	6.86
Arsenic	7	13.0

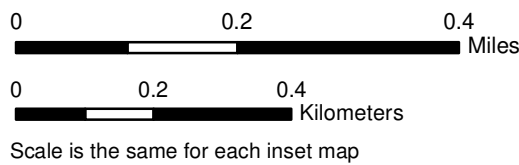
Beach play grab sample collection location (0-45-cm)^a

- Beach Composite 1
- Beach Composite 2
- Beach Composite 3
- Beach play transect
- ▭ Beach play area
- ▭ Early Action Area
- ▭ LDW Superfund Boundary
- ▭ King Co tax parcel
- Navigation Channel
- River mile

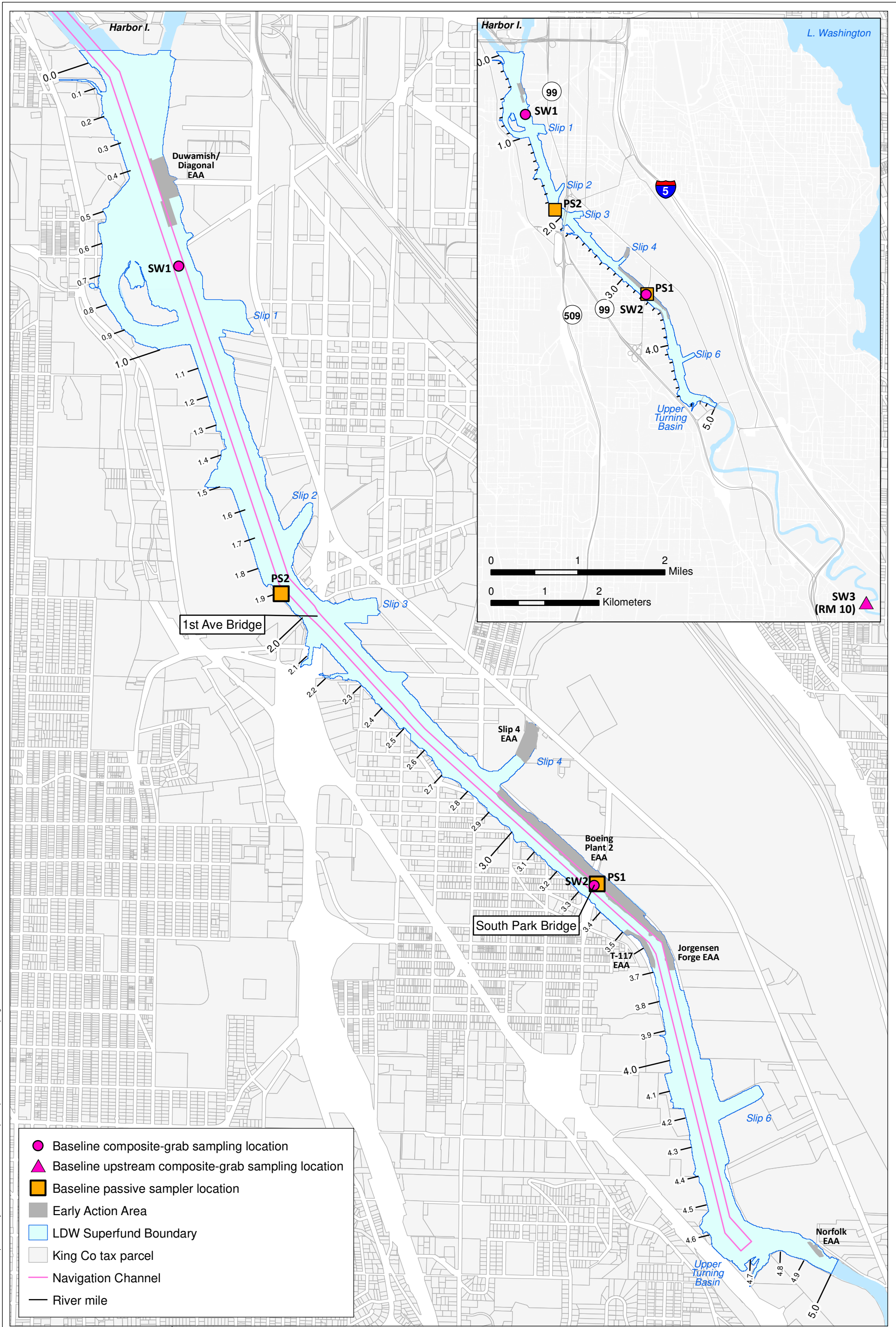
^a Each beach composited separately.
Note: Yellow highlight indicates 95UCL is greater than the ROD CUL.



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Map 2-9. Locations of 0-45-cm grab samples collected for the baseline beach play area sediment composite samples
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- Baseline composite-grab sampling location
- ▲ Baseline upstream composite-grab sampling location
- Baseline passive sampler location
- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile



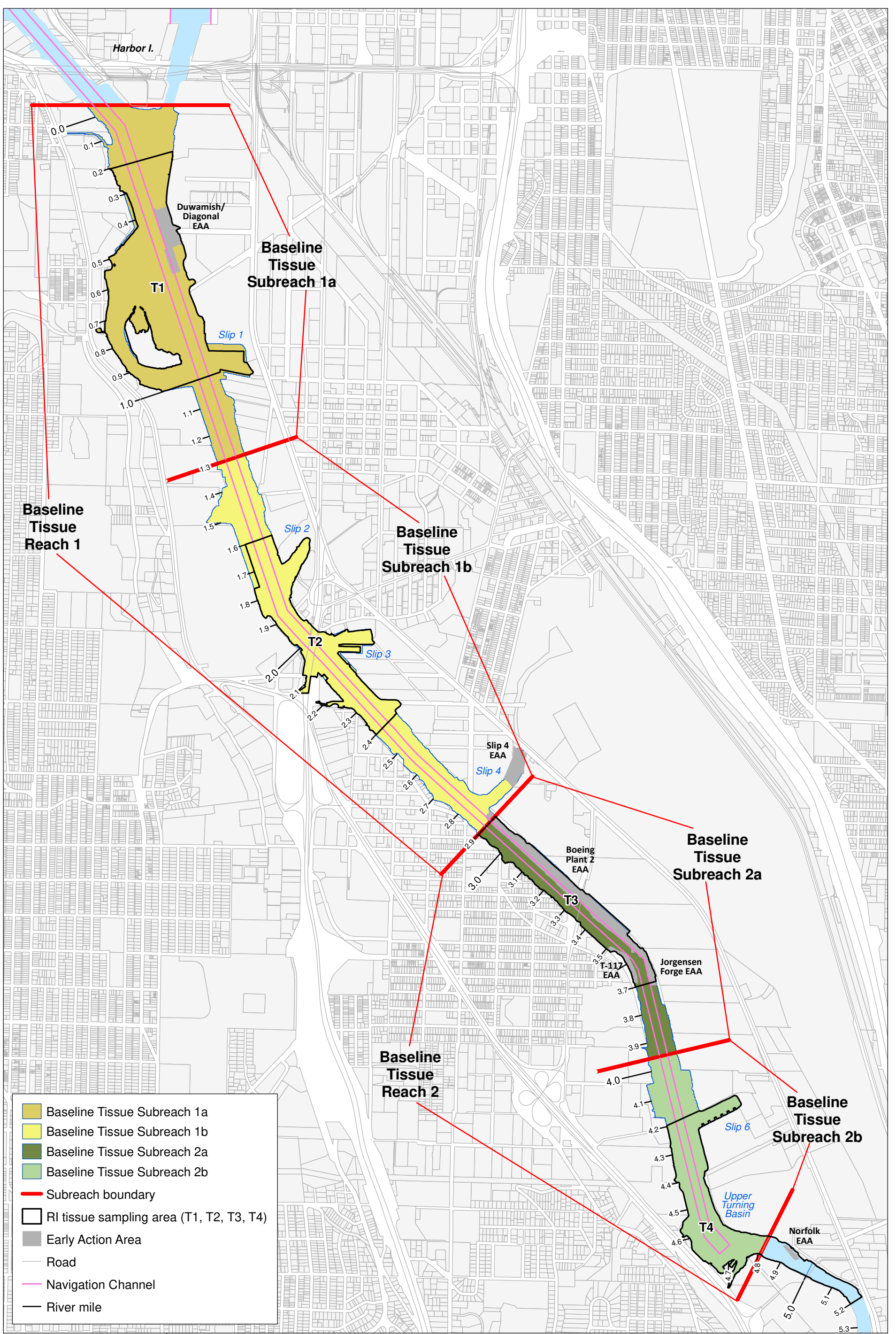
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Map 3-1. Locations of baseline surface water composite-grab samples and passive sampler deployment

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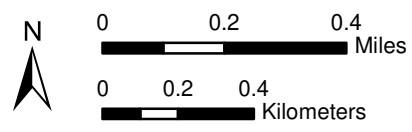
Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 3-1 6522 Surface water sampling locations.mxd



Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 4-1 6986 Fish-crab reaches.mxd

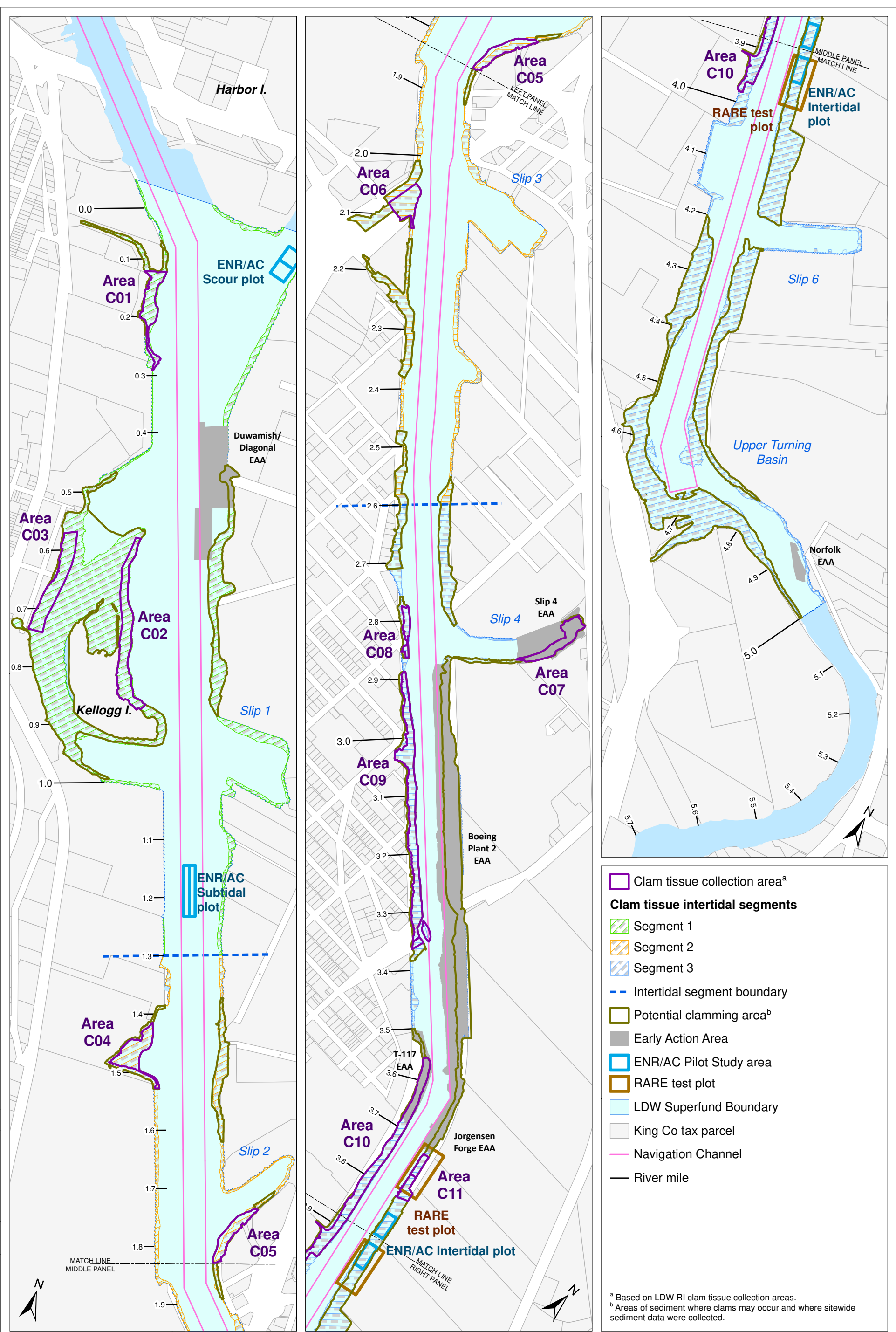


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Map 4-1. Sampling reaches and subreaches for baseline fish and crab tissue sampling

Prepared by craigh. 6/25/20. W:\Projects\Duwamish ACCS\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 5-1 6593 Clam collection areas.mxd



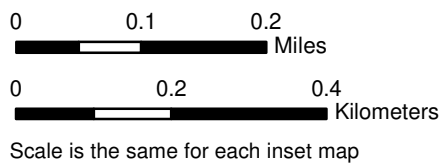
Map 5-1. Baseline clam tissue collection areas

- Clam tissue collection area^a
- Clam tissue intertidal segments**
- Segment 1
- Segment 2
- Segment 3
- Intertidal segment boundary
- Potential clamming area^b
- Early Action Area
- ENR/AC Pilot Study area
- RARE test plot
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

^a Based on LDW RI clam tissue collection areas.
^b Areas of sediment where clams may occur and where sitewide sediment data were collected.



