Lower Duwamish Waterway Superfund Cleanup Roundtable

Reference Binder

Draft v. 10-3-2018

Lower Duwamish Waterway Roundtable
Reference Binder

Materials Table of Contents
v. 10/10/18

Please bring this binder with you to all Roundtable meetings. It will be updated as needed.

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

September 14, 2018

To the Lower Duwamish Waterway Roundtable,

Thank you for your interest in joining the Lower Duwamish Waterway (LDW) Roundtable. The U.S. Environmental Protection Agency (EPA) is looking forward to convening the Roundtable to hear from its members to help shape a successful cleanup of the LDW.

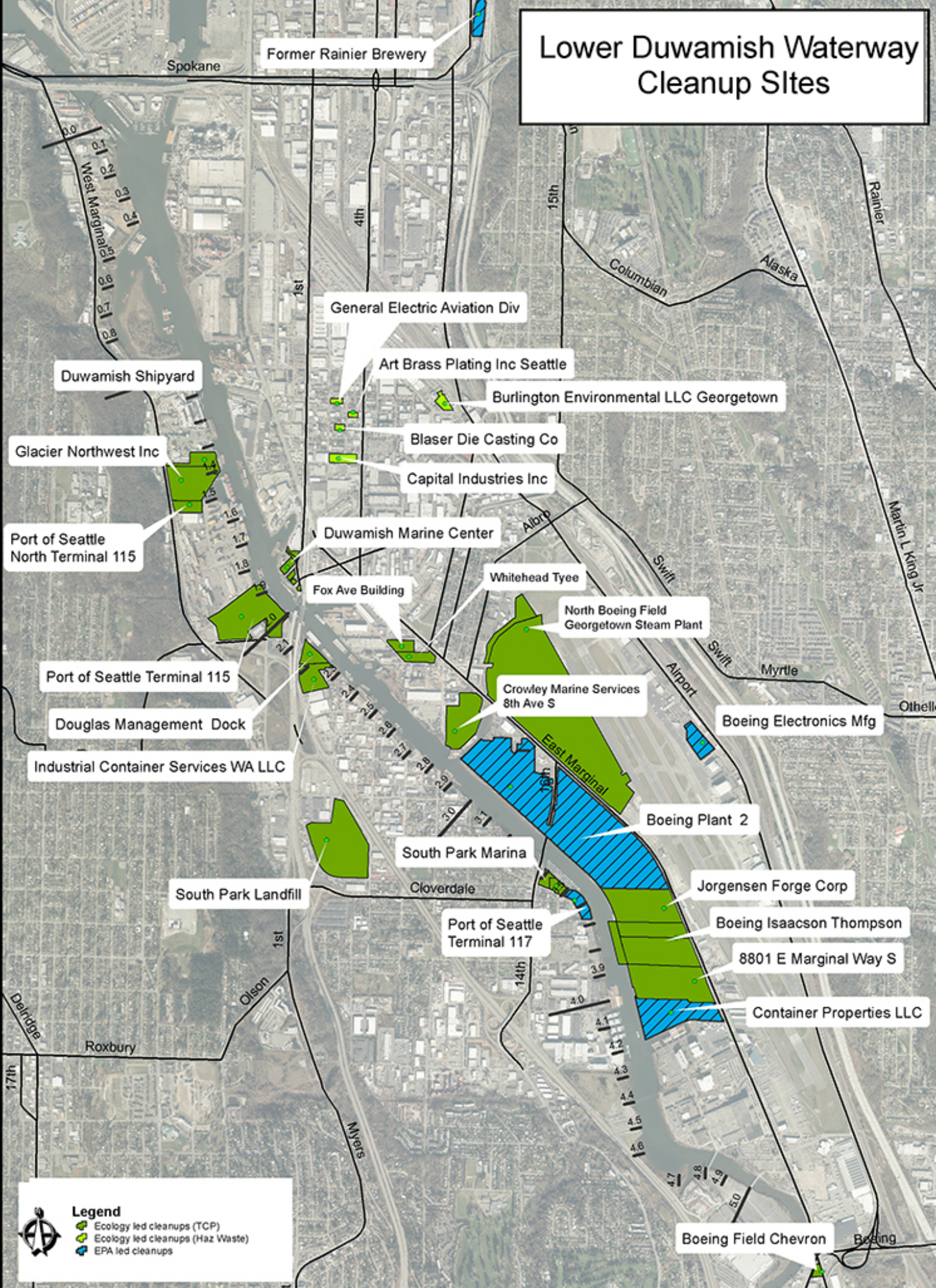
Attached please find a packet of materials for the first Roundtable meeting on October 11 from 3:30 to 5:30 PM at Youngstown Cultural Arts Center (4408 Delridge Way SW, Seattle, WA 98106). We are sending these materials a month in advance of this meeting to give you ample time to review the various documents and reach out with any questions or concerns.

For the past several months, EPA has worked with government agencies, business leaders, tribal representatives, community members, and others to lay the foundation for a Roundtable that will provide EPA with recommendations during the design and implementation of the Superfund cleanup of the LDW. Our intention is to meet with the Roundtable approximately three times per year to get your feedback on a variety of topics during the Remedial Design and Remedial Action phases of the cleanup.

Triangle Associates is a third-party facilitation firm that has been hired to facilitate the Roundtable. As a neutral facilitator, Triangle is committed to a fair process for all Roundtable participants and does not have a stake in the outcome of the Roundtable's work. Please expect to see emails and receive phone calls from Triangle Associates.

Thank you and please let me know if you have any questions.

Julie Congdon
Lead Community Involvement Coordinator
(206) 553-2752
congdon.julie@epa.gov


Lower Duwamish Waterway Cleanup SItes
Former Rainier Brewery
Spokane
West Marginal
4th
1st
15th
Columbian
Alaska
Rainier
Martin L King Jr
General Electric Aviation Div
Art Brass Plating Inc Seattle
Burlington Environmental LLC Georgetown
Blaser Die Casting Co
Capital Industries Inc
Duwamish Shipyard
Glacier Northwest Inc
Port of Seattle North Terminal 115
Duwamish Marine Center
Albro
Swift
Whitehead Tyee
Fox Ave Building
North Boeing Field Georgetown Steam Plant
Port of Seattle Terminal 115
Douglas Management Dock
Industrial Container Services WA LLC
Crowley Marine Services 8th Ave S
Airport
Myrtle
Boeing Electronics Mfg
East Marginal
16th
Boeing Plant 2
South Park Marina
South Park Landfill
Cloverdale
Jorgensen Forge Corp
Port of Seattle Terminal 117
Boeing Isaacson Thompson
8801 E Marginal Way S
14th
Container Properties LLC
Olson
Delridge
Roxbury
17th
Myers
Boeing Field Chevron
Legend
Ecology led cleanups (TCP)
Ecology led cleanups (Haz Waste)
EPA led cleanups

In 2017, the Lower Duwamish Waterway Roundtable Organizing Committee developed draft operating procedures for the Lower Duwamish Waterway Roundtable. These draft operating procedures were then amended based on input from 18 additional stakeholders and the US Environmental Protection Agency. The draft operating procedures will remain under development by all parties until the Roundtable's first meeting in late 2018, in which the Roundtable will have the opportunity to review their operating procedures and then approve them at a subsequent meeting. Please contact Elly Hale (hale.elly@epa.gov or 206-553-1215) or Julie Congdon (congdon.julie@epa.gov or 206-553-2752) with any questions or concerns about this draft document or if you'd like to become involved with the Roundtable.

Lower Duwamish Waterway Roundtable
Proposed Approach and Draft Operating Procedures

Draft v. 10-5-18

1. Background

A. Lower Duwamish Waterway Superfund Cleanup Site

The Lower Duwamish Waterway (LDW) Superfund site is a five-mile segment of Seattle's only river, the Duwamish. The river flows between Georgetown and South Park and through the industrial core of Seattle into Elliott Bay. The US Environmental Protection Agency (EPA) declared the Lower Duwamish Waterway a "Superfund" site in 2001, meaning it was eligible for a special federal cleanup program due to the severity of its contamination. In 2014, EPA completed the final cleanup plan for the site, known as the "Record of Decision."

B. Origins of the LDW Roundtable

Section 13.2.8 of the Record of Decision (ROD) states: "Environmental Justice concerns will be addressed before, during and after implementation of the remedy through means that include...Continuing to engage the community throughout remedial design and implementation of the cleanup, including convening an advisory group as a means for the affected community and local agencies to work together on addressing the impacts of the cleanup on the affected community" (emphasis added).

In 2015-2016, during the interviews leading up to the update of the Community Involvement Plan for the LDW cleanup, the EPA asked interviewees about the purpose and structure of the "advisory group" mandated by the ROD. In general, the EPA heard two main responses: (1) DRCC/TAG should continue functioning as a Community Advisory Group (CAG) for this cleanup site; and (2) there needs to be an additional group with broader membership than DRCC/CAG to provide recommendations to the EPA.

As a result of the interviewees' suggestions, the EPA will continue working with DRCC/TAG as a CAG, but the EPA will also convene a Lower Duwamish Waterway Roundtable (Roundtable) that will have a broader membership than DRCC/TAG. Notably, the Roundtable will include, among others, PRPs such as King County, the City of Seattle, the Port of Seattle, The Boeing Company, and other businesses[1] listed as PRPs. This broader membership will enable a range of interests to come together to make recommendations to the EPA during the design and implementation of the cleanup.

[1] Or representatives of these PRPs

From February through August 2017, a small group of potential members of the LDW Roundtable met as an "Organizing Committee" to draft these operating procedures for the Roundtable to review and approve at their first meeting. See Appendix A for the list of Organizing Committee members. From 2017-2018, a neutral third-party facilitator (Triangle Associates) interviewed a broad cross-section of prospective members of the Roundtable and solicited their feedback on the draft operating procedures (see Appendix B for a list of interviewees). During their first meeting, Roundtable Members will review an updated version of the draft operating procedures that includes feedback from Triangle's interviews.

