APPENDIX A

Plot Selection Memorandum and U.S. Environmental Protection Agency Approval

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL CLEANUP

February 11, 2015

Mike Johns
Windward Environmental
200 W Mercer St., Suite 401
Seattle, WA 98119

Re: Approval of plot locations for carbon amendment pilot study; Lower Duwamish Waterway Superfund Site; Seattle, Washington

Dear Mike:

EPA, the Washington State Department of Ecology (Ecology), and the US Army Corps of Engineers have reviewed the Lower Duwamish Waterway Group's (LDWG) February 3, 2015 memorandum proposing study plot locations for the Lower Duwamish Waterway (LDW) carbon amendment pilot study. This letter provides EPA and Ecology's approval of LDWG's proposed plot locations, including the revised plot configurations included in the memorandum.

Pursuant to the July 17, 2014 second amendment to the LDW Administrative Order on Consent (AOC), LDWG must submit to the agencies a draft design report 130 days after the date of this letter. In order to minimize the required revisions to the draft design report, we propose scheduling a series of meetings between now and June 2015 to discuss the details of the pilot study. We can discuss the frequency, content, and timing of those meetings at our upcoming February 26 meeting.

LDWG is not required to revise the February 3 memorandum, but this letter provides some feedback to consider in designing the study and interpreting study results.

Criteria used in the memorandum: We agree that it was appropriate to include information about cleanup criteria in the November 2014 Record of Decision (ROD) in the memorandum. However, it should have also included the criterion in the AOC, which is repeated in the ROD, that the study plots should have PCB concentrations between the SCO and the CSL. The ROD (page 128) states that "EPA may also consider ENR with in-situ treatment in areas with COC concentrations up to the CSL if it can be demonstrated that it will maintain its effectiveness over time." Average PCB concentrations in Plot 6 "Lane A" exceed this criterion, as do some of the individual data points in plots 6 and 9. We recognize that it is not always possible to find site locations that conform exactly to the desired study criteria, so we accept the proposed plots as containing concentrations reasonably close to the criteria in the AOC and ROD. In addition, we are concerned about how high subsurface contaminant concentrations in Area 9 may affect study results. This should be discussed during the design meetings discussed above.

Future cleanup decisions in areas selected for the AC pilot study: As we have discussed, selection of an area for the AC pilot study does not mean that ENR will ultimately be the technology assigned to the area, regardless of the pilot study results. For example, the technology assignments in the ROD for Areas 1 and 9 are a combination of dredging and capping. Although we are accepting these areas as acceptable for the pilot study, EPA may ultimately determine that dredging is required for these areas, including removal of the pilot study plots.

As a final point of clarification, LDWG's memorandum mentions that Ecology may request additional sampling at the "8801 site". Ecology is not aware of any plans to collect additional data at that location in the near future.

Feel free to contact me at (206) 553-2140 or hiltner.allison@epa.gov if you have any questions.

Sincerely,

Allison Hiltner
Superfund Site Manager

cc: (electronic copies only):
Ron Timm, Ecology
Allison Crowley, City of Seattle
Dave Schuchardt, City of Seattle
Jeff Stern, King County
Debra Williston, King County
Brian Anderson, The Boeing Company
Kathy Bahnick, Port of Seattle
Cliff Whitmus, AMEC

PLOT SELECTION MEMORANDUM

Memorandum

To: Allison Hiltner, USEPA and Ron Timm, Ecology

From: Lower Duwamish Waterway Group

Date: February 3, 2015

Subject: **Final Plot Selections for Lower Duwamish Waterway Enhanced Natural Recovery-Activated Carbon Pilot Study**

This memorandum summarizes the rationale for the proposed Lower Duwamish Waterway (LDW) Pilot Study Plots discussed during our meeting with you on January 21, 2015. The initial screening for the proposed plots can also be found in the *"Candidate Plot Locations for Enhanced Natural Recovery-Activated Carbon Pilot Study (July 24, 2014)"* and in the *"Quality Assurance Project Plan: Enhanced Natural Recovery-Activated Carbon Candidate Plot Surface and Subsurface Sediment Sampling (October 24, 2014)."* The plot designations used in the Quality Assurance Project Plan (QAPP) have been retained for this memo. The table below cross-references plot numbers as they appeared in the July 2014 memo vs. the October 2014 QAPP.

Plot Number in 2014 QAPP and this Memo	Former Plot/Area Number in July 2014 Memo	Area Type
1	1	Scour Mitigation
2	2	Scour Mitigation
3	3	Intertidal
4	4	Subtidal
5	6	Scour Mitigation
6	8	Subtidal
7	10	Subtidal
8	12	Intertidal
9	13	Intertidal

There are three proposed plots, one for each of the following conditions:

- **Plot 1** - Subtidal sediments in a scour area
- **Plot 6** - Subtidal sediments
- **Plot 9 -** Intertidal sediments and subtidal sediments in a scour area.

Each plot consists of two side by side areas, one where an Enhanced Natural Recovery (ENR) layer will be placed and one where ENR with Activated Carbon (ENR-AC) layer will be placed. We have provided key tables and figures to aid in our explanation. Our analysis included data collected in Fall 2014 that is presented in the *"Validated LDW Sediment Data for ENR-AC Pilot (January 15, 2015)"*. Plot 9 also included new data from investigations at two adjacent uplands sites, as discussed below in the Plot 9 discussion.

Tables 1 and 2 contain analytical results for surface and subsurface sediment PCB analyses, respectively. For all plots, 2014 sediment data are presented; for the proposed plots, additional historical data are included. Table 3 contains tabulated summary statistics of PCB concentrations based on the 2014 surface sediment data; for Plot 9, historical data and sediment data from the adjacent sites were included to evaluate the proposed split option, which extends beyond the plots used for 2014 data characterization. Table 4 contains the remedial action levels (RALs) and ENR-upper limits (ULs) for the surface and subsurface sediments and Table 5 contains information on any surface and subsurface RAL and ENR-UL exceedances. For Plot 1, the Recovery Category 1 RALs have been used, but the Recovery Category 2/3 ENR-ULs have been used. For Plot 6, the Subtidal Recovery Category 2/3 RALs and ENR-ULs have been used. For Plot 9, the Intertidal Recovery Category 2/3 RALs and ENR-ULs have been used.

<u>SCOUR PLOTS:</u> Plot 1 proposed (Plots 1 and 2 considered)

Plots 1 and 2 are located near river mile 0.1. The chemistry in both Plots 1 and 2 are similar in PCB concentration ranges; the mudline elevations of the two plots are also similar. The primary differences are in the grainsize of the sediments and the facility operations in the berths. The grainsize of the sediments in Plot 1 were more uniform and contained little or no gravel, and resulted in better core recoveries than Plot 2 during sampling. This is expected to translate into more reliable deployment and recovery of the solid-phase micro-extraction (SPME) fibers. There is less potential of disruption of the ENR layer due to over-water activities at Plot 1 than Plot 2, including less potential for materials falling onto the layer during off-loading from upland operations. Finally, Plot 2 is expected to have more access restrictions due to the type and amount of operations at the pier. For these reasons, Plot 1 is recommended for the Pilot Study. Figure 1 shows the location of Plot 1, its subplots, PCB and other Sediment Management Standard (SMS) chemical exceedances in surface sediments, and bathymetry.

Ownership and access are still being assessed. Access is needed during the wintertime fish window for placement of materials. Direct access for sampling is needed to avoid diver-sampling in confined spaces (for example, under barges).

<u>SUBTIDAL PLOTS</u>: Plot 6 proposed (Plots 4, 6, and 7 considered)

PCB concentrations in Plot 7 are too low to meet study objectives; they are less than or equal to the RAL in all but one of the 2014 locations. The low concentrations make it more difficult to detect differences in PCB behavior between the subplots (the normal field and laboratory variability combined with concentrations near or below the reporting limits results in poor signalto-noise ratios). Additionally, Plot 7 is near but not in an area of shoaling (This is easiest to see in Map 3-1d of the QAPP).