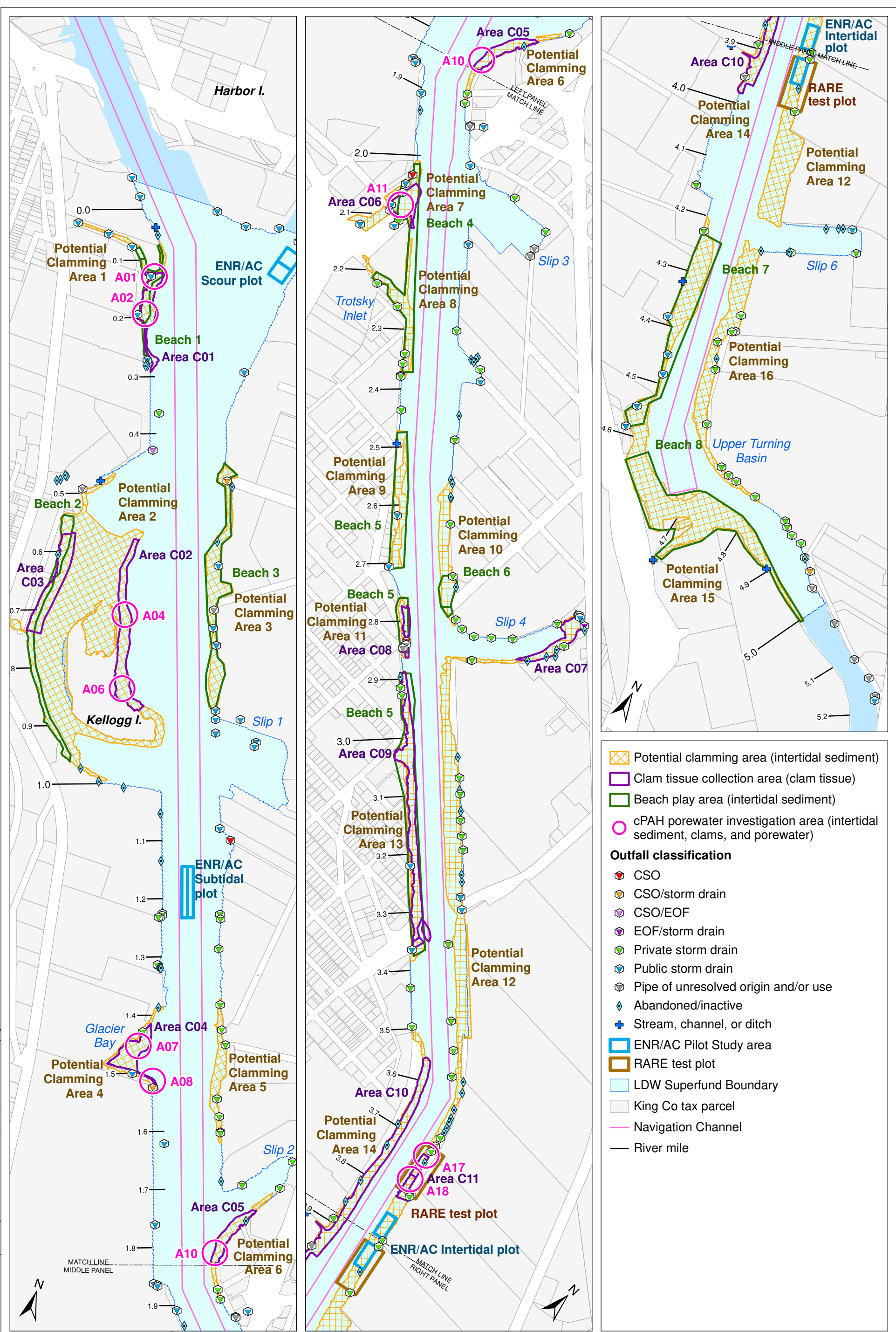
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Map 5-1. Baseline clam tissue collection areas

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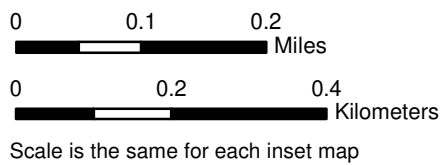
Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOCs\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 5-2 6517 Interstitial sampling - all.mxd



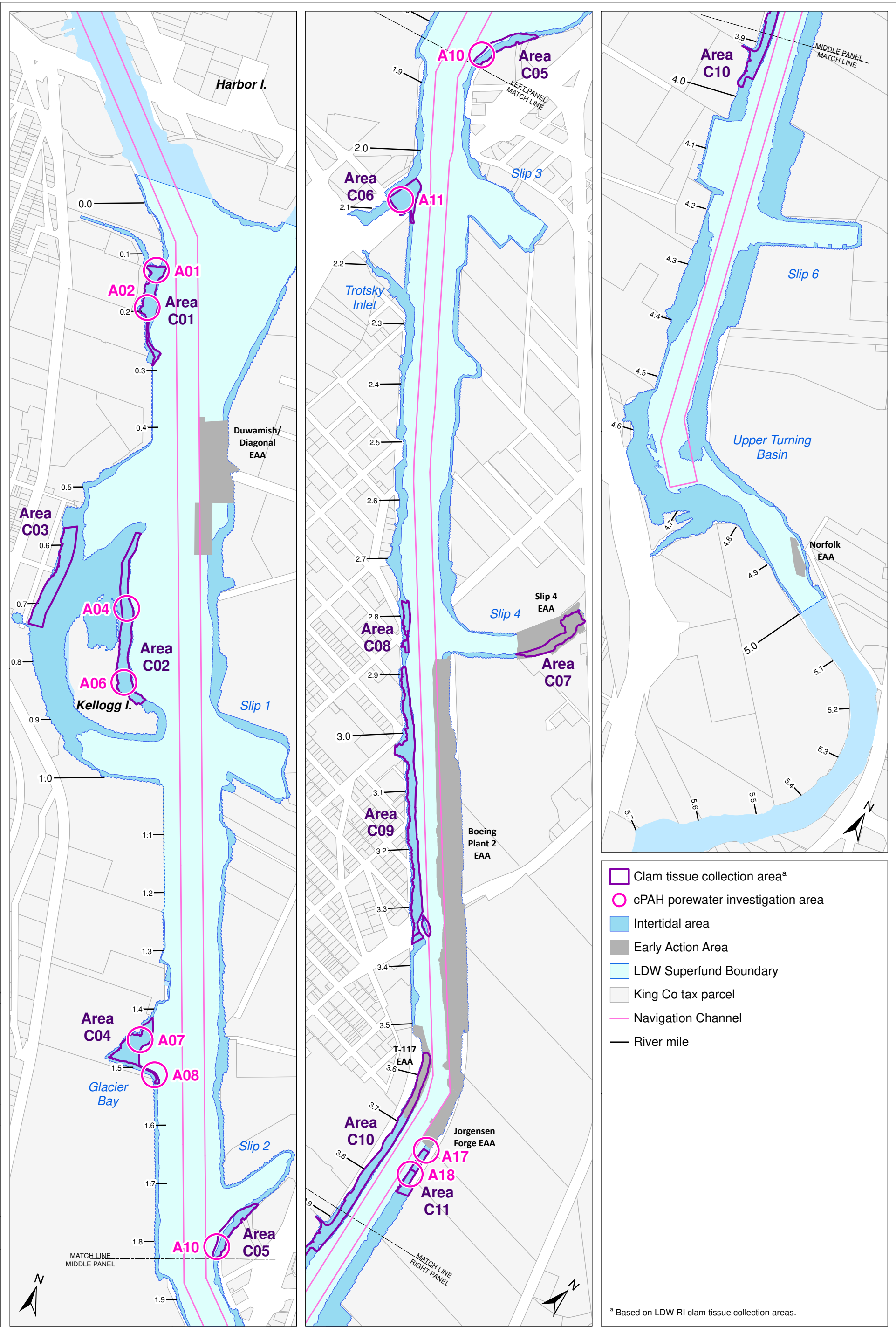
- Potential clamming area (intertidal sediment)
 - Clam tissue collection area (clam tissue)
 - Beach play area (intertidal sediment)
 - cPAH porewater investigation area (intertidal sediment, clams, and porewater)
- Outfall classification**
- CSO
 - CSO/storm drain
 - CSO/EOF
 - EOF/storm drain
 - Private storm drain
 - Public storm drain
 - Pipe of unresolved origin and/or use
 - Abandoned/inactive
 - Stream, channel, or ditch
 - ENR/AC Pilot Study area
 - RARE test plot
 - LDW Superfund Boundary
 - King Co tax parcel
 - Navigation Channel
 - River mile



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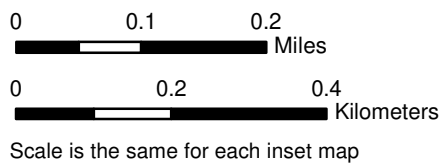


Map 5-2. Potential clamming areas, clam tissue collection areas, cPAH porewater study areas, and beach play areas

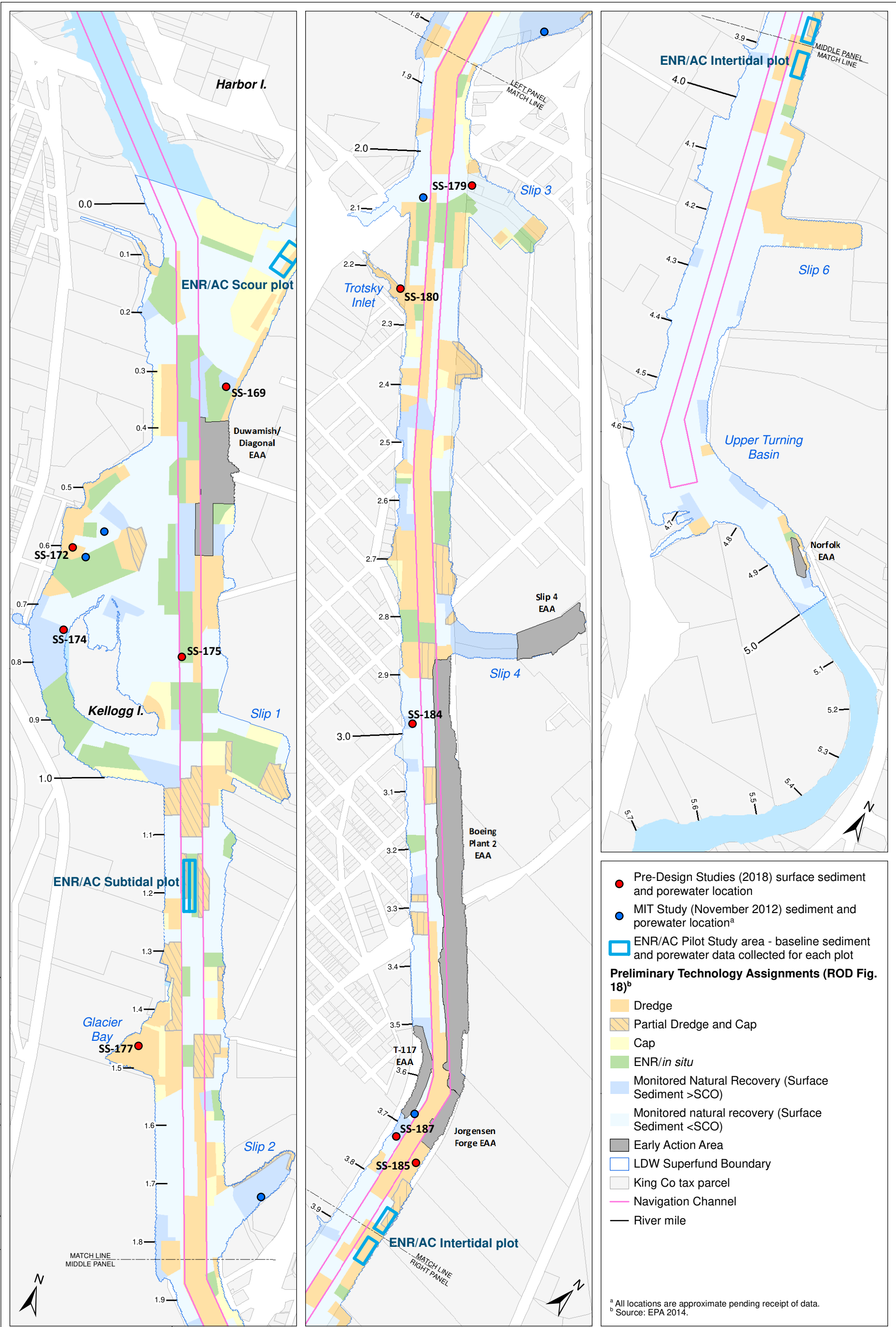


- Clam tissue collection area^a
- cPAH porewater investigation area
- Intertidal area
- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

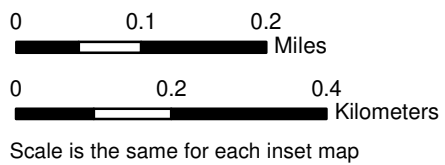
^a Based on LDW RI clam tissue collection areas.



Map 6-1. Targeted clam tissue collection and cPAH porewater investigation areas

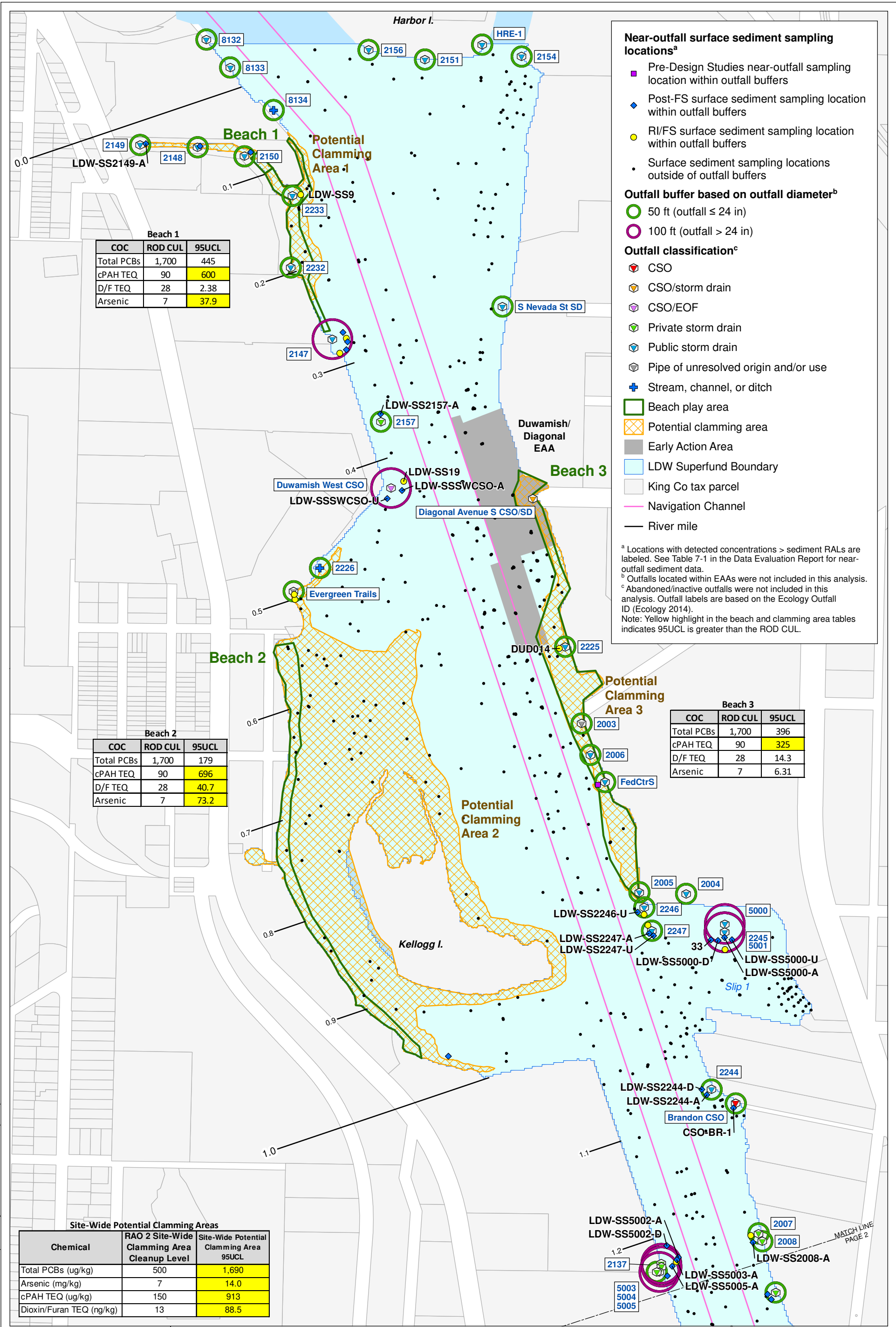


- Pre-Design Studies (2018) surface sediment and porewater location
 - MIT Study (November 2012) sediment and porewater location^a
 - ENR/AC Pilot Study area - baseline sediment and porewater data collected for each plot
- Preliminary Technology Assignments (ROD Fig. 18)^b**
- Dredge
 - Partial Dredge and Cap
 - Cap
 - ENR/*in situ*
 - Monitored Natural Recovery (Surface Sediment >SCO)
 - Monitored natural recovery (Surface Sediment <SCO)
 - Early Action Area
 - LDW Superfund Boundary
 - King Co tax parcel
 - Navigation Channel
 - River mile
- ^a All locations are approximate pending receipt of data.
^b Source: EPA 2014.