2. Purposes and Principles of the Roundtable

A. Purposes

The Roundtable's purposes are to:

- Seek creative solutions to mitigate LDW cleanup construction impacts (e.g. traffic, noise, light, impacts on Tribal activities, air quality, water quality, waterfront business operations, fishing, recreation, and quality of life);
- Provide recommendations to the EPA, as well as other agencies and organizations, to develop a successful cleanup design and implementation;
- Act as an inclusive, neutral, and transparent forum for input from all stakeholders - Tribes, residents, businesses, industries, labor groups, neighborhood groups, government agencies, waterway users, fishers, and others;
- Act as a means of providing good-faith communications, understanding, and information on topics related to the Superfund cleanup;
- Identify opportunities for potential ways to benefit the neighborhoods and communities affected by the cleanup, within the parameters of the Superfund site cleanup; and
- Strive to allow all stakeholders and agencies to operate under the same set of facts.

B. Limitations

Per the Community Involvement Plan, the Roundtable will have certain limitations. For example, the Roundtable is not intended to take the place of:

- DRCC/TAG's function as a CAG;
- Government-to government Tribal consultation with the Suquamish, Muckleshoot, or Yakama Tribes;
- Formal public involvement and public comment opportunities that the EPA and Ecology would otherwise do;
- The Healthy Seafood Consumption Consortium; or
- The Tribes, Trustees, and Community Group.

EPA decisions related to the Tribes, Trustees, and Community Group and Healthy Seafood Consumption Consortium will consider input from the Roundtable. At a minimum, EPA will continue to follow legal requirements and policies. Decisions will consider best use of EPA resources.

C. Principles

The Roundtable will operate in accordance with the following principles: balance of power, transparency, effectiveness, solutions-oriented, and fairness and equity for the entire community.

D. Termination

The Roundtable is intended to provide feedback to EPA throughout the remaining cleanup of the LDW Superfund site. However, if the Roundtable is not meeting EPA needs, or if budget, legal, or other issues arise, EPA may in its discretion discontinue its role as the convener of the Roundtable. In this event, EPA will give notice as soon as possible to Roundtable and Caucus Members. Please note that the Roundtable may continue meeting on its own without having EPA be the official convener.

3. Roundtable Membership

The Roundtable will include a seat for EPA as the convener plus approximately 5-10 seats for Roundtable Members. Roundtable Members will consist of:

- Caucus Leads who represent caucuses made up of members with common interests.
- Each affected federally recognized Tribe that chooses to participate.
- Resource members whose primary role is providing information (rather than recommendations) to the Roundtable.
- One ad-hoc or open seat.

Please see the graphic on page 6 for an illustration of the Roundtable Membership.

A. EPA as the convener of the Roundtable

The EPA will attend all regularly scheduled meetings. It will participate in and conduct educational briefings on the past and present of the site to ensure a shared knowledge of key issues, technologies, and the Superfund process. EPA will provide Roundtable Members with topics and proposals for their consideration in advance of Roundtable meetings. EPA will assist the Steering Committee (see Section 7.B) in formulating Roundtable agendas and work plans. EPA will respond to action items in a clear, direct, and timely fashion. EPA will seriously and in good faith consider the recommendations of the Roundtable and provide verbal responses to that input (see Section 6.B) so that the Roundtable is able to see how its input being considered. EPA will strive throughout the process to engage in respectful, constructive dialogue with Roundtable Members, and be receptive to Roundtable recommendations.

B. Caucuses

Caucuses are sub-groups consisting of identified representatives with similar interests. The purpose of caucuses is to allow interest groups to discuss issues and recommendations prior to larger Roundtable meetings.

- **Potential caucuses may include**:
    - **Community Advisory Group (CAG) Caucus** (i.e. the Duwamish River Cleanup Coalition/Technical Advisory Group (DRCC/TAG) and its members)
    - **Non-CAG Community Caucus** (i.e. community members, neighborhood associations, and community-based organizations that are not part of DRCC/TAG)

- **PRP Governmental Interests Caucus** (i.e. local government agencies listed as PRPs, including Seattle Public Utilities, King County Wastewater Treatment Division, and the Port of Seattle)
- **Non-PRP Governmental Interests Caucus** (i.e. local government agencies that are <u>not</u> listed as PRPs, including health and environmental agencies)
- **PRP Business/Industry/Labor Interests** (i.e. business, industry, and labor groups that may be listed as PRPs)
- **Non-PRP Business/Industry/Labor Interests** (i.e. small businesses that are not listed as PRPs that are affected by the cleanup, such as markets, restaurants and stores)
- **Recreational river users** (i.e. yacht clubs, paddle clubs, rowing clubs)
- **Fishers** (people who fish on the Duwamish River). Note: the Roundtable is distinct from EPA's Institutional Control Program and its associated Community Steering Committee.

- **Caucus Membership:** Each caucus will establish criteria for membership. The criteria for membership in each caucus will be documented once developed. This may also include timeframes for when applications for membership in a caucus will be accepted. Each Caucus Lead shall work with the caucus to determine what constitutes a quorum and how the caucus will govern itself in reaching recommendations.
- **Leads**: Each caucus will have a lead (or leads) who serve as the primary point of contact for EPA and the facilitator. Caucus Leads will be responsible for participating in the Roundtable Steering Committee (see Section 6.B.) and maintaining communication with their caucus members. Each caucus will determine how leads will be selected and terms for the leads. Caucuses can contact the Roundtable's neutral third-party facilitator for guidance on how to fairly create protocols for selecting leads, among other topics.
- **Facilitation**: Caucuses may need facilitation support as the members decide on leadership, how they should organize themselves, and communication protocols. Caucuses can individually decide to obtain outside facilitation if needed.
- **Communication:** Each caucus will internally communicate in advance of Roundtable meetings to develop its own recommendations. It is advised that each caucus meet in person or by phone prior to the larger Roundtable meetings. Each caucus is encouraged to bring a single view to Roundtable meetings. If a caucus cannot come to agreement on a recommendation, multiple viewpoints may be brought forward. Caucuses may speak with each other prior to Roundtable meetings, but this is not required.

C. **<u>Tribes:</u>** Federally recognized Tribes potentially affected by the clean-up (participation is optional). EPA has invited the Suquamish Tribe, Muckleshoot Tribe, and Yakama Nation to participate in the Roundtable. These Tribes' participation in the Roundtable would not affect their government-to-government consultation rights with EPA.

D. **<u>Resource Members:</u>** Resource Members provide information to Roundtable Members and EPA, but they do not develop recommendations for EPA to consider. Resource members may be standing members or requested for specific topics. Standing Resource Members will be identified after the Roundtable convenes. EPA can invite Resource Members to attend meetings, or Roundtable Members can request that EPA invite Resource Members to participate. There are a number of potential Resource Members, as outlined below.

- Elliott Bay Trustee Council members not part of other caucuses or represented by other seats.[2]
- Other federal agencies, such as the US Army Corps of Engineers or US Geological Survey.
- Other state agencies, such as the Washington State Department of Ecology, Washington State Department of Health, Washington State Department of Natural Resources, and Washington Department of Fish and Wildlife.
- Local government agencies that are not part of either the PRP or non-PRP local government caucus.
- Educational institutions, such as the University of Washington's Superfund Research Program.

E. **Ad Hoc:** This could include an interested member of the public or other entity as agreed to by the Roundtable. Roundtable members will have an opportunity to discuss the addition of an ad-hoc member prior to this ad-hoc member officially joining the Roundtable.

4. Other Roundtable Considerations

A. **Compensation:** EPA's legal advisors have confirmed that EPA is not permitted to provide financial stipends to community members for their participation. Other entities (e.g. government agencies, foundations, nonprofit organizations, businesses, etc.) may independently provide community participation stipends, but EPA cannot direct entities to do this or be involved in decisions about compensation.

B. **Attendance:** Roundtable Members and members of the public are encouraged to attend Roundtable meetings consistently so that EPA hears their perspective and so that they stay abreast of cleanup updates.

C. **Conflict of Interest**: To ensure the integrity of the Lower Duwamish Waterway Roundtable, it is important that members disclose conflicts of interests. This means that all Roundtable Members and Caucus Members are expected to disclose any interests (including financial interests) that might benefit from a particular Roundtable recommendation to EPA. This includes a direct benefit to the Roundtable member, or an indirect benefit through a family, business or other affiliation. A Roundtable member with a conflict of interest must disclose in writing to EPA and other Roundtable Members the nature of the potential conflict of interest. The Roundtable will assess options to address the conflict of interest through temporary or permanent modifications to the Roundtable and/or Caucus Member's participation.

[2] The Elliott Bay Trustee Council is comprised of Federal, state and tribal natural resource trustees. Members of the Trustee Council include the U.S. Department of the Interior; the U.S. Department of Commerce, acting through NOAA; the State of Washington; the Suquamish Tribe; and the Muckleshoot Indian Tribe).

Lower Duwamish Waterway Roundtable

Purpose: To provide a forum for interested and affected parties to make recommendations for the EPA to consider throughout the Lower Duwamish Waterway Superfund cleanup.

* Non-governmental community members or interest groups not represented in the Community caucus.

** Government entities that contribute information but do not develop recommendations, including but not limited to the WA Dep't of Ecology and others

V. 10/4/18

5. Work Plan and Topics

The Roundtable will address topics within the scope of the EPA Superfund cleanup of the LDW. The Roundtable will develop an annual work plan to guide its work to accomplish the purposes outlined in 2A. EPA enforcement information will not be included. The ROD for the LDW is final and remedy selection is not the focus of the Roundtable. Instead the Roundtable will focus on issues related to the design and implementation of the remedy.

EPA acknowledges that there are a variety of issues that impact Duwamish Valley residents that fall outside the scope of the Superfund cleanup. For example, EPA understands that gentrification and displacement, a lack of grocery stores, food insecurity, insufficient green space, and rising housing costs are all major concerns in the Duwamish Valley. However, EPA does not have authority over local housing, food policy, and public space decisions, which means these topics will not be directly addressed in Roundtable meetings. To support others in addressing issues important to Roundtable members, EPA will reserve meeting venues for 30-60 minutes beyond the Roundtable meeting to allow local government agencies, organizations, businesses and others to continue focusing on these topics.

6. Making Recommendations to EPA

A. Making Recommendations

The Roundtable will be an advisory, not a decision-making, body. All members of the Roundtable will be involved with making recommendations to EPA. Recommendations are meant to provide input and feedback to the EPA on issues related to the LDW Superfund cleanup.