Plots 4 and 6 have similar PCB surface chemistry and PCB variability between subplots. The 2014 subsurface core in Plot 4A exceeds the subsurface RAL (290 > 195 mg/kg-OC), which is not exceeded in Plot 6. Plots 4 and 6 contain exceedances of the ENR-UL in some of the surface samples; however, the ability to distinguish differences between ENR and ENR-AC subplots is enhanced by the higher concentration levels. This ability can be further enhanced by lowering the variability between the subplots. The ability to distinguish the subplots is further improved by reconfiguring Plot 6 to be two long subplots; this change is recommended and decreases the variability by half. With this improvement, Plot 6 is recommended as the Subtidal Plot.

Figure 2 shows the location and revised layout of Plot 6, its subplots, PCB and other SMS chemical exceedances in surface sediments, and bathymetry.

INTERTIDAL PLOTS: Plot 9 Proposed (Plots 3, 8, and 9 considered)

The PCB concentrations in Plot 3 are too low (below or very near the RAL in all locations) resulting in decreased ability to discern differences between the subplots. Additionally, the location of Plot 3 behind Kellogg Island makes it representative of that area of the waterway, but less predictive of other intertidal areas (for example, groundwater discharge and exposure to wave/wake action behind Kellogg Island are expected to differ from conditions along the main waterway channel).

Similar to Plot 3, the PCBs concentrations in Plot 8 are too low (all but one location is below the RAL). The bathymetry difference at Plot 8 raises concerns. The intertidal bench, defined as that area between -4 MLLW and the toe of the bank, is more narrow at Plot 8 than Plot 9; this results in approximately 1/3 of the plot being representative of one set of conditions and the upper 2/3 another set of conditions (This is easiest to see in Map 3-1e of the QAPP and is summarized in the table below). The presence of multiple conditions within the test plot, decreases the ability to distinguish between the treatment options. In addition, the design of both placement of the ENR and monitoring are more complex. The following table outlines the differences in portions of Plot 8.

Example Characteristic	**Nearshore 2/3 (elevation -5 ft MLLW or greater)**	**Nearchannel 1/3 (elevations lower than -5 ft MLLW**
Groundwater discharge	Seeps and seep face likely	Little discharge expected
Porewater salinity	Brackish and variable	Saline
Potential scour process	Wave/wake	Wave/wake decreased in energy
Slope	Relatively flat, good place to check stability	Relatively steep, will likely require coarser material for stability.

	For comparability, the plots would need to be constructed of materials with similar grainsize throughout, resulting in the coarser materials used on the slopes being used throughout.
Benthic	Potential for different benthic communities due to depth, salinity, grain size and light; this will complicate benthic comparison between ENR and ENR-AC.
TOC normalization	Plot 8 has lower TOC than many of the other locations studied in the waterway; with some locations below the end point used for organic carbon normalization of the data. Having to compare OC-normalized to un-normalized dry weight data adds additional complexity to the study.

Plot 9 eliminates the concerns of variable conditions and low PCB concentrations that are present in Plots 3 and 8. Additionally, Plot 9 is also the most upstream location in the site, giving better overall spatial coverage in the design. Note that there are exceedances of the RAL and ENR-UL in Plot 9, but as discussed previously with the EPA this will allow for better evaluation of the effectiveness of ENR-AC.

Ecology has voiced concern over potential contamination associated with outfalls (#2075, 2076, and 2077) in the vicinity of Plot 9. A split has been placed between the subplots in order to avoid the outfall area; this is shown in Figure 3. In addition, discharges from the remaining two outfalls (#2075 and 2077) now undergo treatment, which could help reduce concerns about contamination from the outfall affecting study results. Outfall #2076 is inactive/abandoned. Sediments directly in front of the outfalls (sampling stations AN-027, AN-029, AN-045, and AN-046) have low concentrations of PCBs and other contaminants, except for two stations (AN-029 and AN-046) that contain a few high metals concentrations; only mercury is high at AN-049 and only lead and zinc are high at AN-046. Mr. Ron Timm, the Ecology Project Manager for the adjacent uplands sites, described a localized sediment area adjacent to the outfalls at the toe of a historical ramp containing surface concrete and metallic debris. It is within this debris area where the metal exceedances occurred; outside of this area all benthic sediment cleanup objective (SCO) RALs for metals are met.

Plot 9 has been reconfigured with a split between the subplots to avoid the area expected to be directly influenced by both the outfalls and the concrete/metal debris. The reconfigured version is shown in Figure 3. Figure 3 also contains contours of surface PCB concentrations. Contours and elevation of chemicals concentrations at Plot 9 utilized data from the LDW RI/FS data set, the Fall 2014 LDW sampling event, plus sediment data from the two adjacent uplands sites (the Boeing Isaacson/Thompson Site and the 8801 E. Marginal Way Site).

As with the other recommended plots, Figure 3 shows the location and revised layout of Plot 9, its subplots, PCB and other SMS chemical exceedances in surface sediments, and bathymetry.

The two adjacent uplands sites have both already conducted sediment sampling; however, we understand Ecology may request that the 8801 Site collect additional data. It is requested that any data needed for the 8801 site from within the area of the reconfigured Plot 9 subplots be collected before the ENR layer is placed in 2016.

Attachments

Table 1 – Surface Sediment PCB Results

Table 2 –Subsurface Sediment PCB Results

Table 3 –Surface Sediment PCB Data Summary for all Plots Considered

Table 4 – RALs and ENR-ULs Used for Table 5

Table 5 - Chemical Exceedances of RAL and ENR-UL in Surface and Subsurface Sediments for Proposed Plots

Figure 1 – Plot 1 Layout, Chemical Exceedances, and Bathymetry

Figure 2 – Plot 6 Revised Layout, Chemical Exceedances, and Bathymetry

Figure 3 – Plot 9 Revised Layout, Chemical Exceedances, and Bathymetry

Table 1
Surface Sediment PCB Results

Surface Sediment PCB Results from 2014 Pilot Study sampling; Proposed Plots also include historical surface data.