Map 6-2. Baseline PCB porewater locations relative to ROD Figure 18 preliminary technology assignments, ENR/AC pilot areas, and MIT study locations

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Beach 1

COC	ROD CUL	95UCL
Total PCBs	1,700	445
cPAH TEQ	90	600
D/F TEQ	28	2.38
Arsenic	7	37.9

Beach 2

COC	ROD CUL	95UCL
Total PCBs	1,700	179
cPAH TEQ	90	696
D/F TEQ	28	40.7
Arsenic	7	73.2

Beach 3

COC	ROD CUL	95UCL
Total PCBs	1,700	396
cPAH TEQ	90	325
D/F TEQ	28	14.3
Arsenic	7	6.31

Site-Wide Potential Clamming Areas

Chemical	RAO 2 Site-Wide Clamming Area Cleanup Level	Site-Wide Potential Clamming Area 95UCL
Total PCBs (ug/kg)	500	1,690
Arsenic (mg/kg)	7	14.0
cPAH TEQ (ug/kg)	150	913
Dioxin/Furan TEQ (ng/kg)	13	88.5

Near-outfall surface sediment sampling locations^a

- Pre-Design Studies near-outfall sampling location within outfall buffers
- Post-FS surface sediment sampling location within outfall buffers
- RI/FS surface sediment sampling location within outfall buffers
- Surface sediment sampling locations outside of outfall buffers

Outfall buffer based on outfall diameter^b

- 50 ft (outfall ≤ 24 in)
- 100 ft (outfall > 24 in)

Outfall classification^c

- CSO
- CSO/storm drain
- CSO/EOF
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Stream, channel, or ditch

Other Symbols:

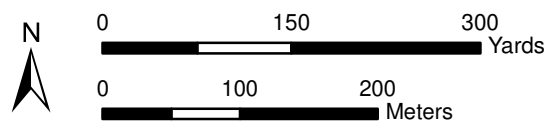
- Beach play area
- Potential clamming area
- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

^a Locations with detected concentrations > sediment RALs are labeled. See Table 7-1 in the Data Evaluation Report for near-outfall sediment data.
^b Outfalls located within EAAs were not included in this analysis.
^c Abandoned/inactive outfalls were not included in this analysis. Outfall labels are based on the Ecology Outfall ID (Ecology 2014).
 Note: Yellow highlight in the beach and clamming area tables indicates 95UCL is greater than the ROD CUL.

Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 7-1a 6894 Near-outfall locations.mxd



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Map 7-1a. Surface sediment sample locations near outfalls, RM 0.0 to RM 1.2

Near-outfall surface sediment sampling locations^a

- Pre-Design Studies near-outfall sampling location within outfall buffers
- Post-FS surface sediment sampling location within outfall buffers
- RI/FS surface sediment sampling location within outfall buffers
- Surface sediment sampling locations outside of outfall buffers

Outfall buffer based on outfall diameter^b

- 50 ft (outfall ≤ 24 in)
- 100 ft (outfall > 24 in)

Outfall classification^c

- CSO
- CSO/storm drain
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Stream, channel, or ditch
- Beach play area
- Potential clamming area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

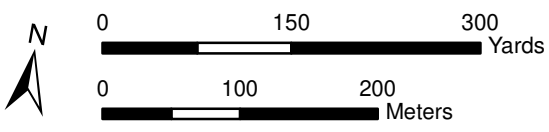
^a Locations with detected concentrations > sediment RALs are labeled. See Table 7-1 in the Data Evaluation Report for near-outfall sediment data.
^b Outfalls located within EAAs were not included in this analysis.
^c Abandoned/inactive outfalls were not included in this analysis. Outfall labels are based on the Ecology Outfall ID (Ecology 2014).
 Note: Yellow highlight in the beach and clamming area tables indicates 95UCL is greater than the ROD CUL.



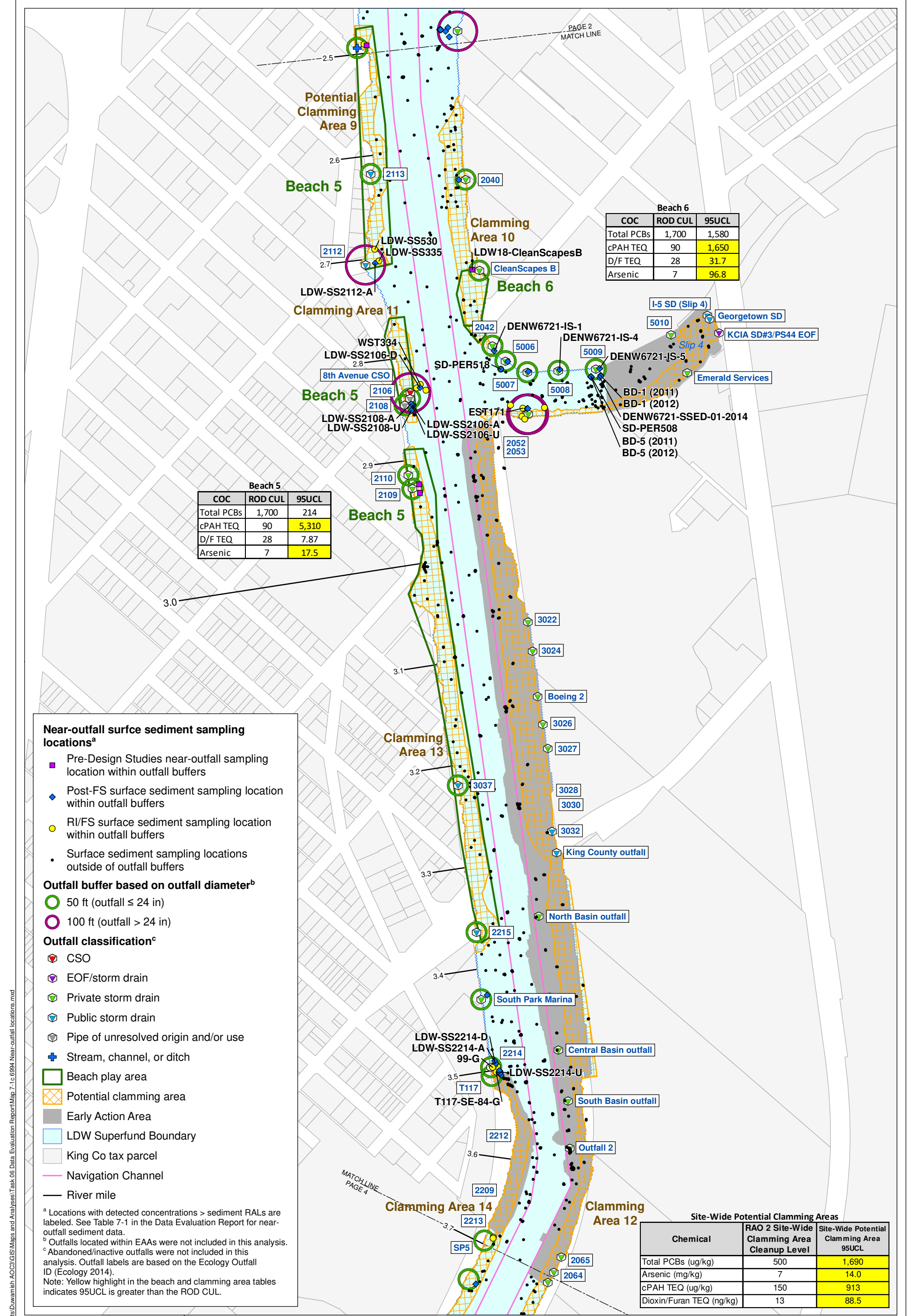
COC	ROD CUL	95UCL
Total PCBs	1,700	815
cPAH TEQ	90	93.4
D/F TEQ	28	125
Arsenic	7	11.8

Chemical	RAO 2 Site-Wide Clamming Area Cleanup Level	Site-Wide Potential Clamming Area 95UCL
Total PCBs (ug/kg)	500	1,690
Arsenic (mg/kg)	7	14.0
cPAH TEQ (ug/kg)	150	913
Dioxin/Furan TEQ (ng/kg)	13	88.5

COC	ROD CUL	95UCL
Total PCBs	1,700	214
cPAH TEQ	90	5,310
D/F TEQ	28	7.87
Arsenic	7	17.5



Map 7-1b. Surface sediment sample locations near outfalls, RM 1.2 to RM 2.5
 LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT



Beach 6

COC	ROD CUL	95UCL
Total PCBs	1,700	1,580
cPAH TEQ	90	1,650
D/F TEQ	28	31.7
Arsenic	7	96.8

Beach 5

COC	ROD CUL	95UCL
Total PCBs	1,700	214
cPAH TEQ	90	5,310
D/F TEQ	28	7.87
Arsenic	7	17.5

Site-Wide Potential Clammings

Chemical	RAO 2 Site-Wide Clammings Area Cleanup Level	Site-Wide Potential Clammings Area 95UCL
Total PCBs (ug/kg)	500	1,690
Arsenic (mg/kg)	7	14.0
cPAH TEQ (ug/kg)	150	913
Dioxin/Furan TEQ (ng/kg)	13	88.5

Near-outfall surface sediment sampling locations^a

- Pre-Design Studies near-outfall sampling location within outfall buffers
- Post-FS surface sediment sampling location within outfall buffers
- RI/FS surface sediment sampling location within outfall buffers
- Surface sediment sampling locations outside of outfall buffers

Outfall buffer based on outfall diameter^b

- 50 ft (outfall ≤ 24 in)
- 100 ft (outfall > 24 in)

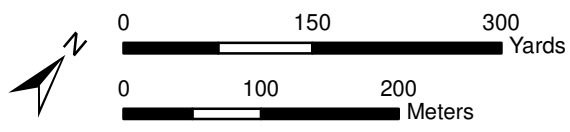
Outfall classification^c

- CSO
- EOF/storm drain
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Stream, channel, or ditch

Other symbols:

- Beach play area
- Potential clamming area
- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

^a Locations with detected concentrations > sediment RALs are labeled. See Table 7-1 in the Data Evaluation Report for near-outfall sediment data.
^b Outfalls located within EAAs were not included in this analysis.
^c Abandoned/inactive outfalls were not included in this analysis. Outfall labels are based on the Ecology Outfall ID (Ecology 2014).
 Note: Yellow highlight in the beach and clamming area tables indicates 95UCL is greater than the ROD CUL.



Map 7-1c. Surface sediment sample locations near outfalls, RM 2.5 to RM 3.7

Site-Wide Potential Clamming Areas		
Chemical	RAO 2 Site-Wide Clamming Area Cleanup Level	Site-Wide Potential Clamming Area 95UCL
Total PCBs (ug/kg)	500	1,690
Arsenic (mg/kg)	7	14.0
cPAH TEQ (ug/kg)	150	913
Dioxin/Furan TEQ (ng/kg)	13	88.5

Beach 7		
COC	ROD CUL	95UCL
Total PCBs	1,700	160
cPAH TEQ	90	63.4
D/F TEQ	28	2.69
Arsenic	7	7.97

Beach 8		
COC	ROD CUL	95UCL
Total PCBs	1,700	302
cPAH TEQ	90	232
D/F TEQ	28	6.86
Arsenic	7	13.0

Near-outfall surface sediment sampling locations^a

- Pre-Design Studies near-outfall sampling location within outfall buffers
- Post-FS surface sediment sampling location within outfall buffers
- RI/FS surface sediment sampling location within outfall buffers
- Surface sediment sampling locations outside of outfall buffers

Outfall buffer based on outfall diameter^b

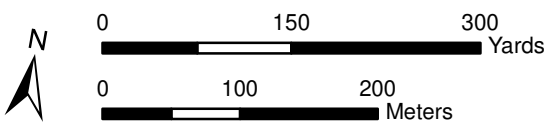
- 50 ft (outfall ≤ 24 in)
- 100 ft (outfall > 24 in)

Outfall classification^c

- CSO/storm drain
- EOF/storm drain
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Stream, channel, or ditch
- Beach play area
- Potential clamming area
- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

