Map 1-1. Upper reach of the Lower Duwamish Waterway

Early Action Area
- AC Pilot plots
- Recovery Category 1*
  - Intertidal area
  - Shoaled subtidal area in navigation channel
  - Subtidal area outside of shoaled area
  - Area not covered by bathymetric survey

Bridge
- Dock/pier/ marina
- LDW Superfund Site
- King Co tax parcel
- Navigation channel
- River mile

* The recovery categories shown are those in Appendix B of the PDI QAPP. The recovery categories will be finalized in the Phase II DER. Note: The federally regulated channel depth in the upper reach is -15 ft MLLW.
Prepared by craigh, 6/28/21; W:\Projects\Duwamish A

The northern boundary of the upper reach will be determined in 30% design based on the design dataset, which will include Phase II sampling results.

The recovery categories shown are those in Appendix B of the PDI GAPP. The recovery categories will be finalized in the Phase II OIS. Sediment preservation and the Remedial Action Area boundaries will be determined in 30% design based on an updated data interpretation (including Phase II data), engineering considerations, and other factors.

Note: RDO Table 26 is the source of RALs for COCs that were used to calculate exceedance factors and determine RAL exceedance areas, except for EFs, which uses the draft (PIH-EIS) RALs (EPA 2021). Additional RAL exceedance areas based on RDO RALs for EFs are shown in orange, pending resolution of the EIS.
Bathymetry (feet MLLW)

- Superfund boundary = MHHW
- Subtidal (0-60 cm)
- Intertidal (0-45 cm)

**Other sampling locations**
- Only analyzed for PCBs
- Core without appropriate RAL interval
- Bank sampling location (no exceedance)

**Outfall classification**
- Private storm drain

**Bank types (approximate)**
- Superfund boundary = MHHW
  - Bulkedhead
  - Armored slope
  - Unarmored slope

**Other LDW features**
- Recovery Category 1
- Intertidal area
- Potential vessel scour area
- Shoal area
- Dock/permarin
- King Co tax parcel
- Navigation Channel
- River mile

**Bathymetry (feet MLLW)**
- 4 ft MLLW
- 10 ft interval
- 2 ft interval

**Phase II PDI sampling locations**
- 0-10 cm
- 0-45 cm
- 0-45 cm Archive
- Vertical

**Legend for Vertical Extent Cores**
- Core intervals 0 and design parameter 0 cm in length, unless noted as the core profiles
- RAL intervals (in cm unless otherwise noted)

*The recovery categories shown are those in Appendix B of the PDI QAPP. The recovery categories will be finalized in the Phase II DRR. Dredge plans and the Remedial Action Area boundaries will be determined in 30% design based on an updated data interpretation (including Phase II data), engineering considerations, and other factors. Note: RDX Table 28 is the source of RAs for CCQs that were used to calculate exceedance factors and determine RAL exceedance areas, except for pNPAS, which are the draft pNPAS RAs (EPA 2021). Additional RAL exceedance areas based on CO RAs for pNPAS are shown in orange, pending resolution of the ESD.*
Map 4-1h. Design dataset with RAL exceedance areas, RM 4.3 to RM 4.55

Pre-Design Investigation Phase II QAPP
Appendix for the LDW Upper Reach

Bank types (approximate Superfund boundary = MHW)
- Bulkheaded
- Armored slope
- Unarmored slope

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
- Navigation Channel
- River mile

Bathymetry (feet MLLW)
- 4 ft MLLW
- 10 ft interval
- 2 ft interval

*The recovery categories shown are those in Appendix B of the PSI QAPP. The recovery categories will be finalized in the Phase II DeFi. Dredge prisms and the Remedial Action Area boundaries will be determined in 30% design based on an updated data interpolation (including Phase III data), engineering considerations, and other factors. The RALs used to calculate exceedance factors and determine RAL exceedance areas, except for CPARs, which use the draft CPAR ESD RALs (EPA 2021). Additional RAL exceedance areas based on PSF/CPARs of RALs are shown in orange, pending resolution of the ESD.
Chemistry will be expected at some locations in Areas 34, 35, and 36 to inform study design (see Sections 4.1.3 and 4.1.5 for details). Only toxicity testing will be conducted at locations 650 and 658.