		PCBs											Conventionals	
	Analyte	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Aroclors	Total PCB Aroclors	TOC	Total solids
	Unit	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	mg/kg OC	% dw	% ww
Sample ID	**Sample Date**													
Plot 1A (2014 Pilot Study and Historical Data)														
SD-DR001-0000	8/31/1998	20 U	40 U	20 U	20 U	20 U	46	53	--	--	99	3.3	3.0	--
LDW-SS6-010	3/10/2005	20 U	20 U	20 U	20 U	740	910	270	--	--	1920	183	1.1	62
LDW-PILOT1A-SS1	10/27/2014	9.4 U	9.4 U	9.4 U	9.4 U	65	78	65	9.4 U	9.4 U	208	15	1.4	59
LDW-PILOT1A-SS2	10/27/2014	9.8 U	9.8 U	9.8 U	9.8 U	160	160	120	9.8 U	9.8 U	440	26	1.7	50
LDW-PILOT1A-SS3	10/29/2014	9.2 U	9.2 U	9.2 U	9.2 U	64	98	77	9.2 U	9.2 U	239	6.8	3.5	46
LDW-PILOT1A-SS4	10/27/2014	9.4 U	9.4 U	9.4 U	9.4 U	48	70	54	9.4 U	9.4 U	172	6.8	2.5	48
Plot 1B (2014 Pilot Study and Historical Data)														
LDW-SS7-010	3/9/2005	19 U	19 U	19 U	19 U	62	92	86	--	--	240	8.8	2.7	47
LDW-SS305-010	10/3/2006	40 U	40 U	40 U	40 U	95 J	250 J	240 J	--	--	590 J	20 J	3.0	51
LDW-PILOT1B-SS1	10/27/2014	9.7 U	9.7 U	9.7 U	9.7 U	62	84	79	9.7 U	9.7 U	225	23	1.0	46
LDW-PILOT1B-SS2	10/29/2014	9.4 U	9.4 U	9.4 U	9.4 U	63	110	84	9.4 U	9.4 U	260	7.6	3.4	45
LDW-PILOT1B-SS3	10/29/2014	9.7 U	9.7 U	9.7 U	9.7 U	70	110	76	9.7 U	9.7 U	260	9.2	2.8	43
LDW-PILOT1B-SS4	10/27/2014	9.9 U	9.9 U	9.9 U	9.9 U	58	84	71	9.9 U	9.9 U	213	9.4	2.3	45
Plot 2A														
LDW-PILOT2A-SS1	10/27/2014	9.7 U	9.7 U	9.7 U	9.7 U	37	54	41	9.7 U	9.7 U	132	14	0.9	64
LDW-PILOT2A-SS2	10/28/2014	9.1 U	9.1 U	9.1 U	9.1 U	29	43	29	9.1 U	9.1 U	101	7.1	1.42 J	68
LDW-PILOT2A-SS3	10/28/2014	9.9 U	9.9 U	9.9 U	9.9 U	52	85	220	9.9 U	9.9 U	360	31	1.18 J	55
LDW-PILOT2A-SS4	10/27/2014	9.0 U	9.0 U	9.0 U	9.0 U	58	86	56	9.0 U	9.0 U	200	7.6	2.6	59
Plot 2B														
LDW-PILOT2B-SS1	10/27/2014	9.7 U	9.7 U	9.7 U	9.7 U	55	69	53	9.7 U	9.7 U	177	7.1	2.5	52
LDW-PILOT2B-SS2	10/28/2014	9.2 U	9.2 U	9.2 U	9.2 U	46	54	40	9.2 U	9.2 U	140	7.0	2.01 J	59
LDW-PILOT2B-SS3	10/28/2014	9.6 U	9.6 U	9.6 U	9.6 U	92	110	70	9.6 U	9.6 U	270	24	1.14 J	53
LDW-PILOT2B-SS4	10/28/2014	9.5 U	9.5 U	9.5 U	9.5 U	98	150	100	9.5 U	9.5 U	350	14	2.44 J	49
Plot 3A														
LDW-PILOT3A-SS1	10/27/2014	9.4 U	9.4 U	9.4 U	9.4 U	54	85	62	9.4 U	9.4 U	201	13	1.6	41
LDW-PILOT3A-SS2	10/27/2014	9.1 U	9.1 U	9.1 U	9.1 U	25	38	26	9.1 U	9.1 U	89	4.9	1.8	61
LDW-PILOT3A-SS3	10/27/2014	9.8 U	9.8 U	9.8 U	9.8 U	33	65	46	9.8 U	9.8 U	144	7.0	2.06 J	52
LDW-PILOT3A-SS4	10/27/2014	9.4 U	9.4 U	9.4 U	9.4 U	45	72	55	9.4 U	9.4 U	172	5.4	3.19 J	44
Plot 3B														
LDW-PILOT3B-SS1	10/27/2014	9.5 U	9.5 U	9.5 U	9.5 U	140 U	120	96	9.5 U	9.5 U	220	13	1.65 J	39
LDW-PILOT3B-SS2	10/27/2014	9.6 U	9.6 U	9.6 U	9.6 U	12 U	14	12	9.6 U	9.6 U	26	4.7	0.6	58
LDW-PILOT3B-SS3	10/27/2014	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	9.9 U	1.5 U	0.7	63
LDW-PILOT3B-SS4	10/27/2014	10 U	10 U	10 U	10 U	43	65	41	10 U	10 U	149	4.1	3.61 J	39
Plot 4A														
LDW-PILOT4A-SS1	10/27/2014	9.6 U	9.6 U	9.6 U	9.6 U	92	100	70	9.6 U	9.6 U	260	24	1.09 J	66
LDW-PILOT4A-SS2	10/27/2014	9.6 U	9.6 U	9.6 U	9.6 U	17	25	12	9.6 U	9.6 U	54	nc	0.261 J	76
LDW-PILOT4A-SS3	10/27/2014	9.9 U	9.9 U	9.9 U	9.9 U	110	140	80	9.9 U	9.9 U	330	26	1.28 J	63
LDW-PILOT4A-SS4	10/27/2014	8.9 U	8.9 U	8.9 U	8.9 U	57	90	50	8.9 U	8.9 U	197	11	1.81 J	63
Plot 4B														
LDW-PILOT4B-SS1	10/27/2014	9.1 U	9.1 U	9.1 U	9.1 U	430	330	180	9.1 U	9.1 U	940	45	2.08 J	61
LDW-PILOT4B-SS2	10/27/2014	10 U	10 U	10 U	10 U	74	100	37	10 U	10 U	210	17	1.26 J	62
LDW-PILOT4B-SS3	10/28/2014	9.6 U	9.6 U	9.6 U	9.6 U	20	21	10	9.6 U	9.6 U	51	6.0	0.846 J	58
LDW-PILOT4B-SS4	10/28/2014	9.8 U	9.8 U	9.8 U	9.8 U	720	660	260	9.8 U	9.8 U	1,640	109	1.51 J	63
Plot 6 - Lane A (2014 Pilot Studay and Historical Data)														
SD-DR089-0000	8/12/1998	20 UJ	40 U	20 U	33	20 U	142	96	--	--	271	14	1.9	--
LDW-SS40-010	1/18/2005	39 UJ	39 UJ	39 UJ	170 J	39 UJ	220	120	--	--	510 J	27 J	1.9	56
LDW-PILOT6A-SS1	10/28/2014	9.3 U	9.3 U	9.3 U	9.3 U	160	200	100	9.3 U	9.3 U	460	28	1.64 J	49
LDW-PILOT6A-SS4	10/28/2014	9.2 U	9.2 U	9.2 U	9.2 U	640	670	220	9.2 U	9.2 U	1,530	81	1.90 J	55
LDW-PILOT6B-SS1	10/29/2014	9.3 U	9.3 U	9.3 U	9.3 U	1,100	1,400	420	9.3 U	9.3 U	2,900	180	1.6	59
LDW-PILOT6B-SS4	10/29/2014	9.4 U	9.4 U	9.4 U	9.4 U	180	180 J	90	9.4 U	9.4 U	450 J	68 J	0.7	78
Plot 6 - Lane B (2014 Pilot Study and Historical Data)														
LDW-PILOT6A-SS2	10/28/2014	9.0 U	9.0 U	9.0 U	9.0 U	75	83	44	9.0 U	9.0 U	202	10	1.94 J	61
LDW-PILOT6A-SS3	10/28/2014	9.3 U	9.3 U	9.3 U	9.3 U	100	130	57	9.3 U	9.3 U	290	13	2.18 J	67
LDW-PILOT6B-SS2	10/29/2014	9.4 U	9.4 U	9.4 U	9.4 U	700	570	200	9.4 U	9.4 U	1,470	116	1.3	60
LDW-PILOT6B-SS3	10/29/2014	9.1 U	9.1 U	9.1 U	9.1 U	390	610	250	9.1 U	9.1 U	1,250	77	1.6	61

Prepared by Floyd|Snider

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Tables 1 and 2_Tables from LDW ENR-AC Pilot Study Data Memo_020215.xlsx

Table 1
Surface Sediment PCB Results

Surface Sediment PCB Results from 2014 Pilot Study sampling; Proposed Plots also include historical surface data.