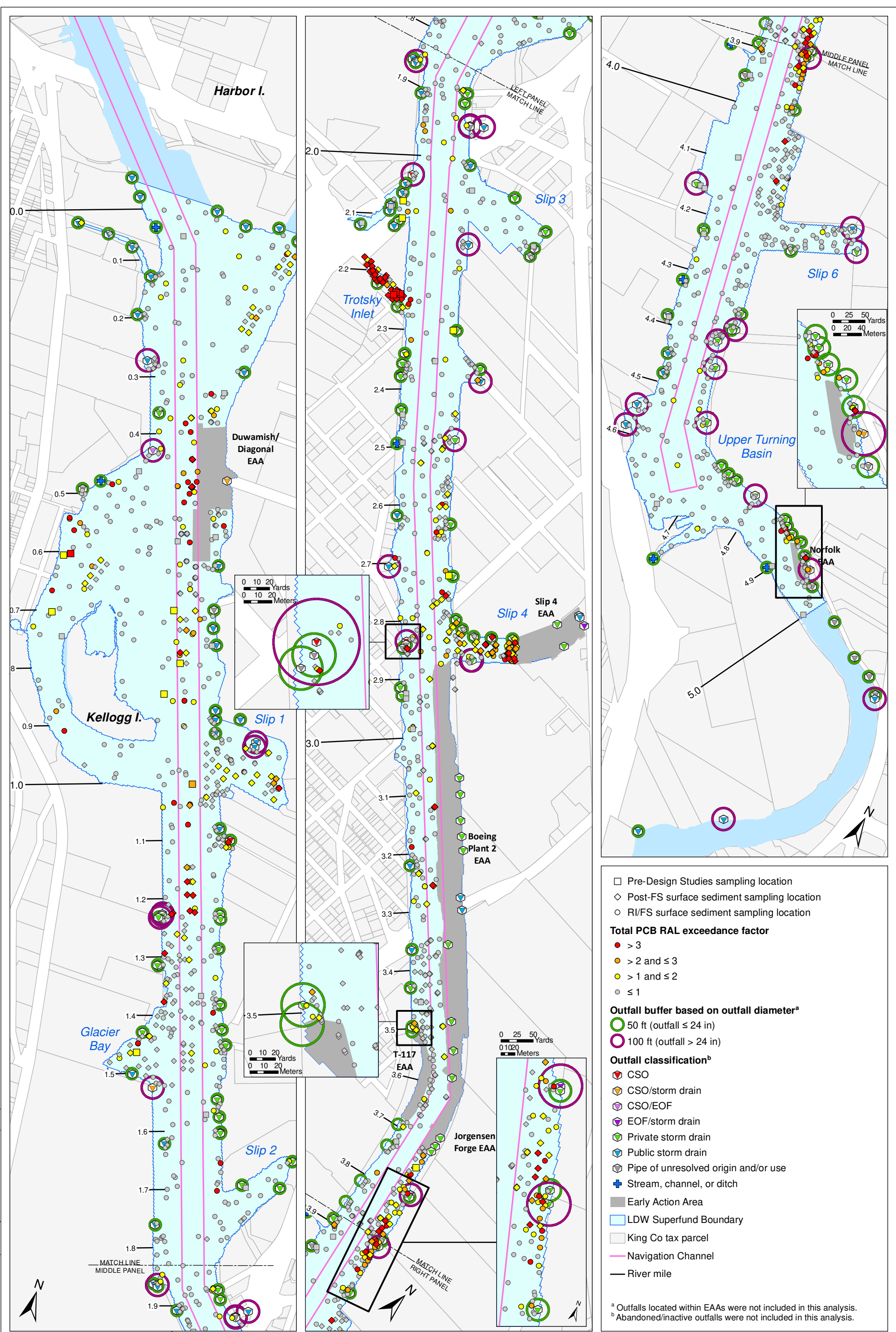
^a Locations with detected concentrations > sediment RALs are labeled. See Table 7-1 in the Data Evaluation Report for near-outfall sediment data.
^b Outfalls located within EAAs were not included in this analysis.
^c Abandoned/inactive outfalls were not included in this analysis. Outfall labels are based on the Ecology Outfall ID (Ecology 2014).
 Note: Yellow highlight in the beach and clamming area tables indicates 95UCL is greater than the ROD CUL.

Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 7-1.d 6894 Near-outfall locations.mxd



Map 7-1d. Surface sediment sample locations near outfalls, RM 3.7 to RM 5.0

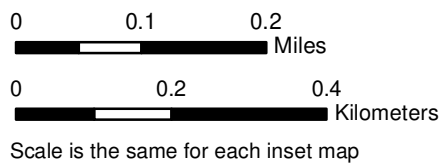
Prepared by craigh_6/25/20: W:\Projects\Duwamish ACCS\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 7-2a 6994_Near-outfall locations - PCBs.mxd



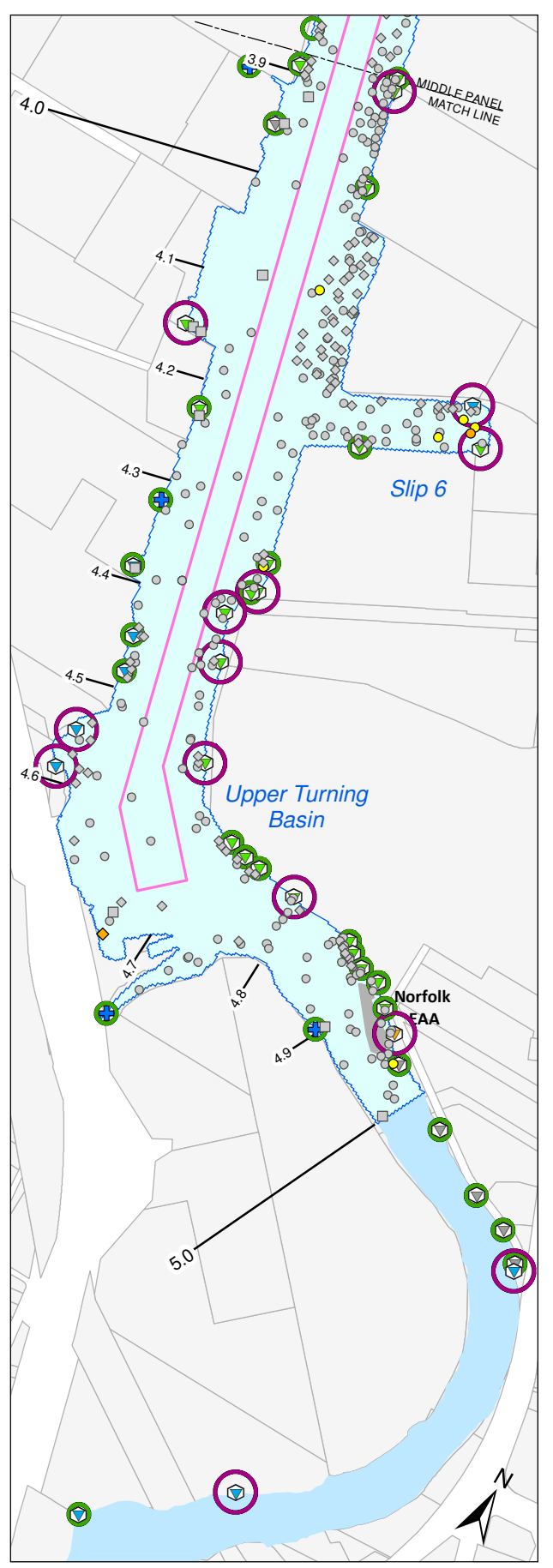
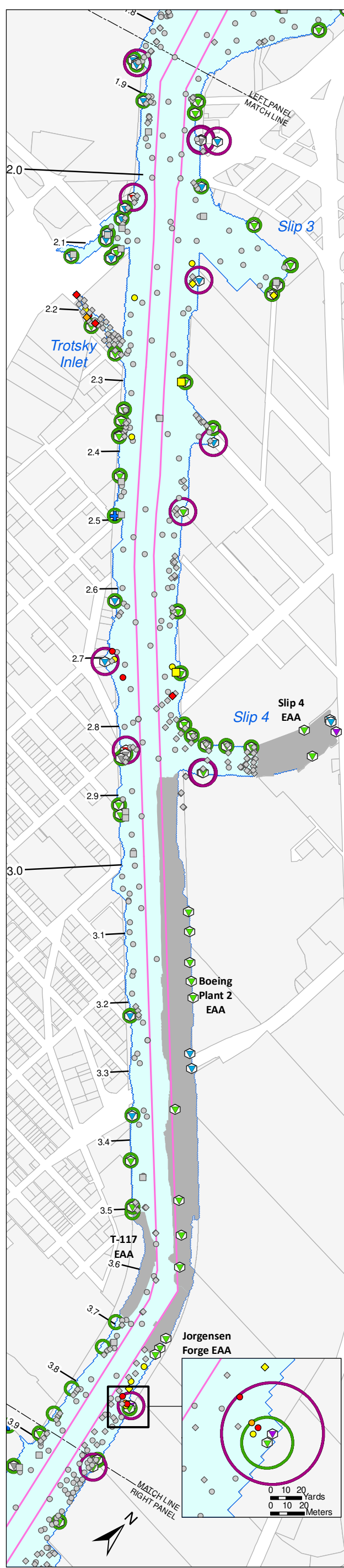
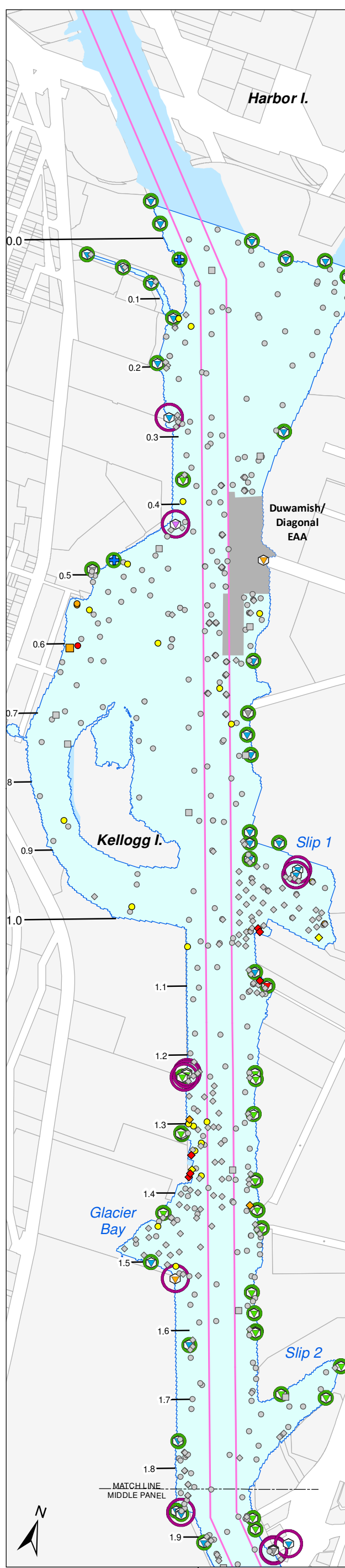
- Pre-Design Studies sampling location
 - ◇ Post-FS surface sediment sampling location
 - RI/FS surface sediment sampling location
- Total PCB RAL exceedance factor**
- > 3
 - > 2 and ≤ 3
 - > 1 and ≤ 2
 - ≤ 1
- Outfall buffer based on outfall diameter^a**
- 50 ft (outfall ≤ 24 in)
 - 100 ft (outfall > 24 in)
- Outfall classification^b**
- ◆ CSO
 - ◆ CSO/storm drain
 - ◆ CSO/EOF
 - ◆ EOF/storm drain
 - ◆ Private storm drain
 - ◆ Public storm drain
 - ◆ Pipe of unresolved origin and/or use
 - ◆ Stream, channel, or ditch
- Early Action Area
 - LDW Superfund Boundary
 - King Co tax parcel
 - Navigation Channel
 - River mile
- ^a Outfalls located within EAAs were not included in this analysis.
^b Abandoned/inactive outfalls were not included in this analysis.

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Map 7-2a. Near-outfall surface sediment sample locations and RAL exceedances - total PCBs
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Pre-Design Studies sampling location
 Post-FS surface sediment sampling location
 RI/FS surface sediment sampling location

cPAH RAL exceedance factor

- > 3
- > 2 and ≤ 3
- > 1 and ≤ 2
- ≤ 1

Outfall buffer based on outfall diameter^a

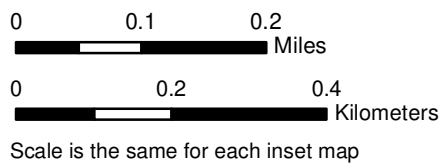
- 50 ft (outfall ≤ 24 in)
- 100 ft (outfall > 24 in)

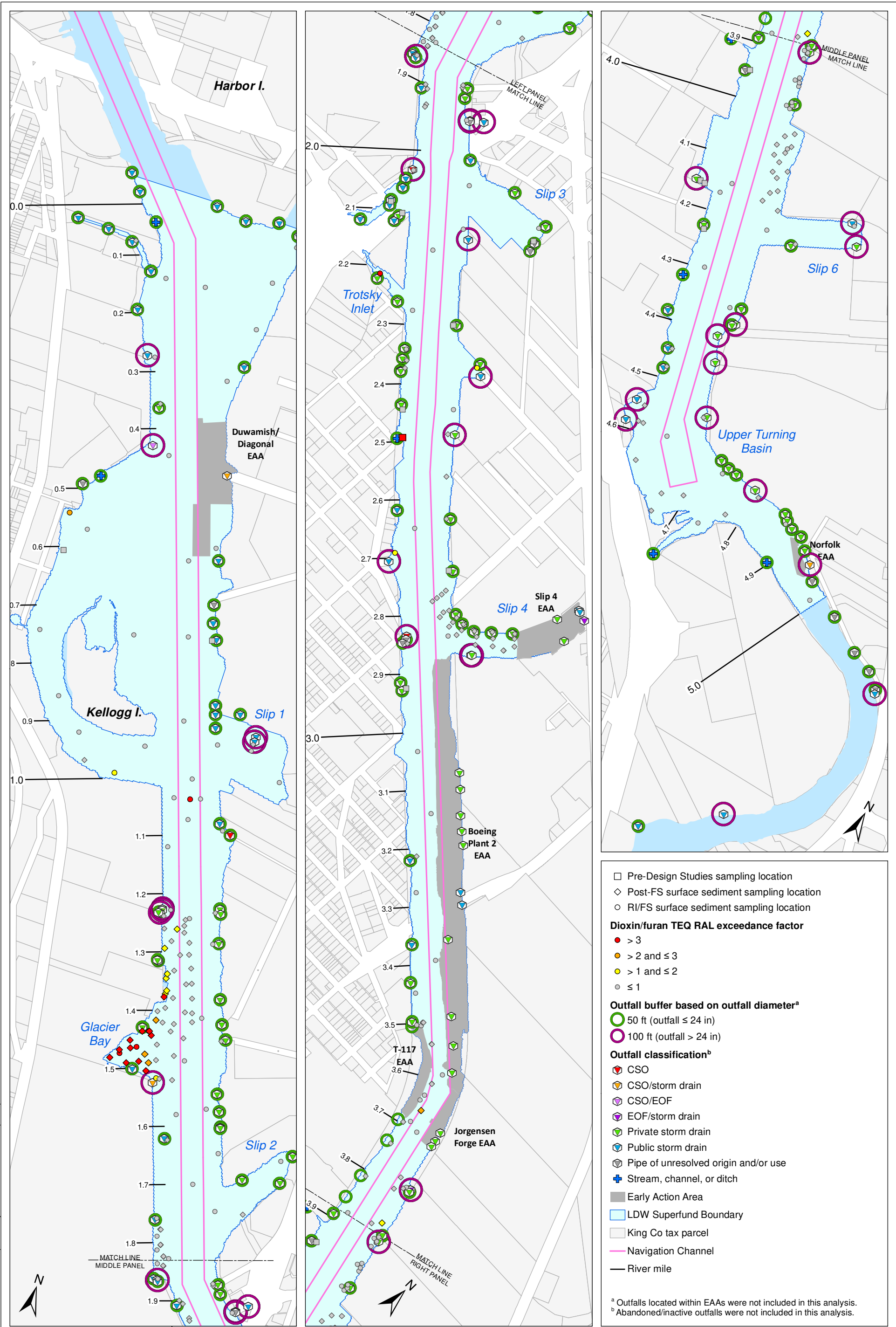
Outfall classification^b

- ◆ CSO
- ◆ CSO/storm drain
- ◆ CSO/EOF
- ◆ EOF/storm drain
- ◆ Private storm drain
- ◆ Public storm drain
- ◆ Pipe of unresolved origin and/or use
- ◆ Stream, channel, or ditch

- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

^a Outfalls located within EAAs were not included in this analysis.
^b Abandoned/inactive outfalls were not included in this analysis.