Prior to Roundtable meetings, Caucus Leads will receive a written overview of the issues that EPA is seeking recommendations or feedback on. Each caucus will develop its own recommendations for EPA to consider. The Roundtable will meet to try to reconcile recommendations into a unified recommendation if desired. If there is disagreement, each caucus can submit its own recommendations. Meeting summaries will document dissenting recommendations at the request of individual Roundtable Members.

B. EPA's Responses to Recommendations

At Roundtable meetings, EPA will provide verbal responses to the recommendations that were provided at the past Roundtable meeting. These responses will be captured in the meeting summaries, which will be posted publicly on the Roundtable website

7. Roles

A. Role of the US Environmental Protection Agency

The EPA will attend and participate in Roundtable meetings as the convener, to serve as a resource and to receive recommendations from the Roundtable. See Sections 3A and 6B for more information about EPA's role.

B. Role of the Steering Committee

A Steering Committee will be established that consists of 3-5 Roundtable Members from among the member types listed on page 6. The Steering Committee will coordinate with EPA to guide the work of the Roundtable, including soliciting agenda topics, drafting meeting agendas, developing Roundtable work plans, and other duties as assigned. Roundtable Members can submit an agenda topic request to EPA and the Steering Committee at least a month prior to a Roundtable meeting.

Steering committee members may be self-nominated and/or nominated by a caucus. Steering committee membership is approved by EPA. Every year EPA and the Roundtable will review Steering Committee membership. There are no term limits for serving on the Steering Committee.

C. Role of the Public

Non-Roundtable Members (i.e. members of the public) will be able to observe Roundtable meetings and will have time on the agenda to ask questions or to comment at the end of each meeting.

Like Roundtable Members, non-members who attend Roundtable meetings are expected to maintain a civil and respectful meeting environment (see Section 8E for ground rules that apply to members and non-members). The Roundtable expects that no personal attacks, clapping, booing or any other form of support or nonsupport be used throughout Roundtable meetings. Non-Roundtable Members who wish to provide informal comments will adhere to the following ground rules:

- A maximum of 3 minutes will be provided to each non-Roundtable member who is interested in providing informal comments.
- Each commenter will state name and affiliation.
- EPA and Roundtable Members are not required to respond to these comments.
- Opportunities for non-Roundtable Members to provide comments at the end of Roundtable meetings do not constitute formal comments, such as those provided in a public hearing. However, a summary of comments from non-Roundtable Members will be captured in the meeting notes.

The Roundtable will discuss if and/or how they might provide food, childcare, and a convenient meeting location to support the involvement of the community. Funding for these accommodations is still to be decided.

D. Role of Facilitator

The facilitator, under EPA contract, will act as a neutral conduit of information and will seek to ensure equitable participation by all members. The facilitator will also enhance the flow of information to and from the EPA and between Roundtable Members. Lastly, the facilitator will develop meeting summaries and offer organizational support. The current facilitation contract is with Triangle Associates.

Other entities, such as the UW Superfund Research program or UW Graduate School fellows may also provide facilitation support to individual caucuses.

8. Materials

A. Agendas

The Steering Committee will work with EPA and the facilitator to develop meeting topics. EPA will make the final decisions on agenda topics. Agendas will be based on a template with regularly appearing sections such as EPA updates, Member updates (caucus members, resource members, Tribes, and ad hoc member); questions and answers; a topic/issue for which recommendations are sought; and comments/questions from the general public. Agendas and materials will be distributed at least a week in advance of Roundtable meetings.

B. Meeting Notifications

Roundtable meetings will be noticed through the Roundtable listserv and Roundtable website. Other notification pathways will be used as available.

C. Summaries

Meeting summaries will be developed after each Roundtable meeting. In general, these summaries will not attribute comments to specific individuals. However, Roundtable Members can choose to go "on the record" and have their comments captured in meeting summaries if requested at the time. Roundtable meeting summaries will include Roundtable recommendations and EPA responses to previous Roundtable recommendations, if discussed at the meeting.

D. Work Plans

EPA will work with the Roundtable Steering Committee to develop annual work plans. These work plans are intended to serve as a guide for the Roundtable and support agenda planning, with the understanding that circumstances may necessitate changes to the Roundtable work plan.

E. Ground Rules

Below are ground rules for effective communication to be used during each Roundtable meeting.
Be Respectful

- One person speaks at a time.
- Listen when others are speaking, avoid interrupting and side conversations.
- Allow time for interpreters when present.
- Hear and respect minority opinions.
- Good allies speak up. Members are encouraged not to ignore inappropriate behavior

Be Constructive

- Acknowledge that all participants bring with them legitimate purposes, goals, concerns and interests, whether or not you are in agreement with them.
- Act in "good faith," seeking to resolve conflicts and identify solutions.
- It is OK to disagree; it is not OK to make personal attacks or slanderous statements.
- Minimize the use of jargon and acronyms, define and explain when used.
- If you have a problem with a particular person, take the matter up with that person directly. If unable to resolve the difference, seek assistance from the facilitator.

Be Productive

- Begin and end meetings on time.
- Respect time constraints.
- Adhere to the agenda as much as possible, focusing on the subject at hand.

The Roundtable will review its ground rules after one year of operation and make adjustments as necessary.

9. Meeting Schedule

The Roundtable will meet three times per year, or as otherwise agreed to by the Roundtable. Once a year there will be an "all hands on deck" meeting that seeks to maximize attendance by all Roundtable Members and Caucus Members. Each caucus will aim to meet at least once between Roundtable meetings.

10. Amending the Operating Procedures

The Roundtable Operating Procedures will be in effect as long as the Roundtable is in existence. It will be reviewed on a biennial basis. The Operating Procedures can be modified at any point in the year through the consensus of Roundtable Members and approval of EPA.

11. Appendices

A. Organizing Committee Members
B. Stakeholder interviewees
C. Media policy

Appendix A – Organizing Committee Members

Name	Affiliation (alphabetical)
Willard Brown	Delridge Neighborhoods Development Association
James Rasmussen	Duwamish River Cleanup Coalition/Technical Advisory Group (DRCC/TAG)
Dave Gering	Manufacturing Industrial Council
Kevin Burrell	Seattle Public Utilities
Elly Hale	US EPA
Julie Congdon	US EPA

Appendix B – Stakeholders Interviewed by Triangle Associates from 2017-2018 to Solicit Feedback on the Draft Roundtable Operating Procedures

Below is a list of stakeholders that the neutral 3rd party firm Triangle Associates to solicit their feedback on the draft Roundtable operating procedures (dated February 13, 2018) that was initially developed by the Roundtable Organizing Committee.

- Anchor QEA, LLC
- LaFargeHolcim
- City of Seattle Duwamish Valley Program
- Duwamish River Cleanup Coalition/Technical Advisory Committee (DRCC/TAG)
- Duwamish Yacht Club
- Environmental Coalition of South Seattle (ECOSS)
- King County Department of Natural Resources and Parks
- Island Tug and Barge
- Highland Park Action Committee
- Johannessen & Associates attorneys
- Nucor
- Public Health Seattle-King County
- Representative from the Lower Duwamish Waterway Group (LDWG)
- Seattle Manufacturing Industrial Council (MIC)
- Soha and Lang attorneys
- Sustainability Ambassadors
- Washington State Department of Natural Resources
- Western Tugboat Co.

Appendix C - Media Policy

Media organizations might have an interest in the activities of the LDW Roundtable. Media organizations include but are not limited to broadcast, electronic, and print. The draft policy below describes how the LDW Roundtable will interact with the media.

1. Media Information Requests

EPA's LDW Remedial Project Manager will be responsible for responding to media requests regarding the Lower Duwamish Waterway. The Remedial Project Manager will adhere to EPA's internal media processes. LDW Roundtable Members and/or the facilitator will alert the LDW Remedial Project Manager if they receive a request from the media.

2. Interacting with the Media

If a reporter directly approaches a member of the LDW Roundtable, this member would speak on behalf of his or her own agency/organization but not on behalf of the Roundtable as a whole. As needed, EPA can develop press releases related to the Roundtable.

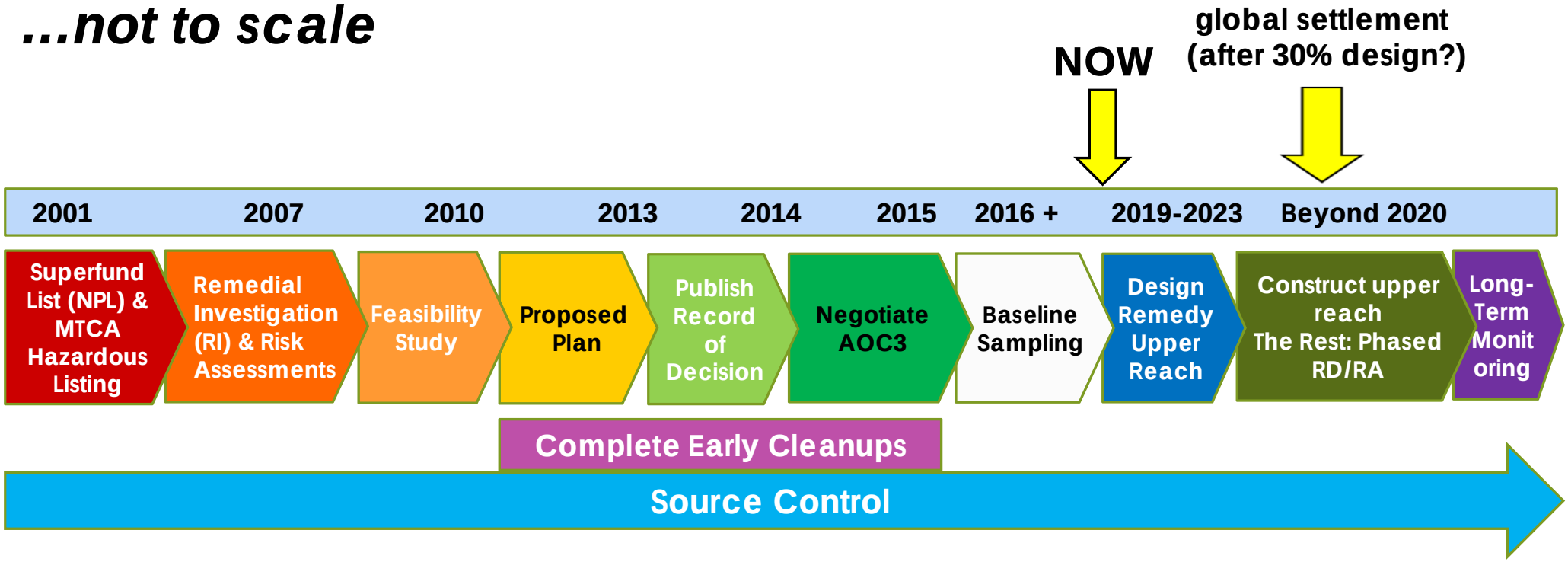
3. Photography and Film

EPA will be responsible for responding to requests to take photographs or film Roundtable meetings. EPA, in responding to the requests, will seek to obtain the consent of Roundtable Members and then either approve or decline the request.