		PCBs											Conventionals	
	Analyte	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Aroclors	Total PCB Aroclors	TOC	Total solids
	Unit	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	mg/kg OC	% dw	% ww
Sample ID	**Sample Date**													
Plot 7A														
LDW-PILOT7A-SS1	10/29/2014	9.7 U	9.7 U	9.7 U	9.7 U	65	130	72	9.7 U	9.7 U	270	10	2.7	47
LDW-PILOT7A-SS2	10/29/2014	9.4 U	9.4 U	9.4 U	9.4 U	43	83	43	9.4 U	9.4 U	169	9	1.9	53
LDW-PILOT7A-SS3	10/29/2014	9.6 U	9.6 U	9.6 U	9.6 U	65	130	71	9.6 U	9.6 U	270	14	1.9	52
LDW-PILOT7A-SS4	10/29/2014	9.2 U	9.2 U	9.2 U	9.2 U	68	130	70	9.2 U	9.2 U	270	10	2.6	45
Plot 7B														
LDW-PILOT7B-SS1	10/29/2014	9.8 U	9.8 U	9.8 U	9.8 U	64	130	94	9.8 U	9.8 U	290	10	2.9	46
LDW-PILOT7B-SS2	10/29/2014	9.2 U	9.2 U	9.2 U	9.2 U	43	80	48	9.2 U	9.2 U	171	6.8	2.5	54
LDW-PILOT7B-SS3	10/29/2014	9.5 U	9.5 U	9.5 U	9.5 U	54	110	78	9.5 U	9.5 U	240	12	1.9	52
LDW-PILOT7B-SS4	10/29/2014	9.9 U	9.9 U	9.9 U	9.9 U	63	140	87	9.9 U	9.9 U	290	11	2.6	46
Plot 8A														
LDW-PILOT8A-SS1	10/28/2014	8.9 U	8.9 U	8.9 U	8.9 U	27	66	57	8.9 U	8.9 U	150	20	0.738 J	69
LDW-PILOT8A-SS2	10/28/2014	9.8 U	9.8 U	9.8 U	9.8 U	28	66	57	9.8 U	9.8 U	151	nc	0.410 J	71
LDW-PILOT8A-SS3	10/28/2014	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	21	13	9.1 U	9.1 U	34	nc	0.203 J	78
LDW-PILOT8A-SS4	10/28/2014	9.8 U	9.8 U	9.8 U	9.8 U	15	28	18	9.8 U	9.8 U	61	9.8	0.622 J	72
Plot 8B														
LDW-PILOT8B-SS1	10/28/2014	9.8 U	9.8 U	9.8 U	9.8 U	28	53	27	9.8 U	9.8 U	108	10.7	1.01 J	71
LDW-PILOT8B-SS2	10/28/2014	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	21	13	9.8 U	9.8 U	34	nc	0.454 J	73
LDW-PILOT8B-SS3	10/28/2014	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	35	20	9.8 U	9.8 U	55	9.7	0.566 J	72
LDW-PILOT8B-SS4	10/28/2014	9.4 U	9.4 U	9.4 U	9.4 U	30	54	37	9.4 U	9.4 U	121	11.9	1.02 J	66
Plot 9A-Split (2014 Pilot Study, Historical Data, and New Data)														
LDW-SS119-010	1/19/2005	120 U	120 U	120 U	120 U	180	460	240 J	--	--	880 J	59 J	1.5	54.1
SD-512G	2/7/2012	19 U	19 U	19 U	19 U	120	250	82	19 U	19 U	452	24	1.9	57
SD-514G	2/7/2012	20 U	20 U	20 U	20 U	360	750	180	20 U	20 U	1290	73	1.8	56
SD-517G	2/7/2012	19 U	19 U	19 U	19 U	220	360	110	19 U	19 U	690	45	1.5	59
LDW-PILOT9A-SS1	10/29/2014	9.5 U	9.5 U	9.5 U	9.5 U	160	450	100	9.5 U	9.5 U	710	42	1.7	58
LDW-PILOT9A-SS2	10/29/2014	9.7 U	9.7 U	9.7 U	9.7 U	45	120	60	9.7 U	9.7 U	230	16	1.4	56
LDW-PILOT9A-SS3	10/29/2014	9.8 U	9.8 U	9.8 U	9.8 U	84	280	82	9.8 U	9.8 U	450	29	1.5	51
LDW-PILOT9A-SS4	10/29/2014	9.3 U	9.3 U	9.3 U	9.3 U	920	2,100	230	9.3 U	9.3 U	3,300	150	2.2	59
Plot 9B-Split (2014 Pilot Study, Historical Data, and New Data)														
SD0017	10/11/1997	20 U	39 U	20 U	20 U	20 U	83	44	--	--	127	9.1	1.4	56
SD-DR236-0000	8/27/1998	20 UJ	40 U	20 U	20 U	20 U	85	44	--	--	129	15	0.9	--
LDW-SS120-010	1/19/2005	72 U	72 U	72 U	72 U	100	330	200 J	--	--	630 J	32 J	1.9	54
LDW-SS121-010	1/25/2005	20 U	20 U	20 U	20 U	20 U	700	360 J	--	--	1060 J	57 J	1.9	60
AN021-SS-061025	10/25/2006	65 U	65 U	65 U	65 U	65 U	290	97	65 U	65 U	390	27	1.4	62
AN022-SS-061025	10/25/2006	59 U	59 U	59 U	59 U	59 U	330	93	59 U	59 U	420	27	1.6	56
AN023-SS-061025	10/25/2006	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	140	50	9.8 U	9.8 U	190	16	1.2	60
AN025-SS-061025	10/25/2006	32 U	32 U	32 U	35 J	32 U	390	130	32 U	32 U	560 J	35 J	1.6	60
AN026-SS-061026	10/26/2006	9.7 U	9.7 U	9.7 U	20	9.7 U	73	58	9.7 U	9.7 U	150	7.2	2.1	46
LDW-PILOT9B-SS3	10/29/2014	9.8 U	9.8 U	9.8 U	9.8 U	71	280	73	9.8 U	9.8 U	420	24	1.7	58
LDW-PILOT9B-SS4	10/29/2014	9.1 U	9.1 U	9.1 U	9.1 U	120	430	67	9.1 U	9.1 U	620	49	1.3	66

Notes:
Depth range for all samples was 0 to 10 cm

Abbreviations:
- dw Dry weight
- ID Identification
- nc Not calculated (TOC concentration is outside of the acceptable range of 0.5 to 4.0%)
- OC Organic carbon
- PCB Polychlorinated biphenyl
- TOC Total organic carbon
- ww Wet weight

Qualifiers:
- J Estimated concentration.
- U Not detected at given concentration.

Table 2
Subsurface Sediment PCB Results

Subsurface Sediment PCB Results from 2014 Pilot Study sampling.

			PCBs											Conventionals	
		Analyte	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Aroclors	Total PCB Aroclors	TOC	Total solids
		Unit	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	µg/kg dw	mg/kg OC	% dw	% ww
Sample ID	Depth Range	Sampling Date													
Plot 1															
LDW-PILOT1A-SC1	0-2 ft	10/30/2014	9.7 U	9.7 U	9.7 U	9.7 U	110	150	93	9.7 U	9.7 U	350	23	1.5	51
LDW-PILOT1B-SC1	0-2 ft	10/30/2014	9.2 U	9.2 U	9.2 U	9.2 U	74	110	76	9.2 U	9.2 U	260	18	1.5	45
Plot 2															
LDW-PILOT2A-SC1	0-2 ft	10/31/2014	9.1 U	9.1 U	9.1 U	9.1 U	55	130	63	9.1 U	9.1 U	250	20	1.2	60
LDW-PILOT2B-SC1	0-1.5 ft	10/31/2014	9.5 U	9.5 U	9.5 U	9.5 U	190 U	240	150	9.5 U	9.5 U	390	20	2.0	53
Plot 3															
LDW-PILOT3A-SC1	0-1.5 ft	11/4/2014	8.9 U	8.9 U	8.9 U	8.9 U	13 U	38	20	8.9 U	8.9 U	58	7.8	0.7	70
LDW-PILOT3B-SC1	0-1.5 ft	11/4/2014	9.2 U	9.2 U	9.2 U	9.2 U	71	160	73	9.2 U	9.2 U	300	13	2.3	59
Plot 4															
LDW-PILOT4A-SC1	0-2 ft	11/4/2014	9.7 U	9.7 U	9.7 U	9.7 U	2,600	3,000	440	9.7 U	9.7 U	6,000	290	2.1	57
LDW-PILOT4B-SC1	0-2 ft	11/4/2014	9.5 U	9.5 U	9.5 U	9.5 U	960	1,800	280	9.5 U	9.5 U	3,000	140	2.1	58
Plot 6															
LDW-PILOT6A-SC1	0-2 ft	11/4/2014	9.7 U	9.7 U	9.7 U	9.7 U	1,200	1,400	260	9.7 U	9.7 U	2,900	140	2.0	59
LDW-PILOT6B-SC1	0-2 ft	11/4/2014	9.6 U	9.6 U	9.6 U	9.6 U	480 U	450	260	9.6 U	9.6 U	710	24	3.0	52
Plot 7															
LDW-PILOT7A-SC1	0-2 ft	11/3/2014	9.4 U	9.4 U	9.4 U	9.4 U	47	100	44	9.4 U	9.4 U	190	7.4	2.6	54
LDW-PILOT7B-SC1	0-2 ft	11/3/2014	9.0 U	9.0 U	9.0 U	9.0 U	50	98	57	9.0 U	9.0 U	205	7.19	2.9	55
Plot 8															
LDW-PILOT8A-SC1	0-1.5 ft	11/3/2014	9.0 U	9.0 U	9.0 U	9.0 U	81 U	420	170	9.0 U	9.0 U	590	70	0.8 J	71
LDW-PILOT8B-SC1	0-1.5 ft	11/3/2014	8.8 U	8.8 U	8.8 U	8.8 U	54	140	53	8.8 U	8.8 U	250	nc	0.5 J	70
Plot 9															
LDW-PILOT9A-SC1	0-1.5 ft	11/3/2014	9.9 U	9.9 U	9.9 U	9.9 U	1,000	2,700	340	9.9 U	9.9 U	4,000	190	2.1	56
LDW-PILOT9B-SC1	0-1.5 ft	11/3/2014	9.7 U	9.7 U	9.7 U	9.7 U	580 U	2,500	420	9.7 U	9.7 U	2,900	110	2.7	58