Pre-Design Studies sampling location
 Post-FS surface sediment sampling location
 RI/FS surface sediment sampling location

Dioxin/furan TEQ RAL exceedance factor

- > 3
- > 2 and ≤ 3
- > 1 and ≤ 2
- ≤ 1

Outfall buffer based on outfall diameter^a

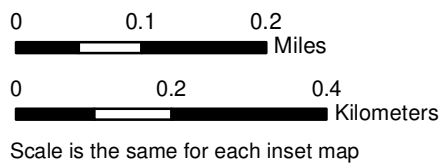
- 50 ft (outfall ≤ 24 in)
- 100 ft (outfall > 24 in)

Outfall classification^b

- ◆ CSO
- ◆ CSO/storm drain
- ◆ CSO/EOF
- ◆ EOF/storm drain
- ◆ Private storm drain
- ◆ Public storm drain
- ◆ Pipe of unresolved origin and/or use
- ◆ Stream, channel, or ditch

- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

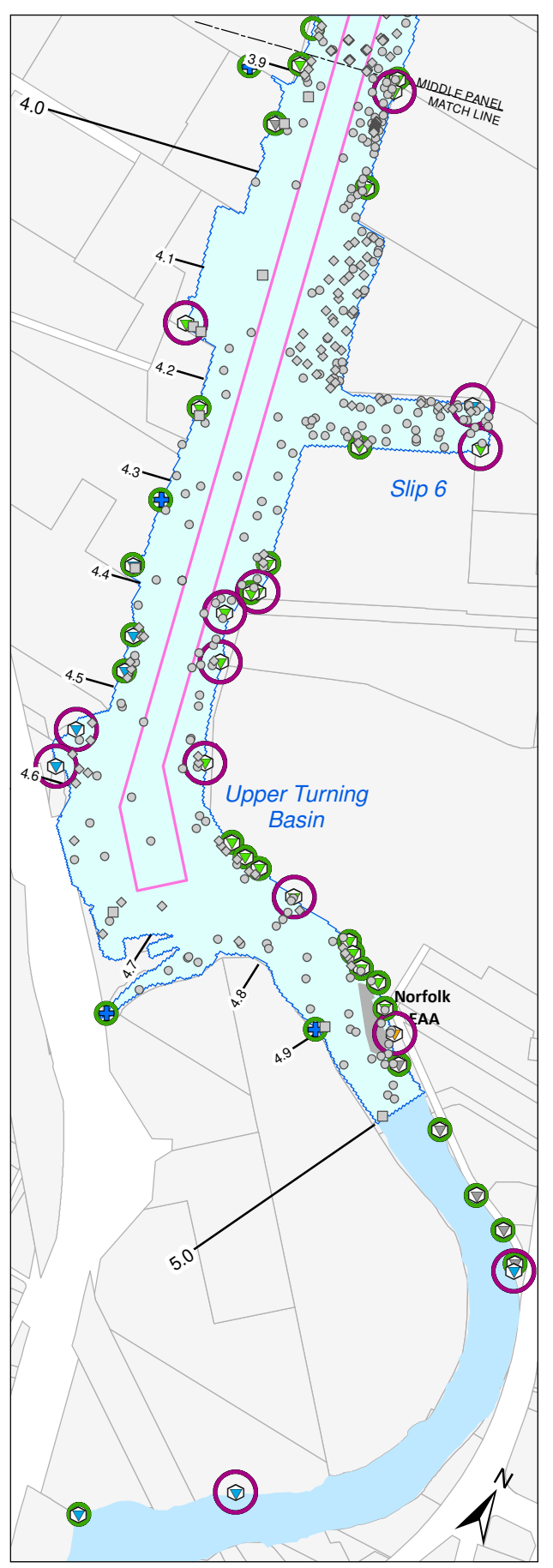
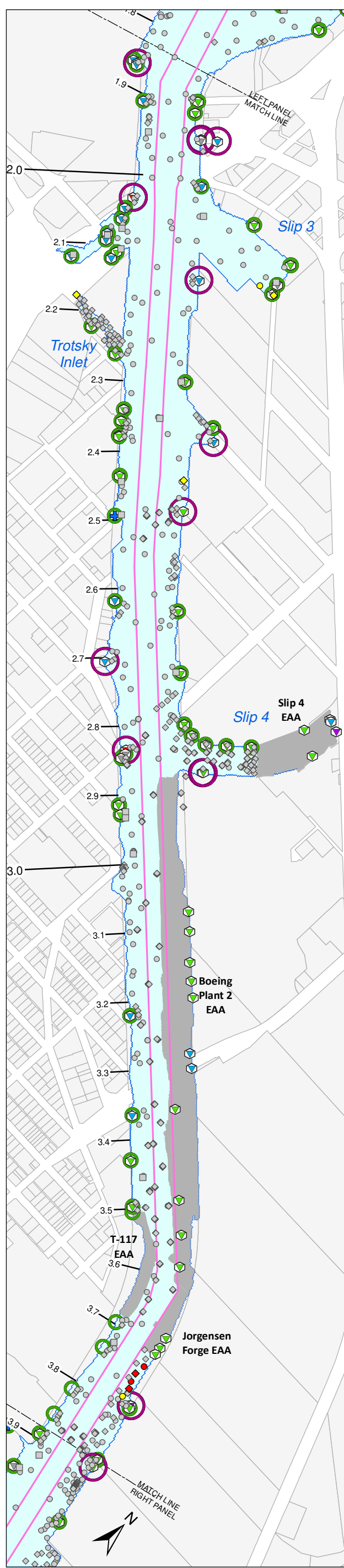
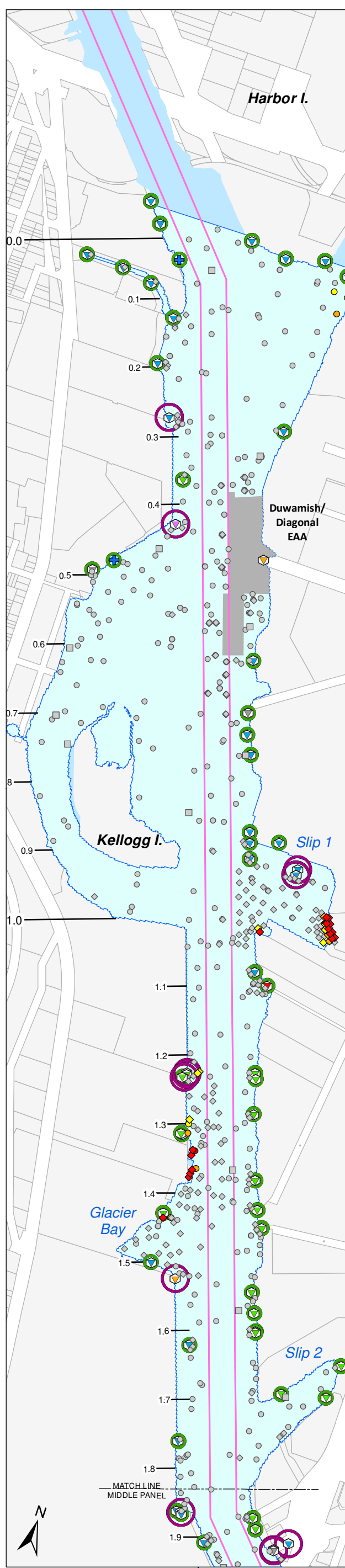
^a Outfalls located within EAAs were not included in this analysis.
^b Abandoned/inactive outfalls were not included in this analysis.



Map 7-2c. Near-outfall surface sediment sample locations and RAL exceedances - dioxin/furan TEQ

LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT

Prepared by craigh_6/25/20: W:\Projects\Duwamish ACCS\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 7-2d 6994 Near-outfall locations - As.mxd



- Pre-Design Studies sampling location
- ◇ Post-FS surface sediment sampling location
- RI/FS surface sediment sampling location

Arsenic RAL exceedance factor

- > 3
- > 2 and ≤ 3
- > 1 and ≤ 2
- ≤ 1

Outfall buffer based on outfall diameter^a

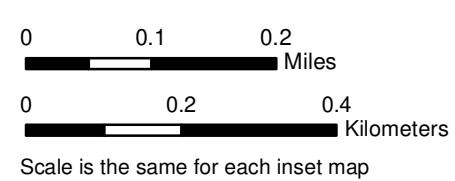
- 50 ft (outfall ≤ 24 in)
- 100 ft (outfall > 24 in)

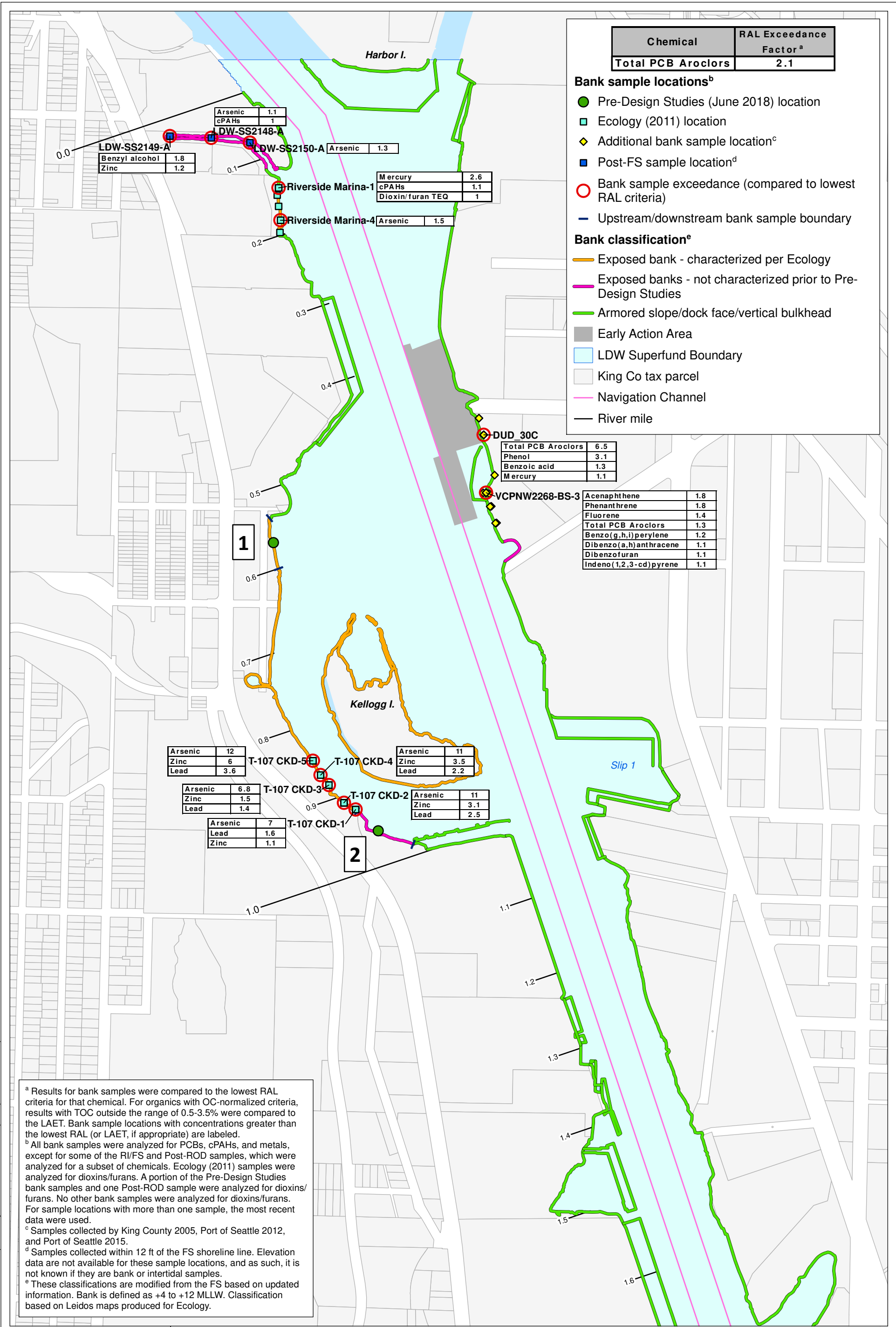
Outfall classification^b

- ◇ CSO
- ◇ CSO/storm drain
- ◇ CSO/EOF
- ◇ EOF/storm drain
- ◇ Private storm drain
- ◇ Public storm drain
- ◇ Pipe of unresolved origin and/or use
- ◇ Stream, channel, or ditch

- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

^a Outfalls located within EAAs were not included in this analysis.
^b Abandoned/inactive outfalls were not included in this analysis.