4. Public Records Requests

The Freedom of Information Act (FOIA) is a federal law that gives the public the right to make requests for federal agency records. All federal agencies, including EPA, are required to make requested records available unless the records are protected from disclosure by certain FOIA exemptions, such as Confidential Business Information, Privacy Act protected information, and others.

LDW Cleanup Timeline
…not to scale



Draft June 2018

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 10

IN THE MATTER OF: Lower Duwamish Waterway Seattle, WA Port of Seattle, City of Seattle, King County, The Boeing Company Respondents Proceeding Under Sections 104, 122(a) and 122(d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9604, 9622(a) and 122(d)(3)	U.S. EPA Region 10 CERCLA Docket No. 10-2001-0055 FOURTH AMENDMENT

Introduction

In December 2000, the City of Seattle, King County, the Port of Seattle, and the Boeing Company ("Respondents") entered into an *Administrative Order on Consent for Remedial Investigation/Feasibility Study*, U.S. EPA, Region 10 Docket No. CERCLA 10-2001-0055, Ecology Docket No 00TCPNR-1895 (12/20/2000) (the "RI/FS AOC") with the United States Environmental Protection Agency ("EPA") and the Washington State Department of Ecology ("Ecology"). Respondents performed a remedial investigation and feasibility study for the Lower Duwamish Waterway Superfund Site ("Site" or "LDW") under the oversight of EPA and Ecology pursuant to the RI/FS AOC. The RI/FS AOC has been amended thrice to provide for the performance of additional studies related to the Site. The First Amendment, effective March 19, 2013, provides for the performance of the Fisher Study for the LDW. The Second Amendment, effective July 17, 2014, provides for the performance of the Enhanced Natural Recovery (ENR)/Activated Carbon (AC) pilot study. The Third Amendment, effective April 27, 2016, provides for the performance of pre-remedial design studies. Respondents continue to perform these studies pursuant to the terms of the RI/FS AOC.

The EPA issued a record of decision for the Site on November 21, 2014 (the "Lower Duwamish Waterway ROD"). The Lower Duwamish Waterway ROD selected remedial actions for the in-waterway portion of the Site.

Source control is an integral part of the strategy for addressing contamination throughout the Site. An objective of the source control is to find and sufficiently control sources before commencing in-waterway remediation. Ecology is the lead agency for implementing source control actions and uses its existing regulatory authorities to control sources. For purposes of assessing adequacy of source control in the immediate source area to the LDW, Ecology has divided the LDW into three reaches: upper, middle, and lower. Consistent with Sections 4.2 and 13.2.7 of the LDW ROD, EPA intends to commence remedial action for the LDW Site or a segment thereof after a source control determination for the LDW Site or segment thereof is made.

The objectives of this Fourth Amendment are to: 1) design the remedy for river mile 3.0 to river mile 5 of Lower Duwamish Waterway Site (the "LDW Upper Reach"), consistent with the Lower Duwamish Waterway ROD and CERCLA; 2) incorporate and supersede the work being carried out under the Third Amendment to this AOC in support of the development of seafood consumption institutional controls for the Site; and (3) provide for timely periodic monitoring of selected site conditions, as necessary. The attached Scope of Work (SOW) provides an overview of the work to be performed, a list of deliverables, and a schedule for these deliverables.

Fourth Amendment

EPA, Ecology, and Respondents agree to amend the RI/FS AOC as follows:

1. The work performed pursuant to this Fourth Amendment shall comply with CERCLA and its implementing regulations, the National Contingency Plan, 40 C.F.R. Part 300 and shall be subject to the review and approval of EPA. With the exceptions of the authority to review (except as a support agency) and approve work, resolve disputes (excluding Ecology's ability to resolve disputes related to its cost recovery), or enforce work performed under this Fourth Amendment and any subsequent amendment to the RI/FS AOC, Ecology shall retain all rights and obligations it has under the RI/FS AOC, including those rights of access and cost recovery conferred to it by Sections XIV and XXII of the RI/FS AOC. EPA will provide Ecology with an opportunity to review and comment on any submittal requiring EPA approval before EPA approves, modifies or disapproves the submittal. However, a failure by EPA to allow such an opportunity to Ecology shall not be a basis for Respondents to dispute an EPA decision to approve, modify or disapprove a submittal.

2. EPA and Respondents may by written agreement modify the work provided for by this Fourth Amendment.

3. For the purposes of this Fourth Amendment, Paragraph 3 of Section X (Modification of the Work Plan) of the RI/FS AOC shall be deleted and replaced by the following:

   EPA may identify gaps in the work required under the Fourth Amendment that prevent the accomplishment of the objectives of the Fourth Amendment as defined above. In that event, EPA may request in

writing that LDWG perform additional work under this Fourth Amendment, as necessary for the accomplishment of these objectives. Respondents shall confirm their willingness to perform such additional work, in writing, to EPA within twenty-one (21) days of receipt of the EPA request, or Respondents shall invoke dispute resolution. Subject to EPA resolution of any dispute, Respondents shall implement the additional work requested by EPA. The additional work shall be completed according to the standards, specifications, and schedule set forth or approved by EPA in a written modification to a plan or written work plan supplement. EPA reserves the right to conduct the work at any point, to seek reimbursement from Respondents, and/or seek any other appropriate relief. If EPA determines that conditions at the Site are creating or have the potential to create a danger to human health or welfare on-site or in the surrounding area or to the environment, EPA may order Respondent to stop further implementation of this Order for such period of time in the judgement of EPA is needed to abate the danger.

4. The amounts paid by Respondents to the EPA Hazardous Superfund pursuant to the requirements of Section XXII (Payment of EPA Oversight Costs) of the RI/FS AOC shall be deposited by EPA into the Lower Duwamish Waterway Superfund Site Special Account pursuant to Section XXI (Reservations of Rights and Reimbursement of Costs) of the RI/FS AOC to be retained and used to conduct or finance response actions at or in connection with the Site. In addition, EPA has several other site-specific accounts related to the Site within the EPA Hazardous Superfund. Funds held in such site specific accounts may be transferred to the Lower Duwamish Waterway Superfund Site Special Account if EPA determines that the funds are no longer needed to finance or otherwise support the implementation of response actions related to response action for which such site specific account was created. After completion of response actions at or in connection with the Site, any funds remaining in the Lower Duwamish Waterway Site Specific Account may be transferred by EPA to the EPA Hazardous Substance Superfund.

5. Remove and replace Paragraph 1 of Section XV with the following:

   All deliverables under this AOC shall be submitted in writing unless otherwise specified. All deliverables must be submitted by deadlines in the SOW attached to this Amendment or as otherwise approved by EPA. Unless otherwise requested by the EPA Project Coordinator, Respondents shall submit all deliverables to EPA in electronic form (native format and web-ready pdf) with a single hard copy of the first draft and the final version of all documents subject to EPA comment.

Technical specifications for sampling and monitoring data and spatial data are addressed in the SOW attached to this Amendment. If any deliverable includes maps, drawings, or other exhibits that are in color or larger than 8.5" by 11", Respondents shall also provide EPA with paper copies of such exhibits.

6. The list of deliverables identified in Paragraph 4 of Section XIX (Delay in Performance, EPA Stipulated Penalties, Enforcement) of the RI/FS AOC is amended to delete deliverables (3) through (6) and to include the original and revised Remedial Design Work Plan, and originals of the Preliminary Remedial Design, the Intermediate Remedial Design, the Pre-Final Remedial Design, and the Final Remedial Design.

7. The basis for violations identified in Paragraph 5 of Section XIX (Delay in Performance, EPA Stipulated Penalties, Enforcement) is amended to delete deliverables (1) through (9) and to include the original and final deliverables requiring EPA approval identified in the attached SOW except for a monthly progress report and those deliverables identified in Paragraph 6 above.

8. Respondents shall, subject to and conditioned upon the prior approval of EPA, implement the activities required by the attached SOW, which is incorporated into and enforceable under the terms of the RI/FS AOC as amended by this Fourth Amendment.

9. All work required by the Task 11 of the Third Amendment to the RI/FS AOC shall be incorporated into and superseded by this Fourth Amendment to the RI/FS AOC.

It is so ORDERED AND AGREED this ninth day of July, 2018.

BY: _____ DATE: 7/9/18
Shawn Blocker
Unit Manager Office of Environmental Cleanup
Region 10
United States Environmental Protection Agency

By: Rebecca S. Lawson for DATE: 7/3/2018
James J. Pendowski
Program Manager
Toxics Cleanup Program
Washington Department of Ecology

EFFECTIVE DATE: July 9, 2018
Agreed this 15 day of June, 2018
For Respondent Port of Seattle

By: _____
Name Stephen Metruck
Title Executive Director

Effective July 1, 2018

Agreed this ___ day of _____, 2018
For Respondent City of Seattle

By: _____
Name
Title

Agreed this 24 day of May, 2018
For Respondent King County

By: Dow Constantine
Name
Title

Agreed this 22 day of May, 2018
For Respondent The Boeing Company

By: S L Shestag
Name Steven L Shestag
Title Director, EHS Environment

Attachment to Fourth Amendment of the *Administrative Order on Consent for Remedial Investigation/Feasibility Study*, U.S. EPA, Region 10 Docket No. CERCLA 10-2001-0055, Ecology Docket No 00TCPNR-1895 (12/20/2000)

REMEDIAL DESIGN

STATEMENT OF WORK

LDW UPPER REACH

LOWER DUWAMISH WATERWAY SUPERFUND SITE

Seattle, King County, State of Washington

EPA Region 10

May 2018

TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND

1.1 Introduction. This Statement of Work (SOW) sets forth the procedures and requirements for implementing Amendment #4 (also referred to as AOC4 or the Fourth Amendment) of the Administrative Order on Consent for Remedial Investigation (RI)/Feasibility Study (FS) of the Lower Duwamish Waterway Superfund Site (Site or LDW) (U.S. EPA Region 10 Docket No. CERCLA 10-2001-0055, Ecology Docket N. 00TCPNR-1895, RI/FS AOC). Amendment #4 work includes remedial design for the upper reach of the Site, as defined in Section 3.2 below, and other tasks enumerated in this SOW, in accordance with the Record of Decision for the Site signed November 21, 2014 (ROD).