Abbreviations:
- dw Dry weight
- ID Identification
- nc Not calculated (TOC concentration is outside of the acceptable range of 0.5 to 4.0%
- OC Organic carbon
- PCB polychlorinated bipheny
- TOC total organic carbon
- ww Wet weight

Qualifications:
- J Estimated concentration.
- U Not detected at given concentration

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Tables 1 and 2_Tables from LDW ENR-AC Pilot Study Data Memo_020215.xlsx

Table 3
Surface Sediment PCB Data Summary for all Plots Considered

Surface Sediment PCB Results from 2014 Pilot Study sampling; Plot 9 also includes historical data and data from adjacent sites.

Scour Plot	Plot 1A				Plot 1B				Comparison
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	172	440	265	120	213	260	240	24	-10%
Total PCBs (mg/kg-OC)	6.8	26	14	9.1	7.6	23	12	7.3	-9.1%
Total Organic Carbon (%)	1.4	3.5	2.3	0.94	0.97	3.4	2.4	1.0	3.2%
Scout Plot	Plot 2A				Plot 2B				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	101	360	198	115	140	350	234	95	17%
Total PCBs (mg/kg-OC)	7.1	31	15	11	7.0	24	13	8.0	-14%
Total Organic Carbon (%)	0.93	2.6	1.5	0.75	1.1	2.5	2.0	0.62	27%
Subtidal	Plot 4A				Plot 4B				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	54	330	210	117	51	1640	710	731	109%
Total PCBs (mg/kg-OC)	11	26	20	8.2	6	109	44	46	74%
Total Organic Carbon (%)	0.26	1.8	1.1	0.6	0.85	2.1	1.4	0.52	25%
Subtidal	Plot 6A - Original				Plot 6B - Original				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	202	1530	621	616	450	2900	1518	1021	84%
Total PCBs (mg/kg-OC)	10	81	33	33	68	180	110	51	108%
Total Organic Carbon (%)	1.6	2.2	1.9	0.22	0.66	1.6	1.3	0.45	-39%
Subtidal	Plot 6 - Lane A				Plot 6 - Lane B				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	450	2900	1335	1160	202	1470	803	650	-50%
Total PCBs (mg/kg-OC)	28	180	89	65	10	116	54	51	-49%
Total Organic Carbon (%)	0.66	1.9	1.4	0.5	1.3	2.2	1.8	0.39	19%
Subtidal	Plot 7A				Plot 7B				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	169	270	245	51	171	290	248	56	1%
Total PCBs (mg/kg-OC)	8.9	14	11	2.2	6.8	12	9.9	2.3	-7.6%
Total Organic Carbon (%)	1.9	2.7	2.3	0.45	1.9	2.9	2.5	0.4	8.8%
Intertidal	Plot 3A				Plot 3B				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	89	201	152	48	9.9	220	101	101	-40%
Total PCBs (mg/kg-OC)	4.9	13	7.5	3.5	1.5	13	5.8	5.0	-25%
Total Organic Carbon (%)	1.6	3.2	2.2	0.71	0.55	3.6	1.6	1.4	-29%
Intertidal	Plot 8A				Plot 8B				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	34	151	99	60	34	121	80	42	-22%
Total PCBs (mg/kg-OC)	9.8	20	15	7	9.7	11.9	11	1	-33%
Total Organic Carbon (%)	0.20	0.74	0.49	0.24	0.45	1.0	0.76	0.30	43%
Intertidal	Plot 9A - Split Configuration				Plot 9B - Split Configuration				
Analyte	Minimum	Maximum	Mean	Stan Dev	Minimum	Maximum	Mean	Stan Dev	% Difference
Total PCBs (µg/kg dry weight)	230	3300	1000	983	127	1060	438	274	-78%
Total PCBs (mg/kg-OC)	16	150	55	43	7.2	57	28	15	-65%
Total Organic Carbon (%)*	1.4	2.2	1.7	0.34	1.3	1.7	1.5	0.33	-12%

*2014 data only for TOC statistics

Abbreviations:

- dw Dry weight
- ID Identification
- nc Not calculated (TOC concentration is outside of the acceptable range of 0.5 to 4.0%)
- OC Organic carbon
- PCB Polychlorinated biphenyl
- TOC Total organic carbon
- ww Wet weight

Qualifiers:

Estimated concentration.

Not detected at given concentration.