**Other sampling locations**

- Only analyzed for PCBs.
- Core without appropriate RAL interval
- Bank sampling location (exceeds RAL)
- Bank sampling location (no exceedance)
- Outfall classification
  - Private storm drain
  - Public storm drain
  - Stream, channel, or ditch
- Shovel area
- Shoal area

**Bank types (approximate Superfund boundary = 100 ft MLLW)**

- Dock/pile/wharf
- King Co tax parcel
- Navigation Channel
- River mile
- Bathymetry (feet MLLW)
  - 4 ft MLLW
  - 10 ft interval
  - 2 ft interval

Note: ROD Table 28 is the source of RALs for COCs that were used to calculate exceedance factors and determine RAL exceedance areas, except for cPAHs, which use the draft cPAH ESD RALs (EPA 2021). Additional RAL exceedance areas based on ROD RALs or cPAHs are shown in orange, pending resolution of the ESD.

**Legend for Vertical Extent Cores**

- 0.6 m depth
- Target core depth (1.0 m)
- Intervals in parentheses after a core noted
- Orange indicates Tier 1 sample
- Light yellow indicates Tier 2 archive sample

The recovery categories shown are those in Appendix B of the PDI OMP. The recovery categories will be finalized in the Phase 3 OERP Design plans and the Remedial Action Area boundaries will be determined in 30 ft intervals based on area delineation data, engineering considerations, and other factors.
Boundary between Area 18 and 23

Design data surface sediment location
- Exceeds RAL
- Does not exceed RAL

Design data subsurface core location
- Exceeds RAL
- Does not exceed RAL

Bank area (MHHW to toe of bank)\(^a\)

Topographic survey and geotechnical data collection area\(^b\)

RAL exceedance area with bank

Additional exceedance area using cPAH ROD RALs

RAL exceedance area without bank

Recovery Category 1\(^*\)
- EOF/storm drain
- Private storm drain
- Abandoned/inactive

Bank types (approximate Superfund boundary = MHHW)
- Bulkheaded
- Unarmored slope

Bathymetry contours (feet MLLW)
- 4 ft MLLW (intertidal boundary)
- 5 ft interval
- 1 ft interval

LiDAR contours (feet MLLW)
- 5 ft interval
- 1 ft interval

Early action area

AC pilot plot

King Co tax parcel

Navigation channel

* All bank sample locations are also included in the Map 4-1 series.
* See the Map 5-4 series for geotechnical locations.
\(^a\) The recovery categories shown are those in Appendix B of the PDI QAPP. The recovery categories will be finalized in the Phase II CERI. Design prime and the Remedial Action Area boundaries will be determined in 30% design based on an updated data interpretation (including Phase II data), engineering considerations, and other factors. Note: ROD Table 28 is the source of RALs for CODs that were used to determine RAL exceedance areas, except for pPAHs, which use the draft cPAH ESD RALs (EPW 2021). Additional RAL exceedance areas based on ROD RALs for cPAHs are shown in orange, pending resolution of the ESD.

Map 5-1b. Area of potential surveying and bank sampling/investigation at RAL Exceedance Area 18

PRE-DESIGN INVESTIGATION PHASE II QAPP
ADDITIONS FOR THE LOW UPPER REACH
Phase II PDI sampling locations

- RAL exceedance area with bank
- Additional exceedance area using cPAH ROD RALs
- Bank area (MHHW to toe of bank)
- Topographic survey and geotechnical data collection area
- Vertical
- Design data surface sediment location
  - Exceeds RAL
  - Does not exceed RAL
- Design data subsurface core location
  - Exceeds RAL
  - Does not exceed RAL

Bank types (approximate Superfund boundary = MHHW)
- Armored slope

Bathymetry contours (feet MLLW)
- 4 ft MLLW
- 5 ft interval
- 1 ft interval

LIDAR contours (feet MLLW)
- 5 ft interval
- 1 ft interval

Note: ROD Table 28 is the source of RALs for COCs that were used to determine RAL exceedance areas, except for cPAHs which use the draft cPAH ESD RALs (EPA 2021). Additional RAL exceedance areas based on ROD RALs for cPAHs are shown in orange, pending resolution of the ESD.

*All bank sample locations are also included in the Map 4-1 series.
* See the Map 5-4 series for geotechnical locations.
* The recovery categories shown are those in Appendix B of the PDI QAPP. The recovery categories will be finalized in the Phase II DEIR. Dredge prime and the Remedial Action Area boundaries will be determined in 30% design based on an updated data interpretation (including Phase 5 data), engineering considerations, and other factors.