1.2 Structure of the SOW.

- Section 2 (Continued Development and Implementation of Seafood Consumption Institutional Controls (ICs)) sets forth the process for continuing to develop, pilot and/or implement outreach for appropriate and effective institutional controls related to seafood consumption.
- Section 3 (Remedial Design) sets forth the process for developing the Remedial Design (RD), which includes the submission of specified primary deliverables.
- Section 4 (Periodic Monitoring of Selected Site Conditions) sets forth elements of site monitoring to be performed by the year 2023 to generate tissue data relevant to human health risk and to assess polychlorinated biphenyls (PCB) trends in surface water quality. Respondents shall perform this work under AOC4 unless it is performed pursuant to another administrative order or Consent Decree.
- Section 5 (Deliverables) describes the content of supporting deliverables and the general requirements regarding Respondents' submission of, and EPA's review of, approval of, comment on, and/or modification of, the deliverables.
- Section 6 (Schedule) sets forth the schedule for submitting the primary deliverables, specifies the supporting deliverables that must accompany each primary deliverable, and sets forth the schedule of milestones regarding the completion of the RD.
- Section 7 (References) provides a list of references, including URLs.

1.3 The terms used in this SOW that are defined in CERCLA, in regulations promulgated under CERCLA, or in the RI/FS AOC, have the meanings assigned to them in CERCLA, in such regulations, or in the RI/FS AOC, except that the term "Paragraph" or "¶" means a paragraph of the SOW, and the term "Section" means a section of the SOW, unless otherwise stated.

2. CONTINUED DEVELOPMENT AND IMPLEMENTATION OF SEAFOOD CONSUMPTION ICs

2.1 This section incorporates and supersedes RI/FS AOC amendment #3 Task 11 (Support for Development of Seafood Consumption Institutional Controls). Respondents are responsible for costs incurred by EPA related to work performed under this section through the date of EPA approval of the upper reach Final (100 percent) Remedial Design, unless otherwise agreed to by EPA and Respondents. Respondents shall provide, fund, or participate in the following: (1) a planning group responsible for development and implementation of a plan for institutional controls; (2) incentives for participation on the planning group by community members who have relevant knowledge or experience, subject to public agencies' legal authority to provide such incentives; (3) technical materials to support the institutional controls; (4) pilot testing of potential institutional control tools, such as outreach campaigns developed using community based social marketing principles; (5) assessment of the pilot test and revisions to the plan, and (6) assessment of the plan's success and recommendations for future ICs on the LDW.

2.2 Respondents shall provide support for planning and managing the meetings of the Healthy Fish Consumption Consortium.

2.3 Respondents shall fund a cooperative agreement between EPA and Public Health Seattle & King County. The tasks under the Cooperative Agreement include: establishing a community based participatory process and producing a Duwamish Seafood Consumption IC Plan; providing on-going direct health promotion and outreach to implement the Duwamish Seafood Consumption ICs; building capacity of community partners that serve the affected communities to design, pilot test and implement community focused IC tools; monitoring and evaluating the IC program effectiveness, as well as provide regular Progress Reports; and developing recommendations for adaptively managing the program and ensuring continued community capacity building.

3. REMEDIAL DESIGN

3.1 The remedial design is generally defined as those activities to be undertaken to develop final construction plans and specifications, general provisions, special requirements, and all other technical documentation necessary to solicit bids for construction of the remedial action. The remedial design also includes identification of the required documentation to be provided by the construction contractor, subject to approval by EPA during the construction phase, and annotated outlines, conceptual plans, or initial drafts of certain documents to be finalized after construction.

3.2 Respondents shall design the selected remedy in the LDW ROD as it applies in the LDW Upper Reach. The LDW Upper Reach (LDW-UR) is defined as River Mile 3.0 to River Mile 5.

3.3 Plans and specifications shall be submitted in accordance with the schedule set forth in Section 5 of this SOW. Subject to inclusion in the RD Work Plan and approval by the EPA, Respondents may submit more than one set of design submittals reflecting different components of the remedial action. Remedial design work, including plans and specifications, shall be developed in accordance with the EPA's Superfund Remedial Design and Remedial Action Guidance (OSWER Directive No. 9355.0-4A) and shall demonstrate that the remedial action shall meet all requirements of the ROD. The Respondents shall meet regularly with the EPA to discuss design issues.

3.4 Respondents shall use EPA guidance documents as the basis for development of work plans, quality assurance project plans, sampling plans, water quality monitoring plans, and other documents. The remedial design and supporting deliverables shall be consistent with current technical guidance, including but not limited to Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, 2005; Guidance for In Situ Subaqueous Capping of Contaminated Sediments, 2012; Contaminated Sediments Remediation: Remedy Selection for Contaminated Sediments, 2014, and shall meet professional engineering standards for sediment remediation sites.

3.5 Remedial Design will progress from the preliminary design phase (30%) through 60%, 90%, and final (100%), with deliverables as identified below and in the RDWP. As information is developed during the phases of design, Respondents shall be prepared to present information and receive input through the Community Involvement process, which includes the Roundtable and other public fora.

4. PERIODIC MONITORING OF SELECTED SITE CONDITIONS

4.1 Respondents shall repeat elements of the Pre-Design Studies work plan developed under RI/FS AOC Amendment #3 for the Site as a whole (1) to assess fish and crab tissue concentrations for Remedial Action Objective 1 risk drivers as conditions in the waterway continue to change due to remediation activities and ongoing source control; and (2) to assess PCB trends in near-bottom surface water using passive samplers. Respondents shall perform this monitoring no less than five years from the baseline monitoring performed under AOC3 unless it is performed pursuant to another administrative order or Consent Decree.

4.2 For work to be done under this section, Quality Assurance Project Plan (QAPP) addendums and a data report that includes data evaluation (see supporting documents) shall be submitted per the Schedule of Deliverables in Section 5.

5. DELIVERABLES

5.1 Applicability. Respondents shall submit deliverables for EPA comment or approval or comment as specified in the Section 5. Copies of deliverables shall be provided, as directed by EPA, to Ecology, the Muckleshoot Tribe, and the Suquamish Tribe to ensure a reasonable opportunity for review and comment. As requested by EPA, Respondents shall provide additional hard copies for use in Community Involvement, including the LDW Roundtable.

5.2 Technical Specifications

(a) LDWG shall submit electronic data in accordance with the Region 10 Data Management Plan (May 2014) and associated guidance and templates. Respondents shall submit sampling and monitoring data in Region 10 Electronic Data Deliverable (EDD) format. Respondents shall upload the data into EPA's SCRIBE and into Ecology's EIM database. Respondents shall provide EPA with a copy of the files created to load data into the EPA database.

(b) Spatial data, including spatially-referenced data and geospatial data, shall be submitted following the procedures in the "U.S. EPA Region 10 Geographic Information Systems (GIS) for External Entities"; and (2) as unprojected geographic coordinates in decimal degree format using North American Datum f1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). The GIS data must be submitted to EPA on discus at the same time as the final reports are submitted. If requested by EPA, LDWG shall provide GIS data used in sampling plans, QAPPs, reports, or other submittals where GIS and mapping programs were used to generate maps, diagrams, and other visual aids. Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at https://edg.epa.gov/EME/.

(c) Each file must include an attribute name for each site unit or sub-unit submitted. Consult https://www.epa.gov/geospatial/geospatial-policies-and-standards for any further available guidance on attribute identification and naming.

(d) Spatial data submitted by Respondents does not, and is not intended to, define the boundaries of the Site.

5.3 Remedial Design Work Plan. Respondents shall submit a Remedial Design (RD) Work Plan (RDWP) for EPA approval. The RDWP shall include a proposed plan and schedule for implementing all RD activities for the LDW Upper Reach and

identification and development of all RD supporting documents. The RDWP must include:

(a) A description of the overall management strategy for performing the RD.

(b) A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring in the LDW Upper Reach;

(c) A description of the responsibility and authority of all organizations and key personnel involved with the development of the RD;

(d) A discussion of additional challenges, data needs, investigations or retesting necessary to initiate or complete the remedial design (e.g., how to characterize and remediate areas with structural or access restrictions);

(e) A Pre-Design Investigations (PDI) Work Plan, as specified in Section 4.4.

(f) Descriptions of any applicable permitting requirements and other regulatory requirements (including but not limited to Applicable or Relevant and Appropriate Requirements (ARARs) identified in the ROD);

(g) Description of plans for obtaining access in connection with RD and RA, such as property acquisition, property leases, and/or easements, and for developing institutional controls in accordance with the ROD;

(h) Proposed approach to reporting data from Pre-Design Investigation (PDI);

(i) Discussion of existing data (e.g., upstream suspended solids data, source control storm drain solids data, flow and other hydrodynamic data, pre-design data, and EAA monitoring data) and data to be collected as part of design or following construction that will assist in anticipating the quality of surface sediments over time. This discussion shall include a conceptual site model (CSM) that considers suspended and bedded sediments, including dredge residuals, and how they move during and after construction, to aid in interpreting monitoring outcomes in the Upper Reach; and

(j) A comprehensive listing and brief description of elements of remedial design to be addressed or supporting deliverables to be submitted as part of remedial design, including but not limited to those listed below or described in ¶ 4.9 (Components of Supporting Deliverables).

(1) QAPPs and health and safety plan [HSP].