Chemical	RAL Exceedance Factor ^a
Total PCB Aroclors	2.1

- Bank sample locations^b**
- Pre-Design Studies (June 2018) location
 - Ecology (2011) location
 - ◆ Additional bank sample location^c
 - Post-FS sample location^d
 - Bank sample exceedance (compared to lowest RAL criteria)
 - Upstream/downstream bank sample boundary

- Bank classification^e**
- Exposed bank - characterized per Ecology
 - Exposed banks - not characterized prior to Pre-Design Studies
 - Armored slope/dock face/vertical bulkhead
 - Early Action Area
 - LDW Superfund Boundary
 - King Co tax parcel
 - Navigation Channel
 - River mile

LDW-SS2149-A	
Benzyl alcohol	1.8
Zinc	1.2

DW-SS2148-A	
Arsenic	1.1
cPAHs	1

LDW-SS2150-A	
Arsenic	1.3

Riverside Marina-1	
Mercury	2.6
cPAHs	1.1
Dioxin/furan TEQ	1

Riverside Marina-4	
Arsenic	1.5

DUD_30C	
Total PCB Aroclors	6.5
Phenol	3.1
Benzoic acid	1.3
Mercury	1.1

VCPNW2268-BS-3	
Acenaphthene	1.8
Phenanthrene	1.8
Fluorene	1.4
Total PCB Aroclors	1.3
Benzo(g,h,i)perylene	1.2
Dibenzo(a,h)anthracene	1.1
Dibenzofuran	1.1
Indeno(1,2,3-cd)pyrene	1.1

T-107 CKD-5	
Arsenic	12
Zinc	6
Lead	3.6

T-107 CKD-4	
Arsenic	11
Zinc	3.5
Lead	2.2

T-107 CKD-3	
Arsenic	6.8
Zinc	1.5
Lead	1.4

T-107 CKD-2	
Arsenic	11
Zinc	3.1
Lead	2.5

T-107 CKD-1	
Arsenic	7
Lead	1.6
Zinc	1.1

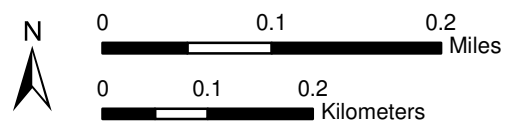
^a Results for bank samples were compared to the lowest RAL criteria for that chemical. For organics with OC-normalized criteria, results with TOC outside the range of 0.5-3.5% were compared to the LAET. Bank sample locations with concentrations greater than the lowest RAL (or LAET, if appropriate) are labeled.

^b All bank samples were analyzed for PCBs, cPAHs, and metals, except for some of the RI/FS and Post-ROD samples, which were analyzed for a subset of chemicals. Ecology (2011) samples were analyzed for dioxins/furans. A portion of the Pre-Design Studies bank samples and one Post-ROD sample were analyzed for dioxins/furans. No other bank samples were analyzed for dioxins/furans. For sample locations with more than one sample, the most recent data were used.

^c Samples collected by King County 2005, Port of Seattle 2012, and Port of Seattle 2015.

^d Samples collected within 12 ft of the FS shoreline line. Elevation data are not available for these sample locations, and as such, it is not known if they are bank or intertidal samples.

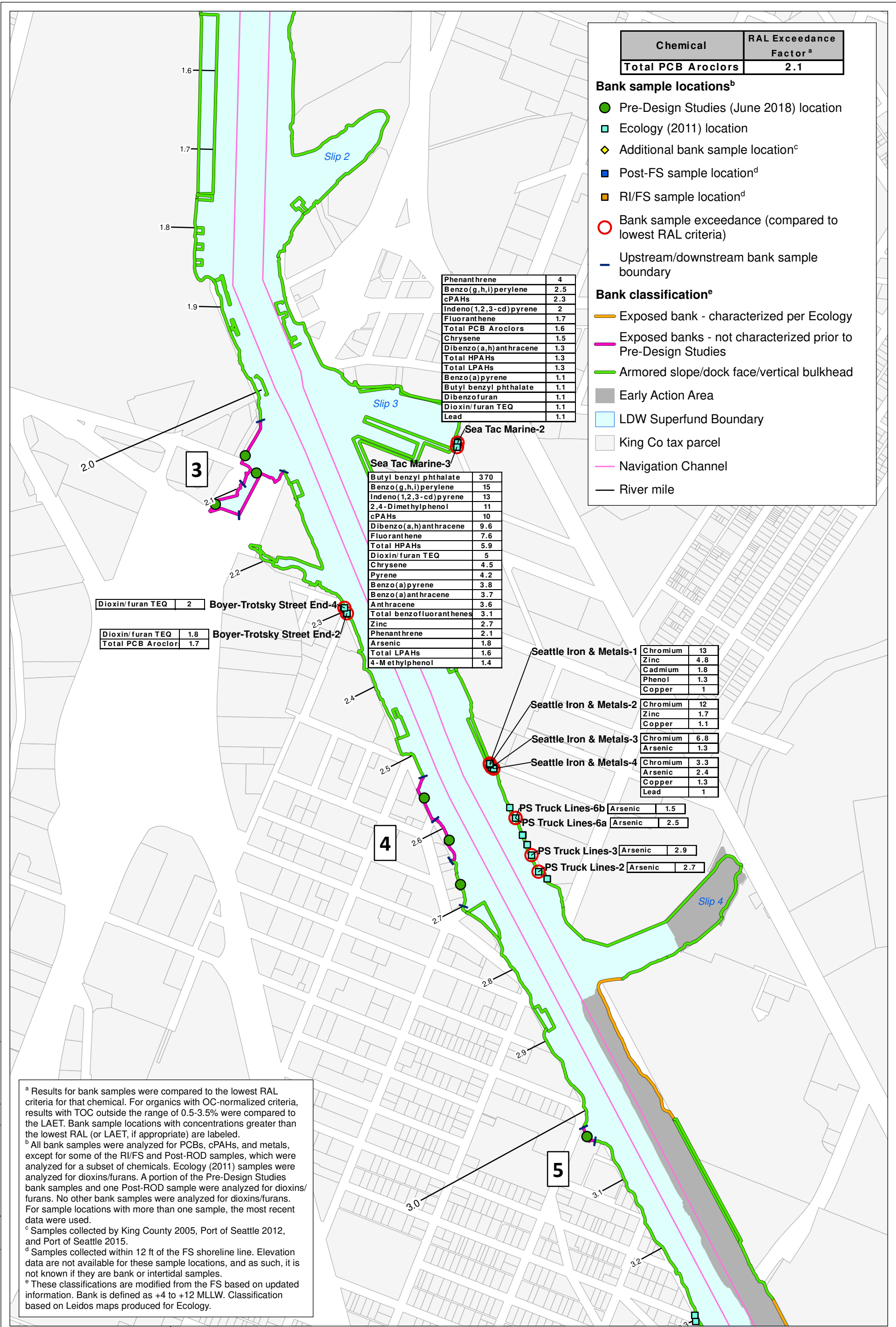
^e These classifications are modified from the FS based on updated information. Bank is defined as +4 to +12 MLLW. Classification based on Leidos maps produced for Ecology.



Map 7-3a. Comparison of bank data with lowest surface sediment RALs, RM 0.0 to RM 1.6

LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT

Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 7-3a 6890 Bank sample locations.mxd



Chemical	RAL Exceedance Factor ^a
Total PCB Aroclors	2.1

- Bank sample locations^b**
- Pre-Design Studies (June 2018) location
 - Ecology (2011) location
 - ◆ Additional bank sample location^c
 - Post-FS sample location^d
 - RI/FS sample location^d
 - Bank sample exceedance (compared to lowest RAL criteria)
 - Upstream/downstream bank sample boundary
- Bank classification^e**
- Exposed bank - characterized per Ecology
 - Exposed banks - not characterized prior to Pre-Design Studies
 - Armored slope/dock face/vertical bulkhead
 - Early Action Area
 - LDW Superfund Boundary
 - King Co tax parcel
 - Navigation Channel
 - River mile

Phenanthrene	4
Benzo(g,h,i)perylene	2.5
cPAHs	2.3
Indeno(1,2,3-cd)pyrene	2
Fluoranthene	1.7
Total PCB Aroclors	1.6
Chrysene	1.5
Dibenzo(a,h)anthracene	1.3
Total HPAHs	1.3
Total LPAHs	1.3
Benzo(a)pyrene	1.1
Butyl benzyl phthalate	1.1
Dibenzofuran	1.1
Dioxin/furan TEQ	1.1
Lead	1.1

Butyl benzyl phthalate	370
Benzo(g,h,i)perylene	15
Indeno(1,2,3-cd)pyrene	13
2,4-Dimethylphenol	11
cPAHs	10
Dibenzo(a,h)anthracene	9.6
Fluoranthene	7.6
Total HPAHs	5.9
Dioxin/furan TEQ	5
Chrysene	4.5
Pyrene	4.2
Benzo(a)pyrene	3.8
Benzo(a)anthracene	3.7
Anthracene	3.6
Total benzofluoranthenes	3.1
Zinc	2.7
Phenanthrene	2.1
Arsenic	1.8
Total LPAHs	1.6
4-Methylphenol	1.4

Dioxin/furan TEQ	2
------------------	---

Boyer-Trotsky Street End-4

Dioxin/furan TEQ	1.8
Total PCB Aroclor	1.7

Boyer-Trotsky Street End-2

Chromium	13
Zinc	4.8
Cadmium	1.8
Phenol	1.3
Copper	1

Seattle Iron & Metals-1

Chromium	12
Zinc	1.7
Copper	1.1

Seattle Iron & Metals-2

Chromium	6.8
Arsenic	1.3

Seattle Iron & Metals-3

Chromium	3.3
Arsenic	2.4
Copper	1.3
Lead	1

Seattle Iron & Metals-4

Arsenic	1.5
---------	-----

PS Truck Lines-6b

Arsenic	2.5
---------	-----

PS Truck Lines-6a

Arsenic	2.9
---------	-----

PS Truck Lines-3

Arsenic	2.7
---------	-----

PS Truck Lines-2

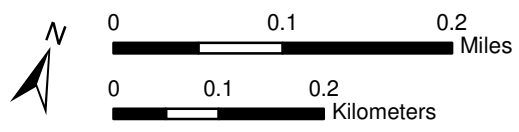
^a Results for bank samples were compared to the lowest RAL criteria for that chemical. For organics with OC-normalized criteria, results with TOC outside the range of 0.5-3.5% were compared to the LAET. Bank sample locations with concentrations greater than the lowest RAL (or LAET, if appropriate) are labeled.

^b All bank samples were analyzed for PCBs, cPAHs, and metals, except for some of the RI/FS and Post-ROD samples, which were analyzed for a subset of chemicals. Ecology (2011) samples were analyzed for dioxins/furans. A portion of the Pre-Design Studies bank samples and one Post-ROD sample were analyzed for dioxins/furans. No other bank samples were analyzed for dioxins/furans. For sample locations with more than one sample, the most recent data were used.

^c Samples collected by King County 2005, Port of Seattle 2012, and Port of Seattle 2015.

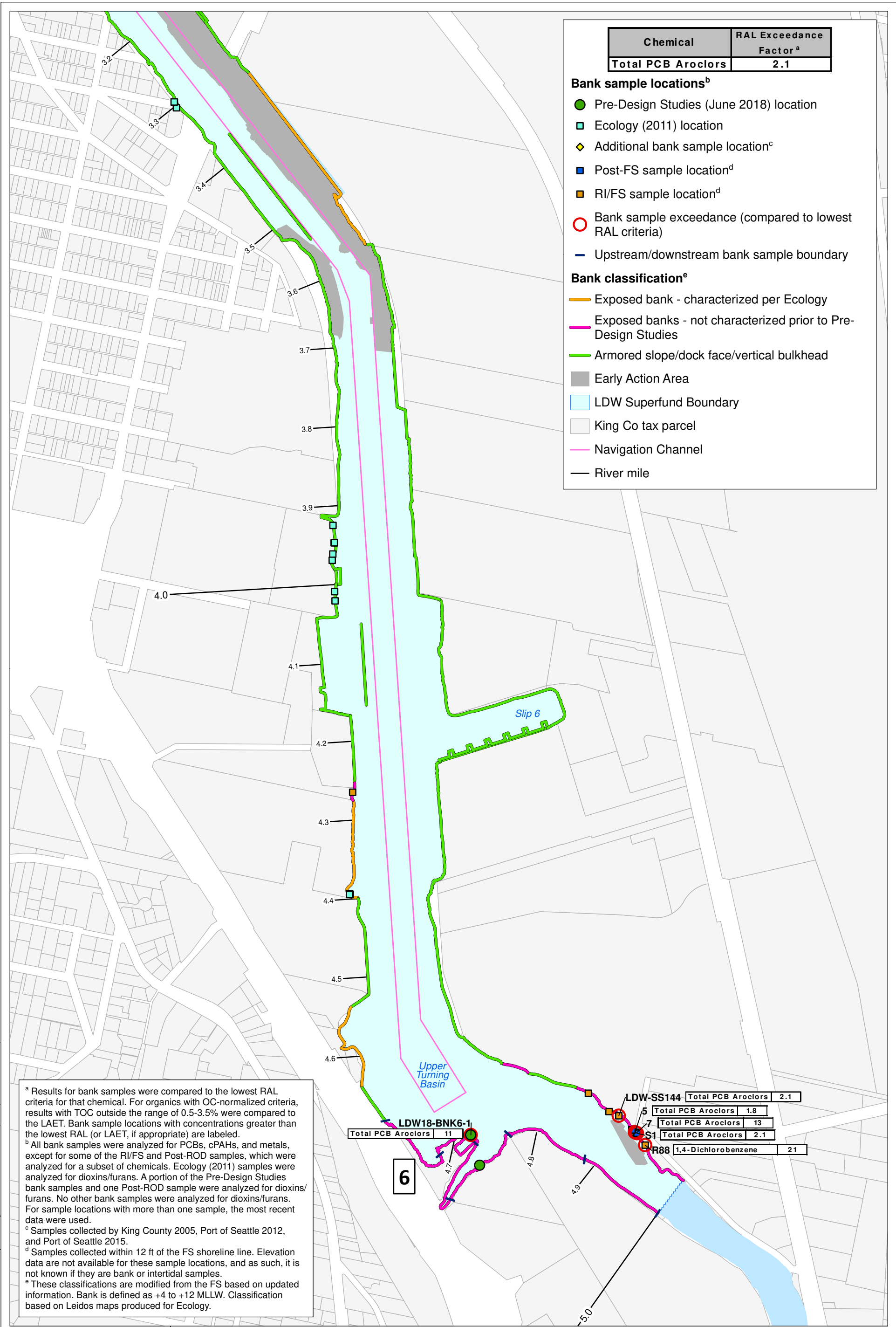
^d Samples collected within 12 ft of the FS shoreline line. Elevation data are not available for these sample locations, and as such, it is not known if they are bank or intertidal samples.

^e These classifications are modified from the FS based on updated information. Bank is defined as +4 to +12 MLLW. Classification based on Leidos maps produced for Ecology.



Map 7-3b. Comparison of bank data with lowest surface sediment RALs, RM 1.6 to RM 3.2

LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT



Chemical	RAL Exceedance Factor ^a
Total PCB Aroclors	2.1

Bank sample locations^b

- Pre-Design Studies (June 2018) location
- Ecology (2011) location
- ◇ Additional bank sample location^c
- Post-FS sample location^d
- RI/FS sample location^d
- Bank sample exceedance (compared to lowest RAL criteria)
- Upstream/downstream bank sample boundary

Bank classification^e

- Exposed bank - characterized per Ecology
- Exposed banks - not characterized prior to Pre-Design Studies
- Armored slope/dock face/vertical bulkhead
- Early Action Area
- LDW Superfund Boundary
- King Co tax parcel
- Navigation Channel
- River mile

^a Results for bank samples were compared to the lowest RAL criteria for that chemical. For organics with OC-normalized criteria, results with TOC outside the range of 0.5-3.5% were compared to the LAET. Bank sample locations with concentrations greater than the lowest RAL (or LAET, if appropriate) are labeled.