Table 4
RALs and ENR-ULs Used for Table 5

		Intertidal Sediments (Plot 9) - Category 2				Subtidal Sediments (Plot 6) - Category 3				Scour Mitigation (Plot 1) - Category 1/2, Subtidal				
		Category 2 and 3, Top 10 cm		Category 2 and 3, Top 1.5 ft		Category 2 and 3, Top 10 cm		Category 2 and 3, Top 2 ft		Category 1, Top 10 cm		Category 1, Top 2 ft		
Human Health COCs	**units**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (Use Category 2/3)**	**RAL**	**UL-ENR (Use Category 2/3)**	**ROD Table[1]**
PCBs	mg/kg-OC	12	36	65	97	12	36	195	195	12	36	12	195	Table 28
cPAHs	µg TEQ/kg dw	1000	3000	900	1350	1000	3000	-	-	1000	3000	1000	-	Table 28
Arsenic	mg/kg dw	57	171	28	42	57	171	-	-	57	171	57	-	Table 28
Dioxins/Furans	ng TEQ/kg dw	25	75	28	42	25	75	-	-	25	75	25	-	Table 28
39 SMS Benthic COCs		**RAL (2xBenthic SCO)**	**UL-ENR (3xRAL)**	-	-	**RAL (2xBenthic SCO)**	**UL-ENR (3xRAL)**	-	-	**RAL (Benthic SCO)**	**UL-ENR (3xRAL)**	**RAL (Benthic SCO)**	-	Table 28
Metals														
Cadmium	mg/kg dw	10.2	30.6	-	-	10.2	30.6	-	-	5.1	15.3	5.1	-	Table 27
Chromium	mg/kg dw	520	1560	-	-	520	1560	-	-	260	780	260	-	Table 27
Copper	mg/kg dw	780	2340	-	-	780	2340	-	-	390	1170	390	-	Table 27
Lead	mg/kg dw	900	2700	-	-	900	2700	-	-	450	1350	450	-	Table 27
Mercury	mg/kg dw	0.82	2.46	-	-	0.82	2.46	-	-	0.41	1.23	0.41	-	Table 27
Silver	mg/kg dw	12.2	36.6	-	-	12.2	36.6	-	-	6.1	18.3	6.1	-	Table 27
Zinc	mg/kg dw	820	2460	-	-	820	2460	-	-	410	1230	410	-	Table 27
Polycyclic Aromatic Hydrocarbons (PAHs)														
2- Methylnaphthalene	mg/kg OC	76	228	-	-	76	228	-	-	38	114	38	-	Table 27
Acenaphthene	mg/kg OC	32	96	-	-	32	96	-	-	16	48	16	-	Table 27
Anthracene	mg/kg OC	440	1320	-	-	440	1320	-	-	220	660	220	-	Table 27
Benzo(a)anthracene	mg/kg OC	220	660	-	-	220	660	-	-	110	330	110	-	Table 27
Benzo(a)pyrene	mg/kg OC	198	594	-	-	198	594	-	-	99	297	99	-	Table 27
Benzo(g,h,i)perylene	mg/kg OC	62	186	-	-	62	186	-	-	31	93	31	-	Table 27
Total benzofluoranthenes	mg/kg OC	4650	13950	-	-	4650	13950	-	-	230	690	230	-	Table 27
Chrysene	mg/kg OC	220	660	-	-	220	660	-	-	110	330	110	-	Table 27
Dibenzo(a,h)anthracene	mg/kg OC	24	72	-	-	24	72	-	-	12	36	12	-	Table 27
Dibenzofuran	mg/kg OC	30	90	-	-	30	90	-	-	15	45	15	-	Table 27
Fluoranthene	mg/kg OC	320	960	-	-	320	960	-	-	160	480	160	-	Table 27
Fluorene	mg/kg OC	46	138	-	-	46	138	-	-	23	69	23	-	Table 27
Indeno(1,2,3-cd)pyrene	mg/kg OC	68	204	-	-	68	204	-	-	34	102	34	-	Table 27
Naphthalene	mg/kg OC	198	594	-	-	198	594	-	-	99	297	99	-	Table 27
Phenanthrene	mg/kg OC	200	600	-	-	200	600	-	-	100	300	100	-	Table 27
Pyrene	mg/kg OC	2000	6000	-	-	2000	6000	-	-	1000	3000	1000	-	Table 27
Total HPAHs	mg/kg OC	1920	5760	-	-	1920	5760	-	-	960	2880	960	-	Table 27
Total LPAHs	mg/kg OC	740	2220	-	-	740	2220	-	-	370	1110	370	-	Table 27
Phthalates														
Bis (2-ethylhexyl)phthalate	mg/kg OC	94	282	-	-	94	282	-	-	47	141	47	-	Table 27
Butyl benzyl phthalate	mg/kg OC	9.8	29.4	-	-	9.8	29.4	-	-	4.9	14.7	4.9	-	Table 27
Dimethyl phthalate	mg/kg OC	106	318	-	-	106	318	-	-	53	159	53	-	Table 27
Chlorobenzenes														
1,2,4- Trichlorobenzene	mg/kg OC	1.62	4.86	-	-	1.62	4.86	-	-	0.81	2.43	0.81	-	Table 27
1,2- Dichlorobenzene	mg/kg OC	4.6	13.8	-	-	4.6	13.8	-	-	2.3	6.9	2.3	-	Table 27
1,4- Dichlorobenzene	mg/kg OC	6.2	18.6	-	-	6.2	18.6	-	-	3.1	9.3	3.1	-	Table 27
Hexachlorobenzene	mg/kg OC	0.76	2.28	-	-	0.76	2.28	-	-	0.38	1.14	0.38	-	Table 27

Table 4
RALs and ENR-ULs Used for Table 5

		Intertidal Sediments (Plot 9) - Category 2				Subtidal Sediments (Plot 6) - Category 3				Scour Mitigation (Plot 1) - Category 1/2, Subtidal				
		Category 2 and 3, Top 10 cm		Category 2 and 3, Top 1.5 ft		Category 2 and 3, Top 10 cm		Category 2 and 3, Top 2 ft		Category 1, Top 10 cm		Category 1, Top 2 ft		
Human Health COCs	**units**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (3xRAL)**	**RAL**	**UL-ENR (Use Category 2/3)**	**RAL**	**UL-ENR (Use Category 2/3)**	**ROD Table[1]**
Other SVOCs and COCs														
2,4- Dimethylphenol	µg/kg dw	58	174	-	-	58	174	-	-	29	87	29	-	Table 27
4-Methylphenol	µg/kg dw	1340	4020	-	-	1340	4020	-	-	670	2010	670	-	Table 27
Benzoic acid	µg/kg dw	1300	3900	-	-	1300	3900	-	-	650	1950	650	-	Table 27
Benzyl alcohol	µg/kg dw	114	342	-	-	114	342	-	-	57	171	57	-	Table 27
n-Nitrosodiphenylamine,	mg/kg OC	22	66	-	-	22	66	-	-	11	33	11	-	Table 27
Pentachlorophenol	µg/kg dw	720	2160	-	-	720	2160	-	-	360	1080	360	-	Table 27
Phenol	µg/kg dw	840	2520	-	-	840	2520	-	-	420	1260	420	-	Table 27

Notes:

- \- No limit given.
- 1 Tables referenced from *Record of Decision: Lower Duwamish Waterway Superfund Site,* United States Environmental Protection Agency Region 10, November 2014.

Abbreviations:

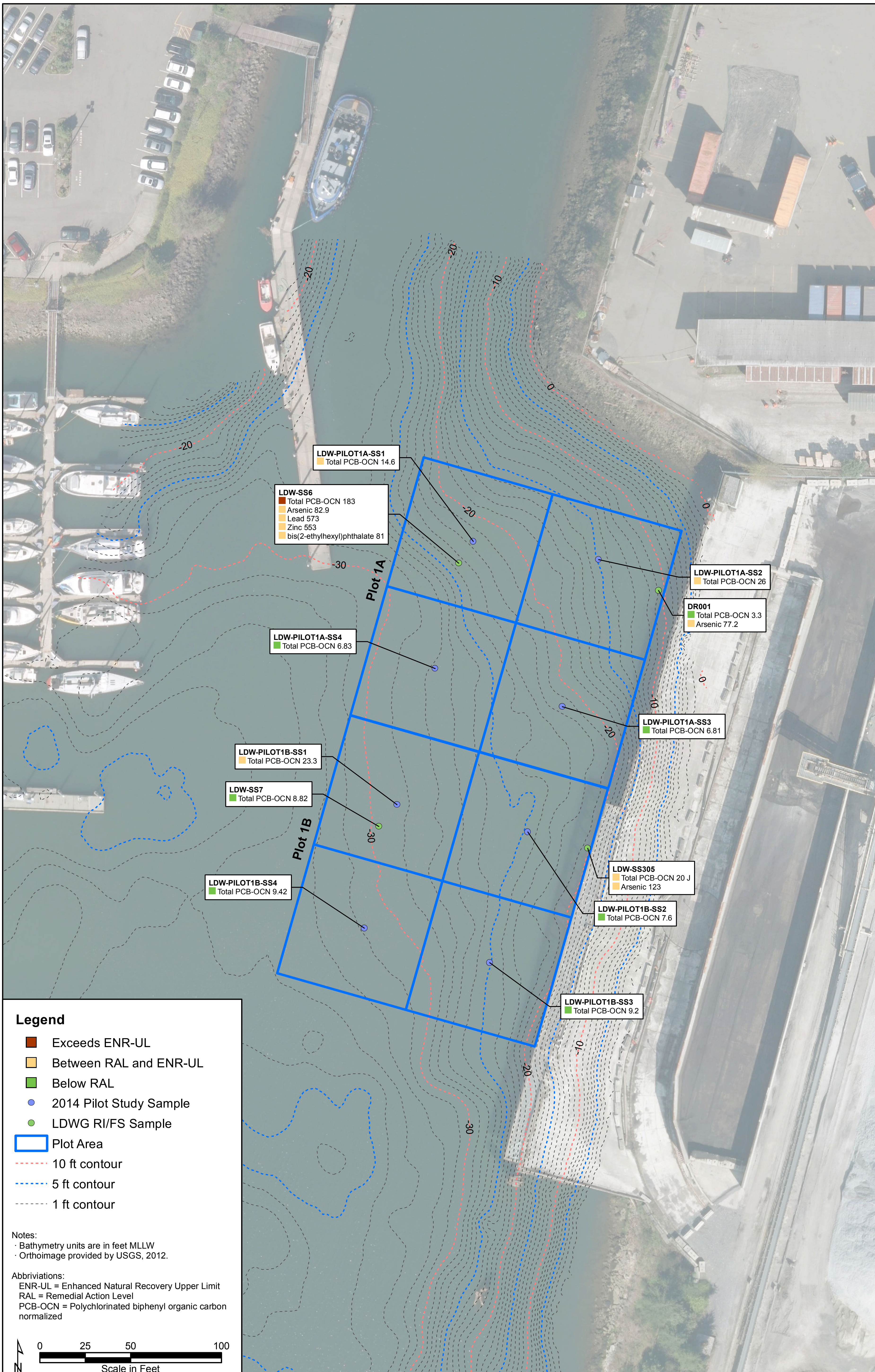
cm Centimeter
COC Contaminants of concern
cPAH Carcinogenic polycyclic aromatic hydrocarbon
dw Dry weight
ENR Enhanced natural recovery
ft Feet
kg Kilogram
mg Milligrams per kilogram
ng Nanogram
OC Organic carbon
PCB Polychlorinated biphenyl
RAL Remedial action level
SCO Sediment cleanup objective
SVOC Semivolatile organic compound
TEQ Toxic equivalent
UL Upper limit