(2) Remedial action basis of design report, including.

(i) Narrative basis of design of dredge, cap, ENR, and MNR>SCO elements, including supporting technical evaluations.

(ii) Permitting and site access.

(iii) Construction sequence, scheduling and cost estimate.

(iv) Anticipated long-term monitoring and maintenance approaches, including any expected measures for climate change adaptation.

(v) Evaluation of institutional controls requirements for caps

(vi) Archaeological monitoring and discovery.

(vii) Transportation and disposal approaches.

(viii) Scheduling and coordination of work under this SOW with other in-water work or navigation or development projects on the bank and intertidal or subtidal areas, if they may substantively affect remedial design or construction in the LDW Upper Reach.

(ix) Green and sustainable remediation evaluation and implementation approach.

(x) Approach to implementation and assurance of institutional controls.

(xi) Geotechnical basis of design.

(xii) Sediment excavation prism verification.

(3) Water quality monitoring plan.

(4) Biological assessment.

(5) Construction quality assurance plan.

5.4 Pre-Design Investigation. The purpose of the PDI is to address data needs for completion of design, by conducting field investigations.

(a) **PDI Work Plan.** Respondents shall submit a PDI Work Plan (PDIWP) per Section 4.4.b, for EPA approval. The PDIWP must include:

(1) An evaluation and summary of existing data and description of data gaps;

(2) A strategy for timely characterization, testing or data gathering to support delineation of areas where each remedial technology applies and engineering design, a discussion of the timing and type of data collection needed to document ARARs compliance, and a plan for natural recovery monitoring where required;

(3) A conceptual sampling plan including proposals and clearly stated rationales for any proposed tiering analyses or phasing of work to refine recovery categories, apply remedial technologies, including natural recovery, and design the remedy. The sampling plan shall identify media to be sampled, general location type and purpose, field sampling and lab analyses, bathymetric, hydrogeologic, and geotechnical studies, and an estimated number and spatial density of samples; and

(4) A schedule for implementing the PDI work.

(b) **PDI Quality Assurance Project Plan**. A QAPP addresses sample collection, analysis and data handling. The QAPP must include a field sampling plan and an explanation of Respondents' data quality objectives, quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance, and monitoring samples. The QAPP shall address disposal of Investigation Derived Waste. Respondents shall submit a QAPP for each field sampling effort and shall develop the QAPP in accordance with *EPA Requirements for Quality Assurance Project Plans*, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006); *Guidance for Quality Assurance Project Plans*, QA/G-5, EPA/240/R 02/009 (Dec. 2002); and *Uniform Federal Policy for Quality Assurance Project Plans*, Parts 1-3, EPA/505/B-04/900A though 900C (Mar. 2005).

(1) To ensure that Respondents' Labs perform all analyses using EPA-accepted methods (i.e., the methods documented in EPA Contract Laboratory Program (CLP) SOW for Inorganic Superfund Methods (ISM02.4, October, 2016); EPA CLP SOW for Organics Superfund Methods (SOM02.4, October, 2016); EPA CLP SOW for High Resolution Superfund Methods (HRSM01.2, October, 2014), or as updated; other methods acceptable to EPA;

(2) To ensure that Respondents' Labs participate in an EPA-accepted QA/QC program or other program QA/QC acceptable to EPA;

(3) To ensure that Respondents validate data in accordance with EPA-accepted data validation guidelines: National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA-540-R-2017-001, January, 2017); National Functional Guidelines for Organic Superfund Methods Data Review (EPA-540-R-2017-002, January, 2017) National Functional Guidelines for High Resolution Superfund Methods Data Review (EPA-542-B-16-001, April, 2016) or as updated.

(c) **PDI Health and Safety Plan(s)**. A Health and Safety Plan (HASP) describes all activities to be performed to protect on site personnel and others transiting the area or living or working nearby from physical, chemical, and all other hazards posed by the Work. Respondents shall develop HASPs in accordance with EPA's Emergency Responder Health and Safety and Occupational Safety and Health

Administration (OSHA) requirements under 29 C.F.R. §§ 1910 and 1926. EPA does not approve the HASP, but will review it to ensure that all necessary elements are included and that the plan provides for the protection of human health and the environment.

(d) **PDI Data.** Respondents shall submit data in accordance with the Schedule of Deliverables.

(e) **PDI Data Evaluation Report**. This report shall include:

(1) Summary of the investigations performed;

(2) Summary of investigation results;

(3) Narrative interpretation of data and results, with supporting figures and tables, including updated graphics (similar to ROD Figure 18 or more detailed) of where specific remedial technologies and details of how the decision trees in the ROD (Figure 19 and corrected Figure 20) were applied;

(4) Results of statistical and modeling analyses, as applicable;

(5) Photographs documenting the work conducted; and

(6) Conclusions and recommendations for RD, including design parameters and criteria, and identification of any remaining data gaps needed to support the design.

5.5 Should additional data be needed to support the design, a QAPP addendum shall be submitted 30 days after submittal of the draft PDI Data Evaluation Report.

5.6 **Preliminary (30%) RD**. Respondents shall submit a Preliminary (30%) RD for EPA's comment. The Preliminary RD must include the following elements and deliverables:

(a) A basis of design report providing descriptions of the analyses conducted to select the design approach, including a summary and detailed justification of design assumptions, restrictions and objectives to be used in design of the selected remedy; Essential supporting calculations shall be included (at least one sample calculation presented for each significant or unique design calculation, such as cap thickness or propeller wash modeling)

(b) Preliminary plans and drawings, and a list of all drawings to be included in the intermediate, pre-final and final design;

(c) An outline of required specifications;

(d) Identification of candidate transloading location(s), transport methods, and permitted upland off-site landfill facility, and import material sources

(e) A schedule, contracting strategy, contractor requirements, any needed controls and monitoring to comply with ARARs and minimize impacts (in accordance with Section 13.2.5 and Section 13.2.8 of the ROD), and plans to manage potential conflicts with other in-water work, treaty-protected uses, navigation, recreation and commerce, and upland developments and land use changes that may affect remedial design and construction in the Upper Reach;

(f) Access and easement requirements.

(g) Descriptions of how compliance with ARARs will be achieved and documented, specifying documentation requirements associated with ARARs identified in Table 26 (such as a Biological Assessment, Compensatory Mitigation Plan if needed, Archaeological Discovery plan);

(h) An outline and description of Long Term Maintenance, and Monitoring Plan (LTMMP) elements for the Upper Reach;

(i) An outline of an Institutional Controls Implementation and Assurance Plan (ICIAP), including an evaluation of the most appropriate institutional, proprietary controls and location-specific use restrictions needed to ensure long-term effectiveness, consistent with ROD Section 13.2.4 (This ICIAP is distinct from plans developed under Section 2 of this SOW).

5.7 **Intermediate (60%) RD**. Respondents shall submit the Intermediate (60%) RD for EPA's comment. The Intermediate RD must: (a) be a continuation and expansion of the Preliminary RD; (b) address EPA's comments regarding the Preliminary RD; and (c) include the elements and deliverables required for the Preliminary (30%) RD at a 60% level of completion.

5.8 **Pre-Final (90%) RD**. Respondents shall submit the Pre-final (90%) RD for EPA's comment. The Pre-final RD must be a continuation and expansion of the previous design submittal and must address EPA's comments regarding the Intermediate RD. The Pre-final RD will serve as the approved Final (100%) RD if EPA approves the Pre-final RD without comments. The Pre-final RD must include:

(a) A complete set of construction drawings and specifications that are: (1) certified by a registered Professional Engineer; (2) suitable for procurement; and (3) follow the Construction Specifications Institute's MasterFormat (or equivalent) and meet other relevant standards for design of sediment cleanup;

(b) A survey and engineering drawings showing existing features in the LDW Upper Reach, such as property boundaries, easements, bathymetry, structures to be protected or removed, and other relevant conditions;

(c) A specification for all necessary construction documentation, including but not limited to photographs and videos, bathymetric surveys, and GPS coordinates); and

(d) Those elements listed for the Preliminary Design, as well as the following (unless previously approved by the EPA):

(e) Draft Construction Quality Assurance Plan (CQAP).

(f) Draft Water Quality Monitoring Plan.

(g) Draft QAPP/HSP for remedial action construction and monitoring activities.

(h) Draft Permitting and Site Access Plan.

(i) Outline of ICIAP, including specific IC elements for each affected area.

(j) Required elements of a vessel management plan (to be finalized by contractor)

(k) Annotated outline and conceptual description of LTMMP elements specific to the Upper Reach, discussing how the elements and schedule fit into a likely LTMMP approach for the LDW site as a whole.

(l) Habitat Area Identification. For the purpose of complying with Endangered Species Act and Section 404 of the Clean Water Act (CWA) (see Table 26 of the ROD), Respondents shall identify habitat areas and proposed elevations and substrate materials for caps, ENR, or placement of backfill materials in any identified habitat areas and shall identify any areas where loss of aquatic habitat is unavoidable.

(m) Draft Biological Assessment.

(n) Draft CWA 404 and Section 10 Rivers and Harbors Act of 1899 memorandum

(o) Engineer's Capital and Operation and Maintenance Cost Estimate.

(p) Engineer's Construction Project Schedule.

(q) Community Outreach and Communications Plan

(r) Any additional plans identified in the Remedial Design Work Plan.

5.9 Final (100%) RD. Respondents shall submit the Final (100%) RD for EPA approval. The Final RD must address EPA's comments on the Pre-final RD and must include final versions of all Pre-final RD elements and deliverables. The ICIAP and LTMMP will remain as annotated outlines in the Final RD.

5.10 Components of Remedial Design Reports. Respondents shall submit each of the following supporting deliverables for EPA approval with each Remedial Design submittal, except as specified in Sections 5.6, 5.7, and 5.8 above. Respondents shall develop the deliverables in accordance with all applicable regulations, guidance, and policies (see Section 7 (References)). Respondents shall update and refine supporting deliverables related to design in accordance with the degree of design completion (30/60/90/100%) or as directed by EPA.