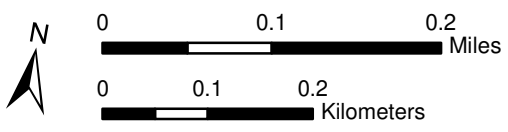
^b All bank samples were analyzed for PCBs, cPAHs, and metals, except for some of the RI/FS and Post-ROD samples, which were analyzed for a subset of chemicals. Ecology (2011) samples were analyzed for dioxins/furans. A portion of the Pre-Design Studies bank samples and one Post-ROD sample were analyzed for dioxins/furans. No other bank samples were analyzed for dioxins/furans. For sample locations with more than one sample, the most recent data were used.

^c Samples collected by King County 2005, Port of Seattle 2012, and Port of Seattle 2015.

^d Samples collected within 12 ft of the FS shoreline line. Elevation data are not available for these sample locations, and as such, it is not known if they are bank or intertidal samples.

^e These classifications are modified from the FS based on updated information. Bank is defined as +4 to +12 MLLW. Classification based on Leidos maps produced for Ecology.

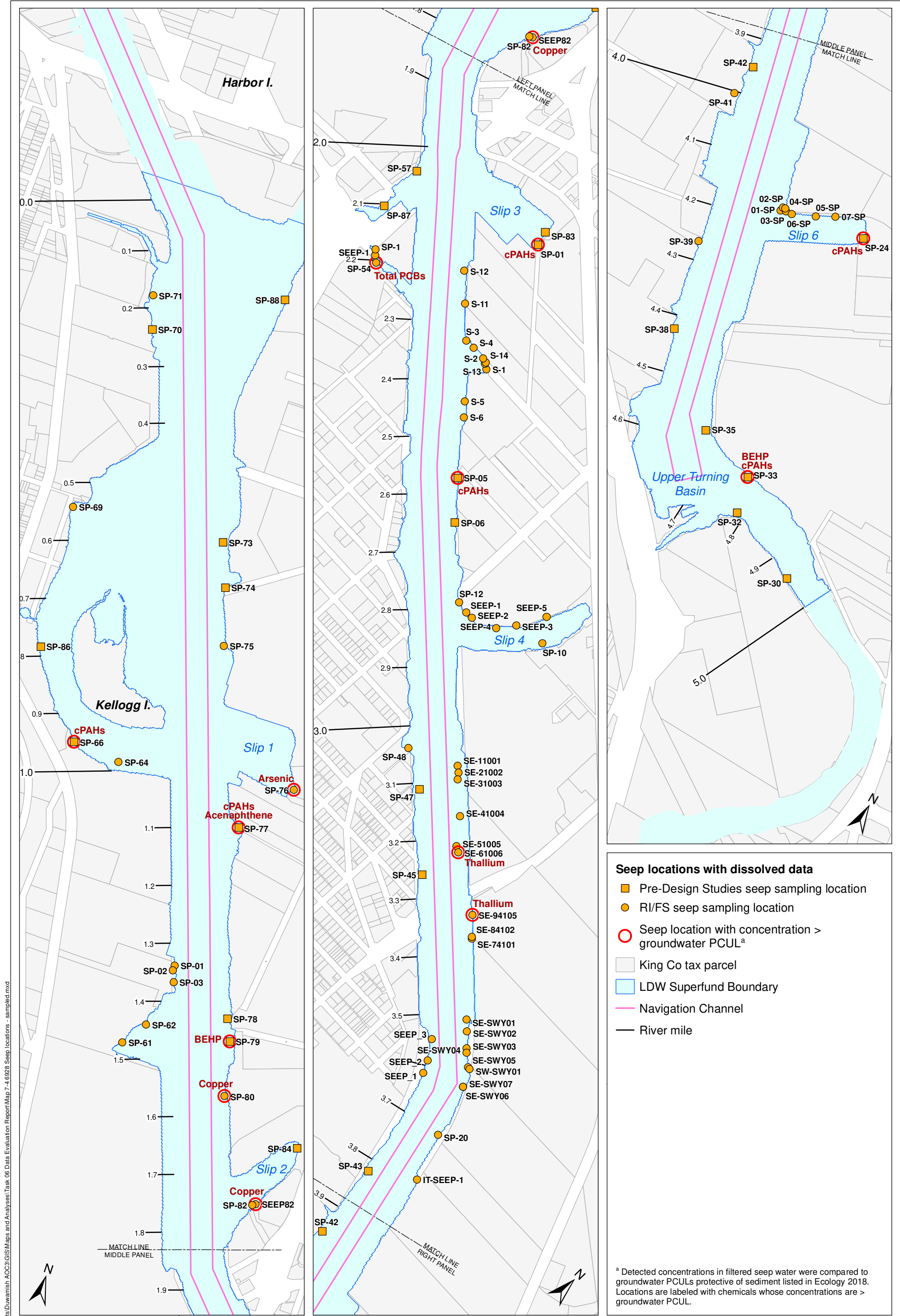
LDW18-BNK6-1	Total PCB Aroclors	11
LDW-SS144	Total PCB Aroclors	2.1
5	Total PCB Aroclors	1.8
7	Total PCB Aroclors	13
S1	Total PCB Aroclors	2.1
R88	1,4-Dichlorobenzene	21



Map 7-3c. Comparison of bank data with lowest surface sediment RALs, RM 3.2 to RM 5.0

LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT

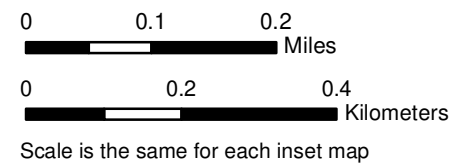
Prepared by craigh. 6/25/20. W:\Projects\Duwamish AOC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 7-3c-6990 Bank sample locations.mxd



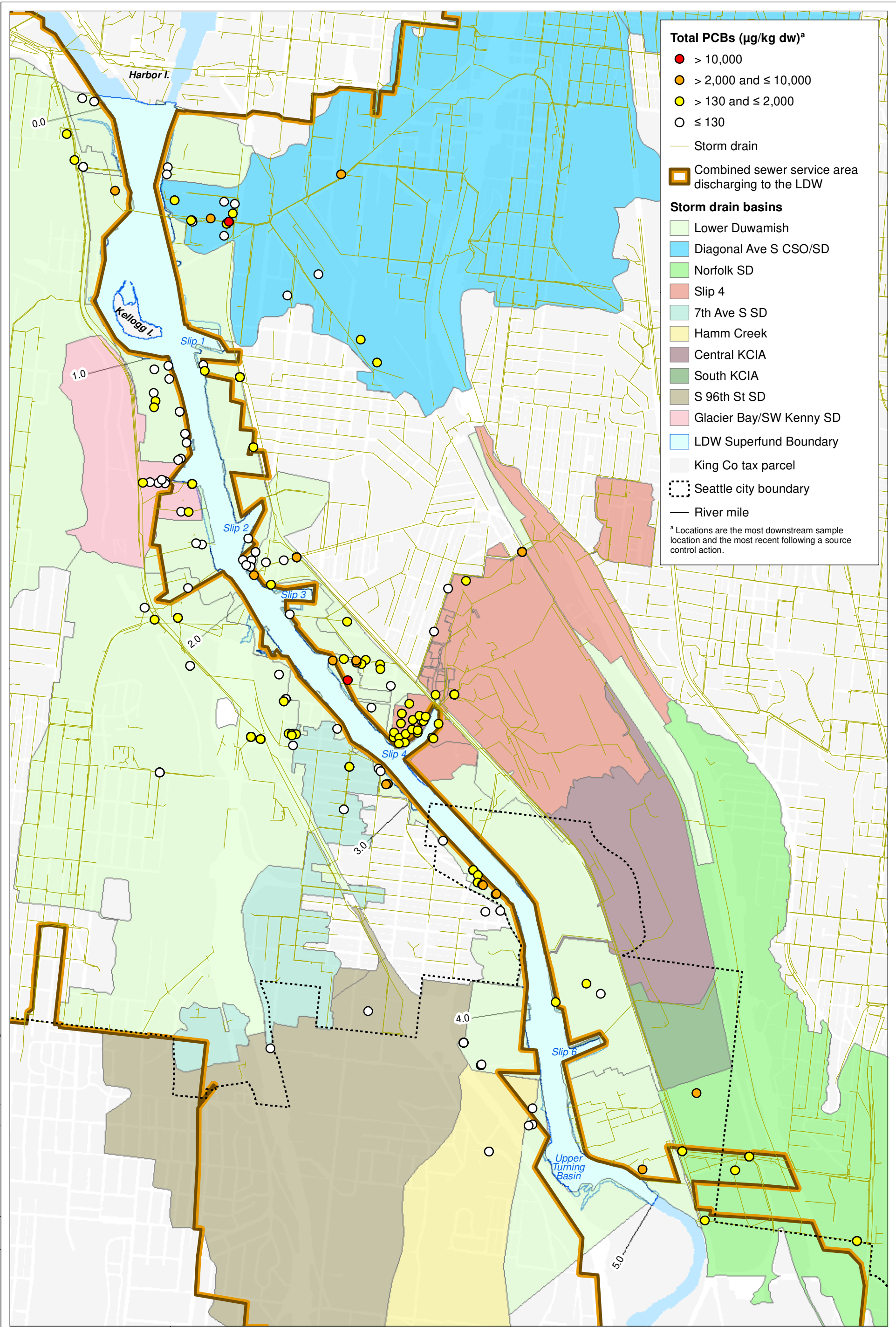
- Seep locations with dissolved data**
- Pre-Design Studies seep sampling location
 - RI/FS seep sampling location
 - Seep location with concentration > groundwater PCUL^a
 - ▭ King Co tax parcel
 - ▭ LDW Superfund Boundary
 - Navigation Channel
 - River mile

^a Detected concentrations in filtered seep water were compared to groundwater PCULs protective of sediment listed in Ecology 2018. Locations are labeled with chemicals whose concentrations are > groundwater PCUL.

Map 7-4. Comparison of seep data to groundwater screening levels protective of sediment in Ecology 2018



Prepared by craigh_6/25/20: W:\Projects\Duwamish ACC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 7-4 6/25/20 Seep locations - sampled.mxd



Total PCBs ($\mu\text{g}/\text{kg dw}$)^a

- > 10,000
- > 2,000 and \leq 10,000
- > 130 and \leq 2,000
- \leq 130

— Storm drain

Combined sewer service area discharging to the LDW

Storm drain basins

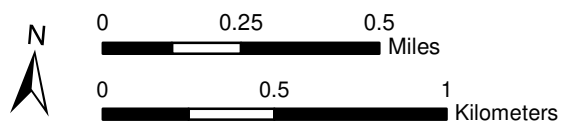
- Lower Duwamish
- Diagonal Ave S CSO/SD
- Norfolk SD
- Slip 4
- 7th Ave S SD
- Hamm Creek
- Central KCIA
- South KCIA
- S 96th St SD
- Glacier Bay/SW Kenny SD
- LDW Superfund Boundary
- King Co tax parcel
- Seattle city boundary
- River mile

^a Locations are the most downstream sample location and the most recent following a source control action.

Prepared by craigh_6/25/20; W:\Projects\Duwamish ACC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 8-1 6996 Source Tracing - PCBs.mxd

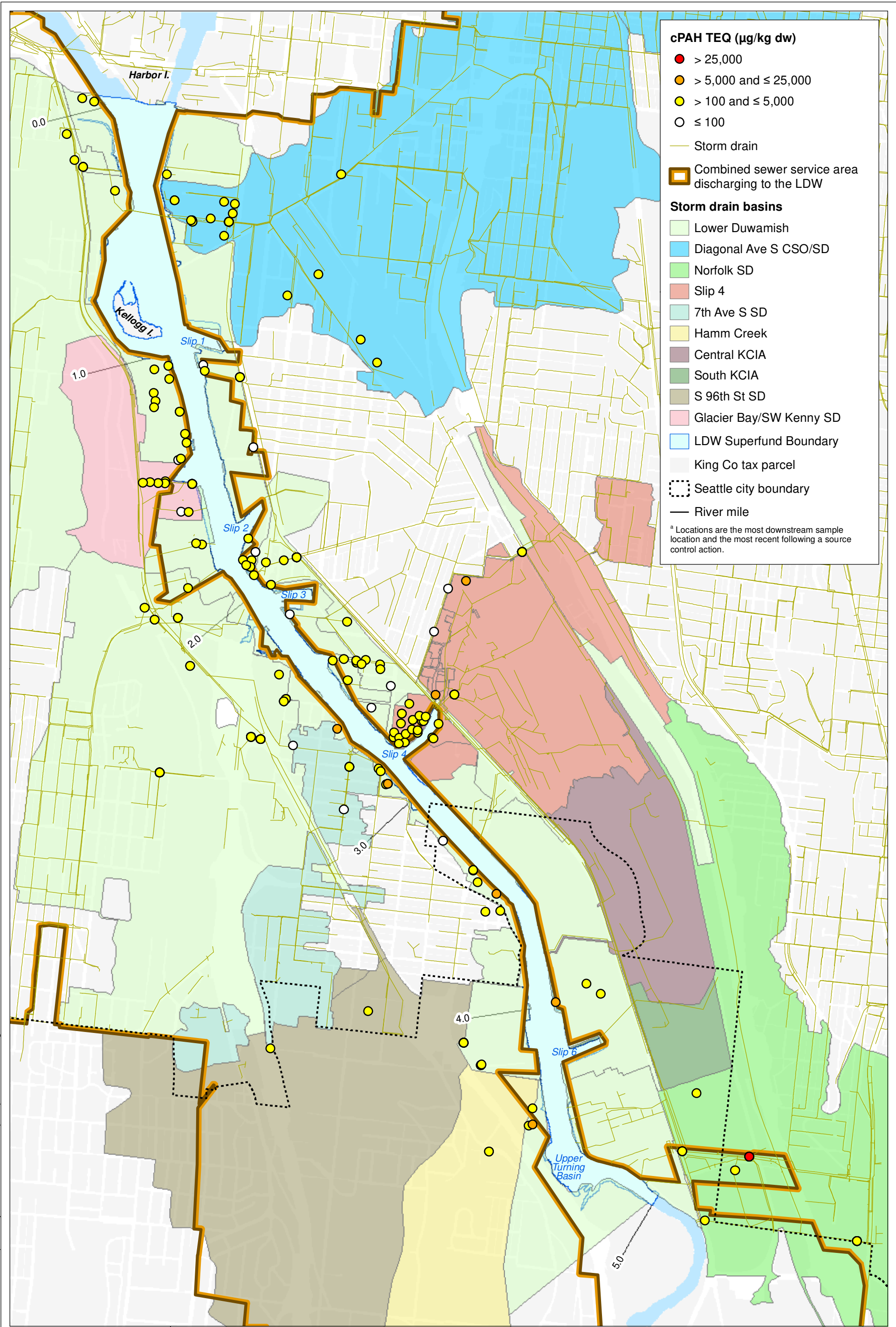


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Map 8-1. BCM lateral input source tracing sample data through October 2018 – total PCBs

LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT



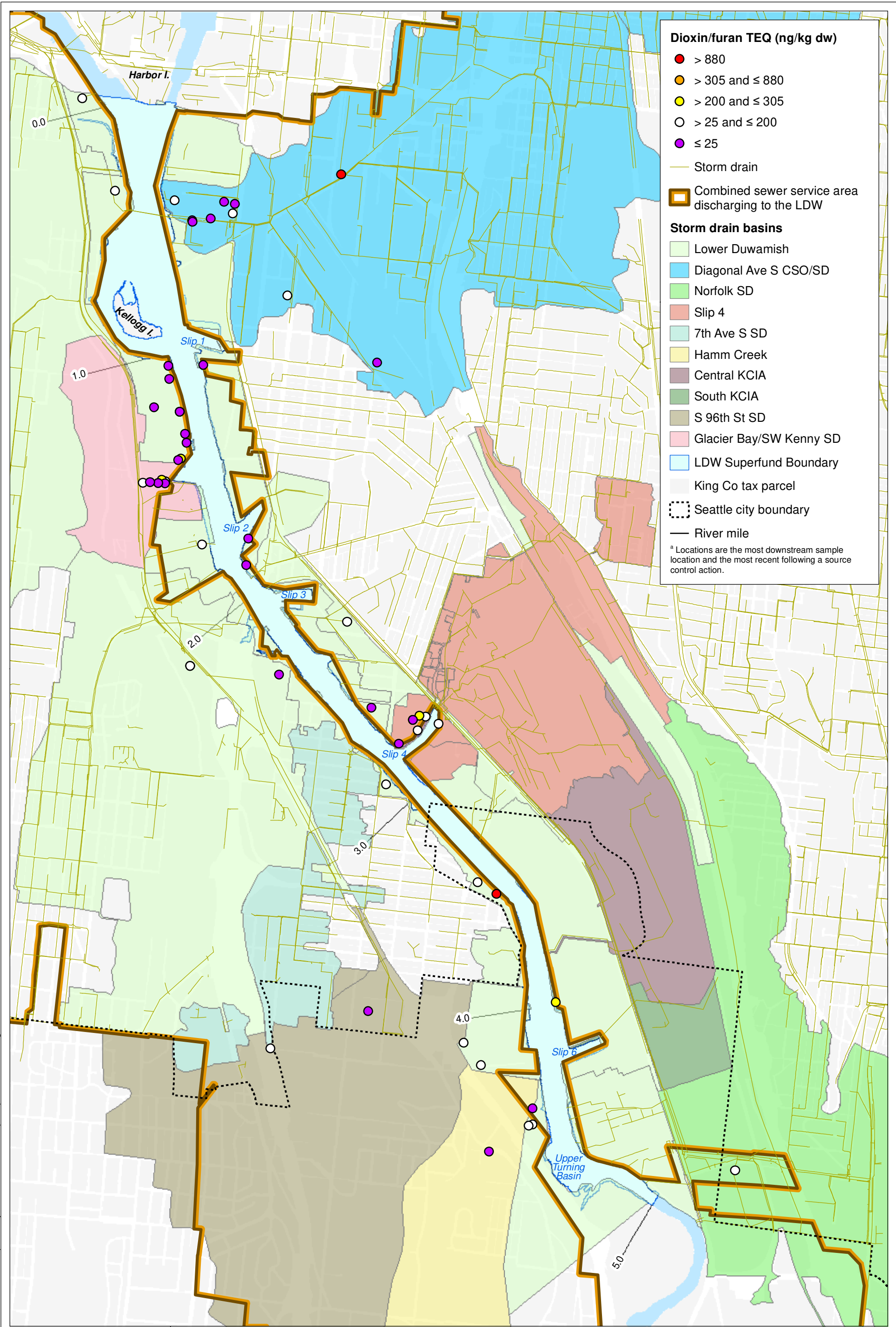
Prepared by craigh_6/25/20: W:\Projects\Duwamish ACC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 8-2 6996 Source Tracing - cPAHs.mxd



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Map 8-2. BCM lateral input source tracing sample data through October 2018 - cPAHs



Dioxin/furan TEQ (ng/kg dw)

- > 880
- > 305 and ≤ 880
- > 200 and ≤ 305
- > 25 and ≤ 200
- ≤ 25

— Storm drain

▭ Combined sewer service area discharging to the LDW

Storm drain basins

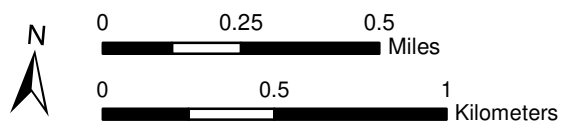
- Lower Duwamish
- Diagonal Ave S CSO/SD
- Norfolk SD
- Slip 4
- 7th Ave S SD
- Hamm Creek
- Central KCIA
- South KCIA
- S 96th St SD
- Glacier Bay/SW Kenny SD
- LDW Superfund Boundary
- King Co tax parcel
- Seattle city boundary
- River mile

^a Locations are the most downstream sample location and the most recent following a source control action.

Prepared by craigh_6/25/20: W:\Projects\Duwamish ACC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 8-3 6996 Source tracing - DF.mxd

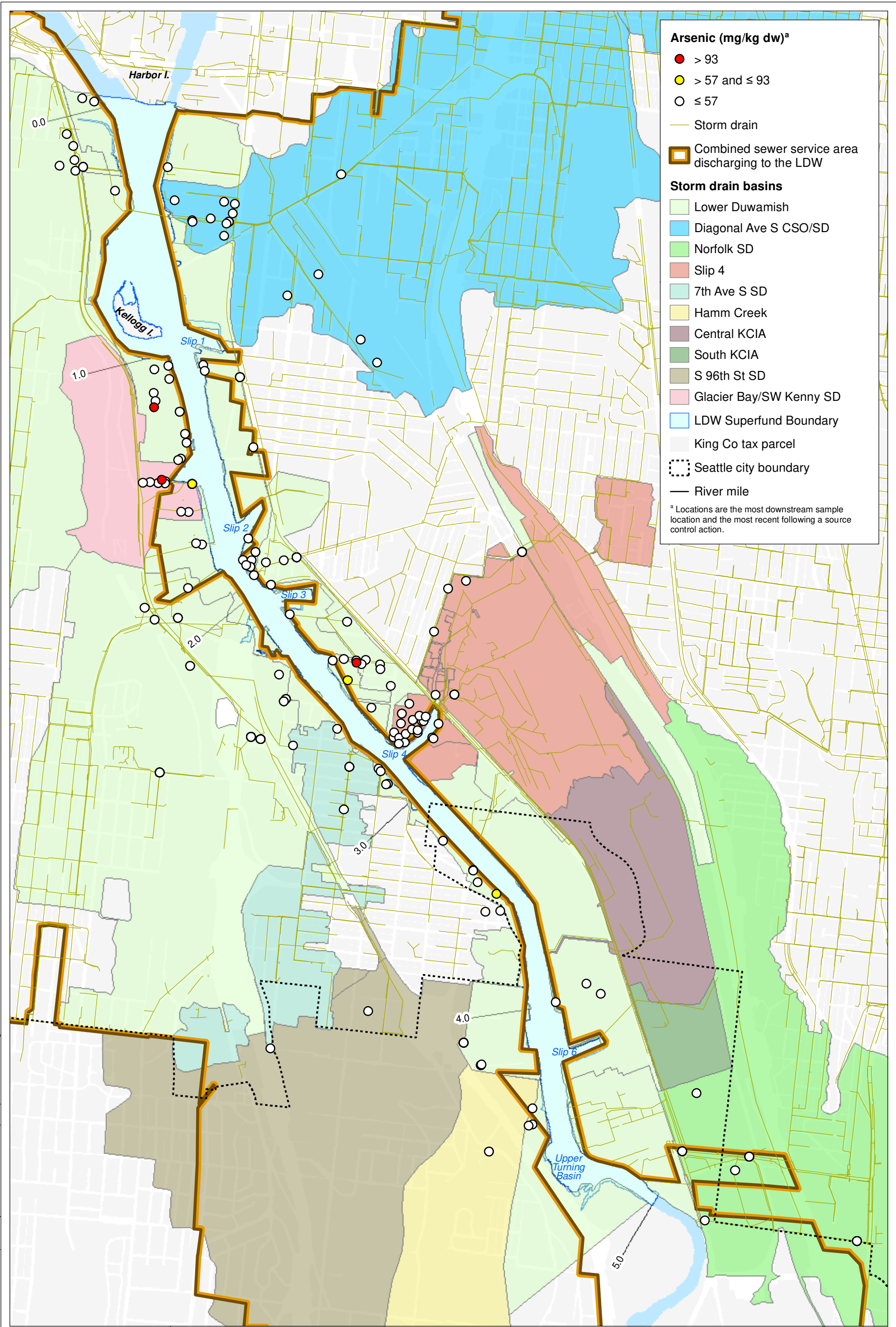


Lower Duwamish Waterway Group
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Map 8-3. BCM lateral input source tracing sample data through October 2018 – dioxins/furans

LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT



Arsenic (mg/kg dw)^a

- > 93
- > 57 and ≤ 93
- ≤ 57

— Storm drain

Combined sewer service area discharging to the LDW

Storm drain basins

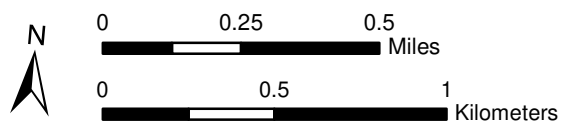
- Lower Duwamish
- Diagonal Ave S CSO/SD
- Norfolk SD
- Slip 4
- 7th Ave S SD
- Hamm Creek
- Central KCIA
- South KCIA
- S 96th St SD
- Glacier Bay/SW Kenny SD
- LDW Superfund Boundary
- King Co tax parcel
- Seattle city boundary
- River mile

^a Locations are the most downstream sample location and the most recent following a source control action.

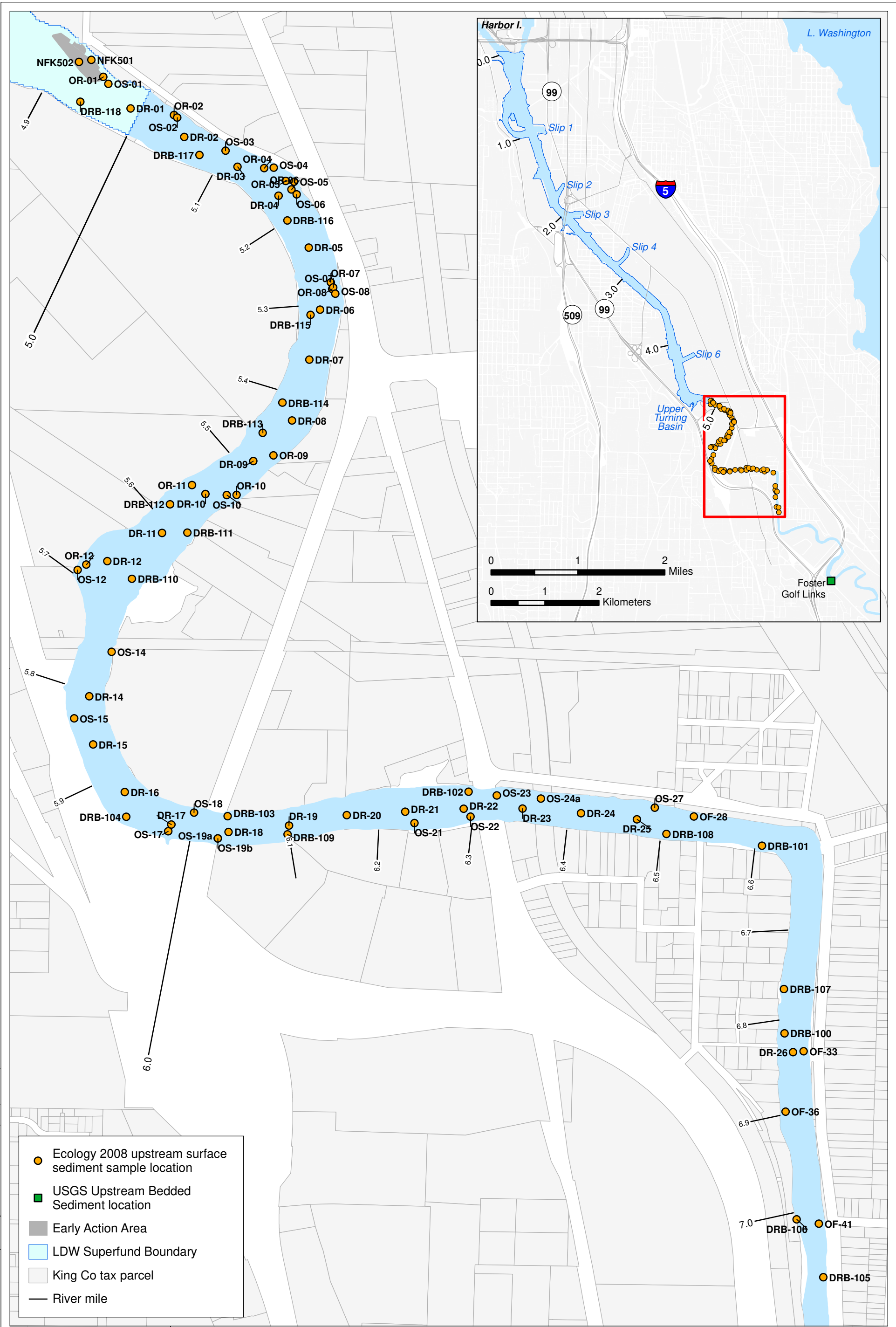
Prepared by craigh_6/25/20; W:\Projects\Duwamish ACC\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 8-4 6996 Source Tracing - As.mxd



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Map 8-4. BCM lateral input source tracing sample data through October 2018 – arsenic



Prepared by craigh. 6/25/20. W:\Projects\Duwamish ACCS\GIS\Maps and Analyses\Task 06 Data Evaluation Report\Map 8-5 6993 Upstream sediment.mxd



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Map 8-5. Surface sediment sampling locations used to characterize sediments from upstream of the LDW Superfund boundary

LDW PRE-DESIGN STUDIES DATA EVALUATION REPORT