Table 5

Chemical Exceedances of RAL and ENR-UL in Surface and Subsurface Sediments for Proposed Plots

LocationName	SampleDate	Analyte	Result	Unit	Exceeds RAL?	Exceeds ENR-UL?
Scour Plot 1 - Surface Sediment						
DR001	8/31/1998	Arsenic	77.2	mg/kg dw	Yes	No
LDW-PILOT1A-SS1	10/27/2014	PCBs	14.6	mg/kg OC	Yes	No
LDW-PILOT1A-SS2	10/27/2014	PCBs	26	mg/kg OC	Yes	No
LDW-PILOT1B-SS1	10/27/2014	PCBs	23.3	mg/kg OC	Yes	No
LDW-SS305	10/3/2006	Arsenic	123	mg/kg dw	Yes	No
LDW-SS305	10/3/2006	PCBs	20 J	mg/kg OC	Yes	No
LDW-SS6	3/10/2005	Arsenic	82.9	mg/kg dw	Yes	No
LDW-SS6	3/10/2005	Bis(2-ethylhexyl)phthalate	81	mg/kg OC	Yes	No
LDW-SS6	3/10/2005	Lead	573	mg/kg dw	Yes	No
LDW-SS6	3/10/2005	PCBs	183	mg/kg OC	Yes	Yes
LDW-SS6	3/10/2005	Zinc	553	mg/kg dw	Yes	No
Scour Plot 1 - Subsurface Sediment						
LDW-PILOT1A-SC1	10/30/2014	PCBs	23	mg/kg OC	Yes	No
LDW-PILOT1B-SC1	10/30/2014	PCBs	18	mg/kg OC	Yes	No
Subtidal Plot 6 - Surface Sediment						
DR089	8/12/1998	PCBs	14.1	mg/kg OC	Yes	No
LDW-PILOT6A-SS1	10/28/2014	PCBs	28	mg/kg OC	Yes	No
LDW-PILOT6A-SS3	10/28/2014	PCBs	13	mg/kg OC	Yes	No
LDW-PILOT6A-SS4	10/28/2014	PCBs	80.5	mg/kg OC	Yes	Yes
LDW-PILOT6B-SS1	10/29/2014	PCBs	180	mg/kg OC	Yes	Yes
LDW-PILOT6B-SS2	10/29/2014	PCBs	116	mg/kg OC	Yes	Yes
LDW-PILOT6B-SS3	10/29/2014	PCBs	76.7	mg/kg OC	Yes	Yes
LDW-PILOT6B-SS4	10/29/2014	PCBs	68 J	mg/kg OC	Yes	Yes
LDW-SS40	1/18/2005	PCBs	27 J	mg/kg OC	Yes	No
Intertidal Plot 9 - Surface Sediment						
AN-021	10/25/2006	PCBs	27	mg/kg OC	Yes	No
AN-022	10/25/2006	PCBs	27	mg/kg OC	Yes	No
AN-023	10/25/2006	PCBs	16	mg/kg OC	Yes	No
AN-025	10/25/2006	Butyl benzyl phthalate	13	mg/kg OC	Yes	No
AN-025	10/25/2006	PCBs	35 J	mg/kg OC	Yes	No
AN-027	10/25/2006	Butyl benzyl phthalate	14	mg/kg OC	Yes	No
AN-027	10/25/2006	PCBs	14	mg/kg OC	Yes	No
AN-028	10/25/2006	PCBs	15 J	mg/kg OC	Yes	No
AN-029	10/25/2006	Mercury	6.8	mg/kg dw	Yes	Yes
AN-029	10/25/2006	PCBs	15	mg/kg OC	Yes	No
AN-046	2/11/2008	Lead	21700 J	mg/kg dw	Yes	Yes
AN-046	2/11/2008	Zinc	1050	mg/kg dw	Yes	No
AN-047	2/11/2008	Butyl benzyl phthalate	83	mg/kg OC	Yes	Yes
AN-047	2/11/2008	PCBs	110	mg/kg OC	Yes	Yes
DR236	8/27/1998	PCBs	15	mg/kg OC	Yes	No
EST143	9/25/1997	PCBs	28	mg/kg OC	Yes	No
LDW-PILOT9A-SS1	10/29/2014	PCBs	42	mg/kg OC	Yes	Yes
LDW-PILOT9A-SS2	10/29/2014	PCBs	16	mg/kg OC	Yes	No
LDW-PILOT9A-SS3	10/29/2014	PCBs	29	mg/kg OC	Yes	No
LDW-PILOT9A-SS4	10/29/2014	PCBs	150	mg/kg OC	Yes	Yes
LDW-PILOT9B-SS1	10/29/2014	PCBs	25	mg/kg OC	Yes	No
LDW-PILOT9B-SS2	10/29/2014	PCBs	53.8	mg/kg OC	Yes	Yes
LDW-PILOT9B-SS3	10/29/2014	PCBs	24	mg/kg OC	Yes	No
LDW-PILOT9B-SS4	10/29/2014	PCBs	49	mg/kg OC	Yes	Yes
LDW-SS119	1/19/2005	PCBs	59 J	mg/kg OC	Yes	Yes
LDW-SS120	1/19/2005	Butyl benzyl phthalate	12	mg/kg OC	Yes	No
LDW-SS120	1/19/2005	PCBs	32 J	mg/kg OC	Yes	No
LDW-SS121	1/25/2005	Butyl benzyl phthalate	17	mg/kg OC	Yes	No
LDW-SS121	1/25/2005	PCBs	57 J	mg/kg OC	Yes	Yes
SD-512G	2/7/2012	PCBs	24.4	mg/kg OC	Yes	No
SD-514G	2/7/2012	PCBs	72.5	mg/kg OC	Yes	Yes
SD-517G	2/7/2012	PCBs	44.8	mg/kg OC	Yes	Yes
Plot 9 - Subsurface Sediment						
LDW-PILOT9A-SC1	11/3/2014	PCBs	190	mg/kg OC	Yes	Yes
LDW-PILOT9B-SC1	11/3/2014	PCBs	110	mg/kg OC	Yes	Yes
LDW2006LDW-1211	2/7/2006	Arsenic	28	mg/kg dw	Yes	No
SD-517	2/3/2012	Arsenic	56.3	mg/kg dw	Yes	Yes
SD-512	2/3/2012	Arsenic	290	mg/kg dw	Yes	Yes

Abbreviations:
- dw Dry weight
- ENR Enhanced natural recovery
- kg Kilogram
- µg Microgram
- mg Milligrams per kilogram
- OC Organic carbon
- PCB Polychlorinated biphenyl
- RAL Remedial action level
- SVOC Semivolatile organic compound
- UL Upper limit



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ENR-AC Pilot Study
Final Plot Selection Memo