EagleView Technologies, Inc.
Map 5-1e. Area of potential surveying and bank sampling/investigation at RAL Exceedance Area 32
Prepared by craigh, 6/28/21; W:\Projects\Duwamish AOC4\GIS\Maps and Analyses\Phase II\QAPP Addendum\Map 5-1e 7266 Banks - 32.mxd
±
0 50 100 Feet
0 10 20 Meters
Directions of north, south, east, and west are illustrated on both sides of the map.
Phase II PDI sampling locations
- 0-10 cm
- Vertical
- Vertical Archive

Design data surface sediment location
- Exceeds RAL
- Does not exceed RAL

Design data subsurface core location
- Exceeds RAL
- Does not exceed RAL

Bank area (MHHW to toe of bank)
- Topographic survey and geotechnical data collection area
- RAL exceedance area with bank
- RAL exceedance area on Norfolk EAA

Recovery Category: 1
- CSO/storm drain
- Private storm drain
- Pipe of unresolved origin and/or use
- Abandoned/inactive
- Stream, channel, or ditch

Bank types (approximate Superfund boundary = MHHW)
- Bulkheaded
- Armored slope
- Unarmored slope

Bathymetry contours (feet MLLW)
- 4 ft MLLW
- 5 ft interval
- 1 ft interval

LiDAR contours (feet MLLW)
- 5 ft interval
- 1 ft interval
- Early action area
- Boeing South Storm Drain removal area
- King Co tax parcel
- River mile

*All bank sample locations are also included in the Map 4-1 series.
See the Map 5-4 series for geotechnical locations.
The recovery categories shown are those in Appendix B of the PDI QAPP. The recovery categories will be finalized in the Phase II DFR. Dredge prims and the Remedial Action Area boundaries will be determined in 30% design based on an updated data interpolation (including Phase II data), engineering considerations, and other factors.
Map 5-2b. Area of habitat restoration at RAL Exceedance Areas 20, 21, and 25.

Pre-Design Investigation Phase II QAPP
Addendum for the LW Upper Reach.
Notes:
1. Primary outfall label corresponds to existing ecology identification label (Leslies 2014).
2. Bathymetry is a composite of NW Hydro 2019 and 2020 surveys and Army Corps of Engineers 2020 survey. MLW datum.

Bank types
(approximate Superfund boundary = MHW/W)
- Bulkheaded
- Armored slope
- Unarmed slope
- Area with RAL exceedances
- Additional exceedance area using cPAH ROD RALs
- Area with RAL exceedances on the Norfolk EAA

Outfall classifications from previous studies
- Pile
- Dolphin
- Flow diversion structure
- Navigation Channel
- Stream/estuary
- Underwater powerline
- Underwater cable or pipe structure
- Cable area

Features identified during previous studies
- Pile
- Dolphin
- Flow diversion structure
- Navigation Channel
- Stream/estuary
- Underwater powerline
- Underwater cable or pipe structure
- Cable area

Map 5-3a
Phase II PDI structure and outfall inspection locations, RM 3.0 to RM 4.0.
PRE-DESIGN INVESTIGATION PHASE II DAPP
ADDITIONS FOR LOWER DUWAMISH HUSBAND RIVER
Geotechnical data collection areas

- Phase II PDI CPT test location
- Phase II PDI geotechnical boring location
- Phase II PDI Vane shear test location
- Historical geotechnical studies
- RAL exceedance area with bank
- Additional exceedance area using cPAH ROD RALs
- RAL exceedance area without bank or with habitat constructed on bank
- Bank types (approximate Superfund boundary = MHHW)
  - Bulkheaded
  - Armored slope
  - Unarmored slope
  - Early Action Area
  - AC Pilot plots
  - King Co tax parcel
  - Navigation Channel
  - River mile

Note: ROD Table 28 is the source of RALs for COCs that were used to determine RAL exceedance areas, except for cPAHs, which use the draft cPAH ESD RALs (EPA 2021). Additional RAL exceedance areas based on ROD RALs for cPAHs are shown in orange, pending resolution of the ESD.
Map 5-4b. Phase II Geotechnical data collection areas, RM 4.0 to RM 5.0

Pre-Design Investigation Phase II QAPP Addendum for the LDW Upper Reach

Geotechnical data collection areas
- Phase II PDI CPT test location
- Phase II PDI hand auger or DCP location
- Phase II PDI Vane shear test location
- Historical geotechnical studies
- RAL exceedance area with bank
- Additional exceedance area using cPAH ROD RALs
- RAL exceedance area on Norfolk EAA
- RAL exceedance area without bank or with habitat constructed on bank

Bank types (approximate Superfund boundary = MHHW)
- Bulkheaded
- Armored slope
- Unarmored slope
- Early Action Area
- AC Pilot plots
- King Co tax parcel
- Navigation Channel
- River mile

Note: ROD Table 28 is the source of RALs for COCs that were used to determine RAL exceedance areas, except for cPAHS, which use the draft cPAH ROD RALs (EPA 2021). Additional RAL exceedance areas based on ROD RALs for cPAHs are shown in orange, pending resolution of the ESD.