Figure 1
Plot 1 Layout, Chemical Exceedances, and Bathymetry

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2/3/2015

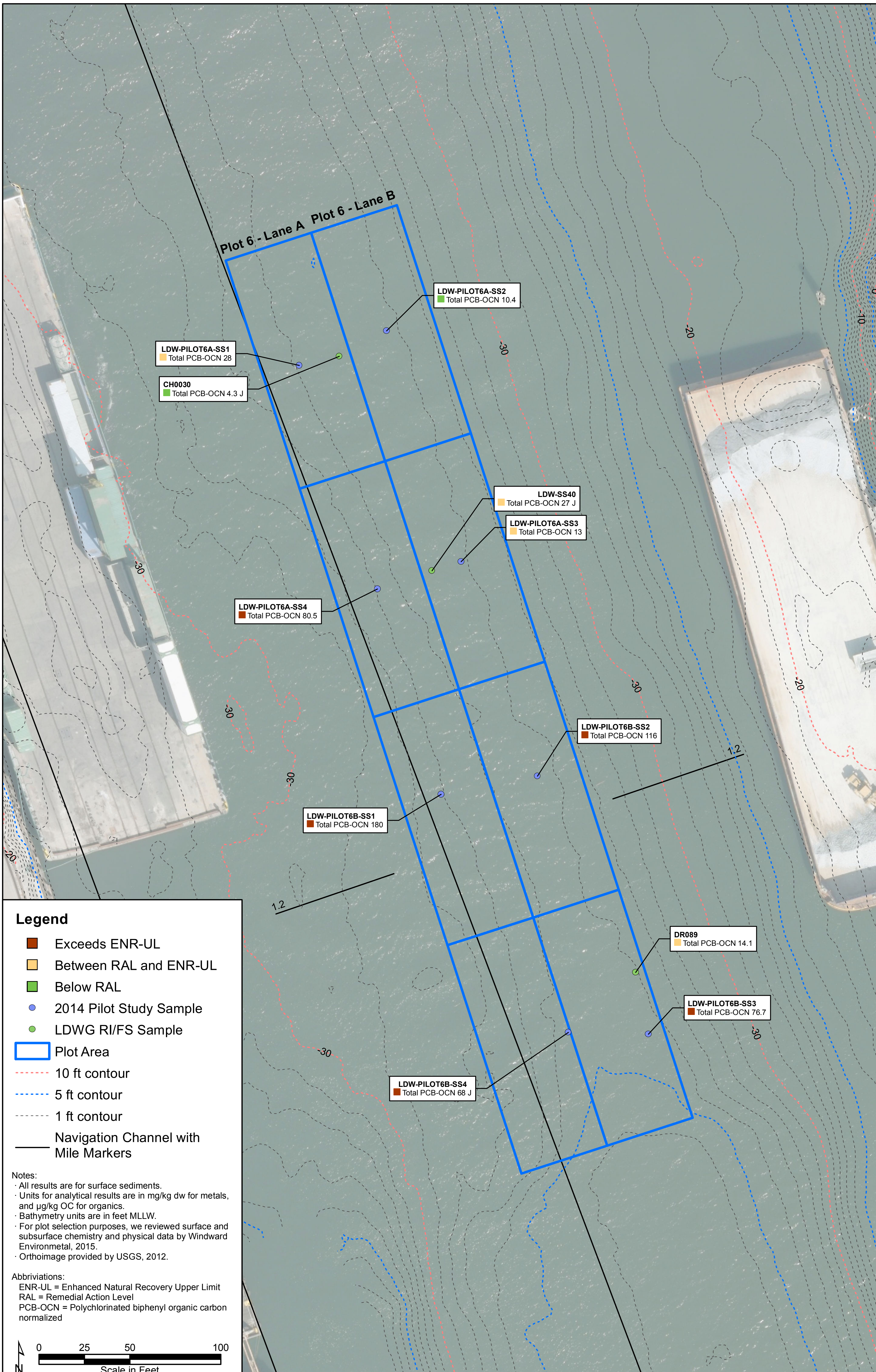

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Figure 2
Plot 6 Revised Layout, Chemical Exceedances, and Bathymetry

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2/3/2015

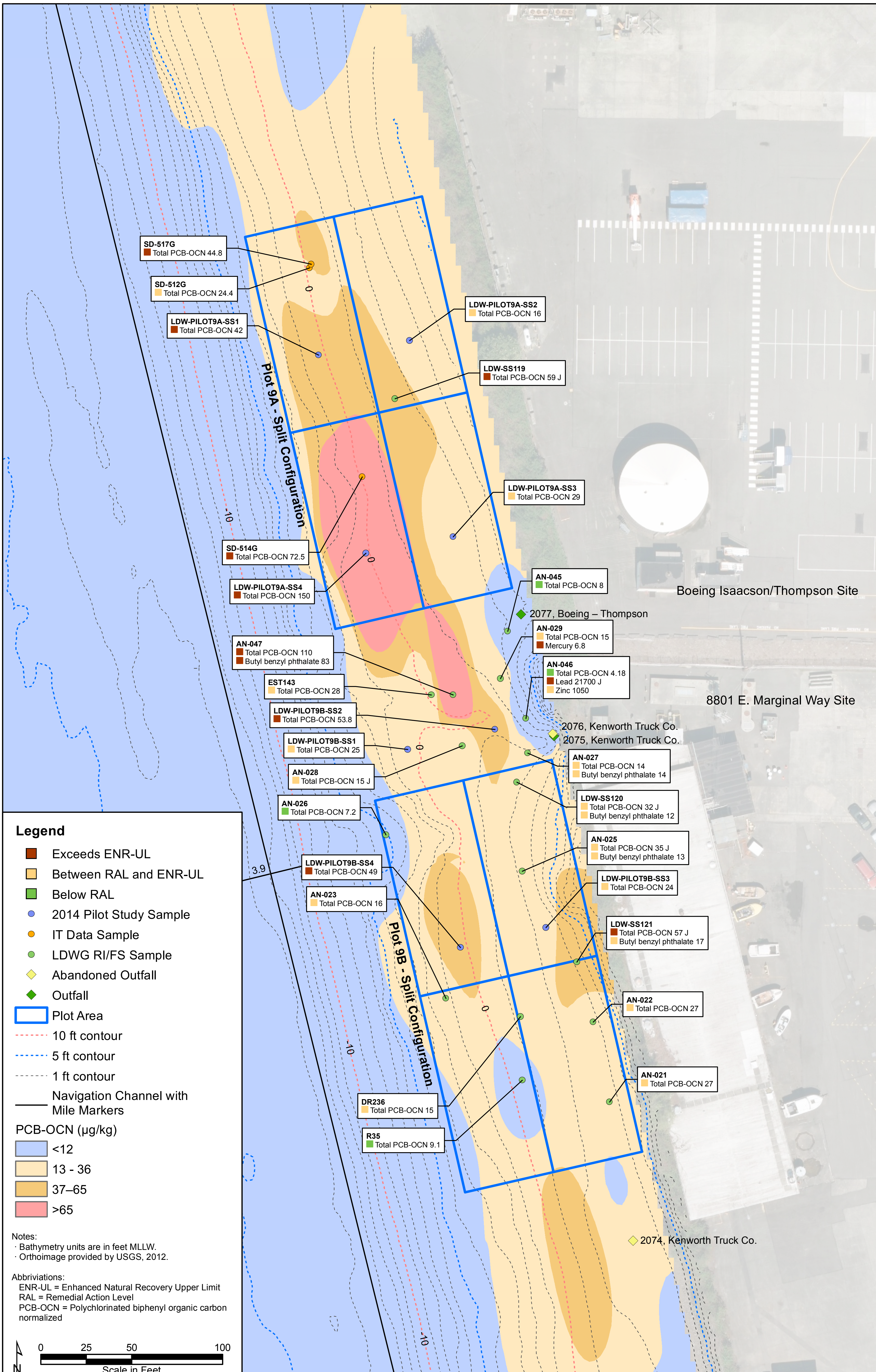

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Figure 3
Plot 9 Revised Layout, Chemical Exceedances, and Bathymetry

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2/3/2015