(a) **LDW Upper Reach Water Quality Monitoring Plan**. The purpose of the LDW Upper Reach Water Quality Monitoring Plan (WQMP) is to obtain information during construction to identify water quality impacts that may be caused by remedy construction; The WQMP must include:

(1) Description of the data collection parameters, including existing and proposed monitoring devices and locations, schedule and frequency of monitoring, analytical parameters to be monitored, and analytical methods employed;

(2) Description of how performance data will be analyzed, interpreted, and reported, and/or other Site-related requirements;

(3) Description of the communications and response protocols to respond to detected exceedances of water quality parameters as defined in the EPA 401 memo;

(4) Description of deliverables that will be generated in connection with monitoring, including sampling schedules, laboratory records, monitoring reports, data reports and data evaluation reports to EPA; and

(5) Description of additional monitoring and data collection actions (such as increases in frequency of monitoring, and/or installation of additional monitoring devices in the affected areas) that would be triggered in the event that monitoring results indicate higher than expected concentrations of TSS or the contaminants of concern in surface water.

(b) **Construction Quality Assurance Plan**. The purpose of the CQAP is to describe planned and systemic activities that provide confidence that the RA construction will satisfy all plans, specifications, and related requirements, including quality objectives. In addition, the purpose is to describe the activities to verify that RA construction has satisfied all plans, specifications, and related requirements, including quality objectives. The CQAP must:

(1) Identify, and describe the responsibilities of, the organizations and personnel implementing the CQAP;

(2) Describe the requirements to be met to achieve completion of the LDW Upper Reach RA;

(3) Describe the key performance standards and quality control elements required of the Contractor in the technical specifications;

(4) Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQAP

(5) Describe procedures for tracking construction deficiencies from identification through corrective action;

(6) Describe procedures for documenting all CQAP activities; and

(7) Describe procedures for retention of documents and for final storage of documents.

(c) **Emergency Response Plan**. Specifications for an Emergency Response Plan (ERP) shall be submitted as part of the 30/60/90 and 100% design submittal to address requirements for clear procedures in the event of an accident or emergency during remedial construction (for example, vessel or equipment damage, failure or power outages, unauthorized discharges to water, water impoundment failure, bank slope failure, etc.). The ERP may be updated in future as part of the remedial action work plan (RAWP). Specifications for the ERP shall address:

(1) Name of the person or entity responsible for responding in the event of an emergency incident;

(2) Plans for meeting(s) with the local community, including local, State, and federal agencies involved in the cleanup, as well as local emergency squads and hospitals;

(3) Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), consistent with the regulations under 40 C.F.R. Part 112, describing measures to prevent, and contingency plans for, spills and discharges;

(4) Notification activities in the event of a release of hazardous substances requiring reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004; and

(5) A description of all necessary actions in the event of an occurrence during the performance of the Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency or may present an immediate threat to public health or welfare or the environment.

(d) **Community Outreach and Communications Plan (COCP).** The COCP shall describe actions being taken to minimize the potential impacts including safety issues of remedy implementation on the community (e.g. residents, businesses, fishers, commuters, waterway users) and a plan for communicating with and responding to the community. Safety and other community concerns about construction will also be discussed with the Round Table during RD.

(e) **Archeological Discovery Plan.** For the purpose of complying with historical and archaeological preservation requirements, Respondents shall document any districts, sites, buildings, structures or objects included or eligible for inclusion in the National Register of Historic Places potentially impacted by remedy implementation and shall include specifications for an archaeological discovery plan to ensure protection of Native American artifacts and cultural or archaeological resources.

(f) **Biological Assessment**. With the 90% RD, Respondents shall submit a biological assessment for EPA review and use in consultation related to the Endangered Species Act.

(g) **Compensatory Mitigation Plan**. If necessary to comply with Clean Water Act Section 404 requirements, Respondents shall submit a plan for compensatory mitigation.

(h) **Section 408 Compliance Documentation**. Respondents shall include documentation necessary to evaluate compliance with 33 U.S.C. Section 403 and Section 408.

6. SCHEDULE

6.1 Applicability and Revisions. All deliverables and tasks required under this SOW must be submitted or completed by the deadlines or within the time durations listed in the Schedule of Deliverables set forth below. Deliverables not identified below shall be due in accordance existing requirements (progress reports), an EPA approved schedule proposed by Respondents or as directed by EPA. Respondents may propose changes to the Schedule of Deliverable for EPA approval. Upon EPA's approval, the revised schedule supersedes the schedule set forth below and previously-approved schedules.

6.2 General. Unless otherwise approved by EPA, submittal revisions following initial EPA comments shall be due 30 days from receipt of the comments. Subsequent revisions shall be due 14 days or as directed in EPA comments on the prior revision.

Schedule of Deliverables – Fourth Amendment of RI/FS AOC

Item	Deliverable, Task	SOW or (AOC) reference	Deadline
1	Notification of contractor/sub-contractor selection	(RI/FS AOC VIII, 1)	150 days from Amendment #4 effective date
2	RDWP	5.3	120 days from Issuance of Notice to Proceed to Contractor
3	PDIWP	5.4a	same as #2 above
4	PDI QAPP/HSP	5.4b/c	60 days after receipt of EPA comments on the revised draft PDIWP
5	Completion of PDI field work	5.4a	In accordance with the schedule in the approved PDIWP, unless otherwise approved by EPA.
6	PDI Data	5.4d	For each round of data collection, 10 days after Respondents' receipt of validated PDI sampling data.
7	PDI Data Evaluation Report – Phase I	5.4e	60 days after Respondents' submittal of PDI data for first phase of data collection to EPA.
8	PDI Data Evaluation Report – Phase II	5.4e	45 days after Respondents' submittal of PDI data for second phase of data collection to EPA.
9	Preliminary (30%) RD submittal	5.6	45 days from EPA approval of PDI Data Evaluation Report - Phase II.
10	Intermediate (60%) RD Submittal	5.7	120 days after EPA comments on Preliminary RD.
11	Pre-final (90%) RD Submittal	5.8	90 days after EPA comments on Intermediate RD.
12	Final (100%) RD	5.9	60 days after EPA comments on Pre-final RD.
13	Periodic Monitoring QAPP Addendum	4.2	4 years from Amendment #4 effective date
14	Periodic Monitoring Data / Evaluation Report	4.2	5 years from Amendment #4 effective date

7. REFERENCES

7.1 The following regulations and guidance documents, among others, apply to the Work. Any item for which a specific URL is not provided below is available on one of the two EPA Web pages listed in ¶ 7.2:

(a) A Compendium of Superfund Field Operations Methods, OSWER 9355.0-14, EPA/540/P-87/001a (Aug. 1987).

(b) CERCLA Compliance with Other Laws Manual, Part I: Interim Final, OSWER 9234.1-01, EPA/540/G-89/006 (Aug. 1988).

(c) CERCLA Compliance with Other Laws Manual, Part II, OSWER 9234.1-02, EPA/540/G-89/009 (Aug. 1989).

(d) Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G-90/001 (Apr.1990).

(e) Guidance on Expediting Remedial Design and Remedial Actions, OSWER 9355.5-02, EPA/540/G-90/006 (Aug. 1990).

(f) Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS (Jan. 1992).

(g) Permits and Permit Equivalency Processes for CERCLA On-Site Response Actions, OSWER 9355.7-03 (Feb. 1992).

(h) National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. Part 300 (Oct. 1994).

(i) Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R-95/025 (Mar. 1995).

(j) Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).

(k) EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).

(l) Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009 (Dec. 2002).

(m) Institutional Controls: Third Party Beneficiary Rights in Proprietary Controls (Apr. 2004).

(n) Quality management systems for environmental information and technology programs -- Requirements with guidance for use, ASQ/ANSI E4:2014 (American Society for Quality, February 2014).

(o) Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A though 900C (Mar. 2005).

(p) USEPA Office of Solid Waste and Emergency Response. Geospatial Superfund Site Data Definition and Recommended Practices Memo. OLEM Directive 9200.2-191. (November 29, 2017)

(q) Principles for Greener Cleanups (Aug. 2009), https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups.

(r) Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, EPA-540-R-05-012 Office of Solid Waste and Emergency Response OSWER 9355.0-85 December 2005

(s) Guidance for In Situ Subaqueous Capping of Contaminated Sediments, USACE 2012

(t) Contaminated Sediments Remediation: Remedy Selection for Contaminated Sediments, ITRC 2014

(u) USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration), ISM02.4 (October 2016).

(v) USEPA Contract Laboratory Program Statement of Work for Organic Superfund Methods (Multi-Media, Multi-Concentration), ISM02.4 (October 2016).

(w) EPA CLP SOW for High Resolution Superfund Methods (HRSM01.2, October, 2014)

(x) National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA-540-R-2017-001, January, 2017)

(y) National Functional Guidelines for Organic Superfund Methods Data Review (EPA-540-R-2017-002, January, 2017)

(z) National Functional Guidelines for High Resolution Superfund Methods Data Review (EPA-542-B-16-001, April, 2016)

(aa) Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance," OSWER 9355.7-18 (Sep. 2011).

(bb) Construction Specifications Institute's MasterFormat 2012, available from the Construction Specifications Institute, http://www.csinet.org/masterformat.

(cc) Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001 (Dec. 2012).

(dd) Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02 (Dec. 2012).

(ee) Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105 (Feb. 2017), https://www.epa.gov/superfund/superfund-post-construction-completion.

(ff) EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B-01/003. Mar. 2001, reissued May 2006.

7.2 A more complete list may be found on the following EPA Web pages:

Laws, Policy, and Guidance https://www.epa.gov/superfund/superfund-policy-guidance-and-laws

Test Methods Collections https://www.epa.gov/measurements/collection-methods

For any regulation or guidance referenced in the RI/FS AOC or Amendment #4 the reference will be read to include any subsequent modification, amendment, or replacement of such regulation or guidance.

Record of Decision

Lower Duwamish Waterway Superfund Site

United States
Environmental Protection Agency
Region 10

November 2014

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Part 1 Declaration

Site Name and Location

Site Name: Lower Duwamish Waterway

Location: Seattle and Tukwila, King County, Washington

U.S. Environmental Protection Agency (EPA) identification number: WA00002329803

Statement of Basis and Purpose

This decision document presents the Selected Remedy for the In-waterway Portion of the Lower Duwamish Waterway Superfund Site, in King County, Washington. The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record file for this site. The State of Washington, through the Washington Department of Ecology, concurs with the Selected Remedy.

Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

The Selected Remedy is a final action for the In-waterway Portion of the Lower Duwamish Waterway (LDW) Site. It addresses unacceptable human health risks associated with consumption of resident fish and shellfish, and with direct contact (skin contact and incidental ingestion) from net fishing, clamming, and beach play. It also addresses ecological risks to bottom-dwelling organisms (benthic invertebrates), fish, and wildlife.

The Selected Remedy is the third component of an overall strategy for addressing contamination and the associated risks in the LDW Site that includes:

1. early identification and cleanup of the most contaminated areas in the waterway, referred to as Early Action Areas (EAAs) — an estimated 29 acres will be cleaned up in the EAAs;
2. controlling sources of contamination to the waterway (Washington State Department of Ecology [Ecology] is the lead agency for this component); and
3. cleanup of the remaining contamination in the waterway, including long-term monitoring to assess the success of the remedy in achieving cleanup goals (the Selected Remedy).

The Selected Remedy will be implemented after cleanup in the EAAs has been completed, source control sufficient to minimize recontamination (see Section 4.2) has been implemented, additional sampling and analysis has been conducted, and design of the remedy has been completed.

The Selected Remedy addresses approximately 412 acres, and includes the following elements:

- A total of 177 acres of active cleanup, consisting of:
  - 105 acres of dredging or partial dredging and capping (an anticipated total volume of 960,000 cubic yards would be dredged and disposed in an upland landfill);
  - 24 acres of capping, with possible amendment with activated carbon or other contaminant-sequestering agents; and
  - 48 acres of Enhanced Natural Recovery (ENR – placing 6 to 9 inches of clean material over contaminated sediments) with possible amendment with activated carbon or other contaminant-sequestering agents, if these amendments are shown to be effective in pilot tests.
- Further reduction of contaminant concentrations over time in the remaining 235 acres through Monitored Natural Recovery (MNR – relying on natural processes such as burial of contaminated sediments by cleaner sediments from upstream). Long-term monitoring data will determine whether additional cleanup actions will be necessary in MNR areas.
  - In MNR areas, more intensive long-term monitoring will be conducted in an estimated 33 acres where contaminant of concern (COC) concentrations in sediment are less than the sediment remedial action levels (RALs – contaminant concentrations above which remedial action is required) but greater than the sediment cleanup objectives for protection of benthic invertebrates (benthic SCO); this is referred to as MNR To Benthic SCO. If MNR does not achieve the benthic SCO or progress sufficiently toward achieving it in 10 years, additional cleanup will be required as a part of this remedy.
  - Less intensive monitoring will be conducted in areas where sediment COC concentrations are below the benthic SCO but above the sediment cleanup levels[1] for protection of human health; this is referred to as MNR Below Benthic SCO. This includes 202 acres where COC concentrations were below the benthic SCO in remedial investigation sampling, and will also include the 33 acres described in the previous bullet after COC concentrations are reduced to below the benthic SCO in those areas. If the cleanup levels for protection of human health are not achieved, additional cleanup actions will be considered in a future decision document.
- Institutional controls (ICs) and LDW-wide monitoring, including:
  - Proprietary controls, e.g., under the Washington Uniform Environmental Covenants Act (UECA), to prohibit activity that could result in a release or exposure of COCs remaining in the subsurface absent EPA approval; and
  - Seafood consumption advisories.

The purpose of ICs is to protect the integrity of other remedial action elements such as capping, and to provide information about how much and what types of fish and shellfish are safe to consume in the form of fish advisories, education and outreach programs. A study is currently underway to gather information from people who harvest or consume seafood and who may assist in understanding aspects of seafood

[1] Cleanup levels are contaminant concentrations that must be achieved at the end of the 10-year natural recovery period. They include human health-based levels (which must be met on an area-wide basis) and benthic SCO criteria (which must be met on a point-by-point basis. See Section 8).

consumption from the LDW as a first step in developing effective and appropriate ICs intended to reduce exposure of the LDW seafood consuming community to risks from consuming resident fish and shellfish.

The Selected Remedy assumes completion of an additional 29 acres of cleanup in EAAs (see Section 4.1 for further discussion of the EAAs), not included in the 412 acres addressed by the remedy.

The Selected Remedy is estimated to take 7 years to construct. The lowest contaminant concentrations in fish and shellfish tissue are predicted by modeling to be achieved in 17 years following the start of construction.

Total estimated net present value costs (discounted at 2.3%) for the Selected Remedy are $342 million, of which capital costs are $295 million, and operation, maintenance, and monitoring (OM&M) costs are approximately $48 million.

Statutory Determinations

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site.

This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The NCP emphasizes the expectation that treatment will be used to address the principal threats posed by a site whenever practicable. Principal threat waste is defined in EPA guidance as source material that is highly toxic or highly mobile, and that generally cannot be contained in a reliable manner. EPA has determined that the contaminated sediments in the LDW outside of the EAAs are not highly mobile or highly toxic. The remedy does include potential treatment of some contaminated sediments through provisions for amendment of caps and ENR with activated carbon or other contaminant-sequestering agents.

Because this remedial action will result in hazardous substances, pollutants, or contaminants remaining on-site at levels above those that would allow for unlimited use and unrestricted exposure, statutory five-year reviews will be conducted every five years after initiation of remedial action to ensure that the remedy continues to be protective of human health and the environment.

ROD Data Certification Checklist

The following information is included in the Decision Summary (Part 2) of this ROD. Additional information can be found in the Administrative Record for the site.

- Contaminants of concern and their respective concentrations (Section 5.3)
- Baseline risks represented by the contaminants of concern (Section 7).
- Cleanup levels established for contaminants of concern and the basis for these levels (Section 8.2.1).
- How source materials constituting principal threats are addressed (Sections 11 and 14.5).
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of surface water used in the baseline risk assessment and the ROD (Section 6).
- Potential land and surface water use that will be available at the site as a result of the selected remedy (Section 13.4).

- Estimated capital, annual OM&M, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Section 13.3).
- Key factors that led to the selection of the remedy (Section 13.1).

Authorizing Signature

Lori Cohen, Associate Director
Office of Environmental Cleanup

11/21/14.

Date

8 Remedial Action Objectives

In accordance with the NCP, EPA developed Remedial Action Objectives (RAOs) to describe what the proposed cleanup is expected to accomplish to protect human health and the environment. The RAOs for the LDW are based on results of the human health and ecological risk assessments described in Section 7. RAOs help focus the development and evaluation of remedial alternatives and form the basis for establishing cleanup levels in the ROD.

8.1 Remedial Action Objectives

The four RAOs established for the LDW are presented below along with a brief summary of how the Selected Remedy addresses each one:

RAO 1: Reduce risks associated with the consumption of contaminated resident LDW fish and shellfish by adults and children with the highest potential exposure to protect human health. Risk will be reduced by reducing sediment and surface water concentrations or bioavailability of PCBs, arsenic, cPAHs and dioxins/furans, the primary COCs that contribute to the estimated cancer and noncancer risks from consumption of resident seafood, which will reduce concentrations of these COCs in tissue. Ongoing source control and the use of seafood consumption advisories and education and outreach programs will provide additional risk reduction.

RAO 2: Reduce risks from direct contact (skin contact and incidental ingestion) to contaminated sediments during netfishing, clamming, and beach play to protect human health. Risks will be reduced by reducing sediment concentrations or bioavailability of PCBs, arsenic, cPAHs, and dioxins/furans, the primary COCs that contribute to the estimated excess cancer and noncancer risks.

RAO 3: Reduce to protective levels risks to benthic invertebrates from exposure to contaminated sediments. Risks will be reduced by reducing sediment concentrations of the 41 contaminants listed in Table 20 to the chemical or biological benthic SCO.

RAO 4: Reduce to protective levels risks to crabs, fish, birds, and mammals from exposure to contaminated sediment, surface water, and prey. Risks will be reduced by reducing sediment and surface water PCB concentrations or bioavailability, which will reduce PCB concentrations in tissue. Addressing risks to river otters due to consumption of PCB-contaminated seafood, along with addressing risks associated with RAOs 1 – 3, will also address risks to other ecological receptors.

8.2 Cleanup Levels, ARARs and Target Tissue Concentrations

This section describes the selected cleanup levels (see Section 8.2.1), ARARs (see Section 8.2.2), and target tissue concentrations (see Section 8.2.3) for the in-waterway cleanup and key factors that formed the basis for each. The selected cleanup levels are contaminant concentrations that will be used to measure the success of the cleanup alternatives in meeting the RAOs. Cleanup levels are based on applicable or relevant and appropriate requirements (ARARs), which provide minimum legal standards, and other information such as toxicity information from the HHRA and ERA.

8.2.1 Cleanup Levels

Table 19 lists sediment cleanup levels for RAOs 1, 2, and 4, and Table 20 lists sediment cleanup levels for RAO 3. Sediment cleanup levels for contaminants for RAO 3 are point-based and applicable to any sample location; for the other RAOs, cleanup levels are applied to a specific area (see Table 19). Benthic cleanup levels are based on the benthic SCO in the SMS (WAC 173-204-562). For RAO 3, the SCO numerical chemical criteria can be overridden by the SCO biological criteria (see text box "What are the Sediment Management Standards?" on page 26) unless they are co-located with exceedances of remedial action levels (RALs) associated with human health COCs, which are also point-based. Exceedances of RALs for human health COCs cannot be overridden by toxicity testing.

Table 19. Cleanup Levels for PCBs, Arsenic, cPAHs, and Dioxins/Furans in Sediment for Human Health and Ecological COCs (RAOs 1, 2 and 4)

COC	Cleanup Levels				Application Area and Depth		
	RAO 1: Human Seafood Consumption	RAO 2: Human Direct Contact	RAO 4: Ecological (River Otter)	Basis for Cleanup Levels[a]	Spatial Scale of Application[b]	Spatial Compliance Measure[e]	Compliance Depth[b]
PCBs (µg/kg dw)	**2**	1,300	128	background (RAO 1) RBTC (RAO 2) RBTC (RAO 4)	LDW-wide	UCL95	0 – 10 cm
	NA	500	NA	RBTC	All Clamming Areas[c]	UCL95	0 – 45 cm
	NA	1,700	NA	RBTC	Individual Beaches[d]	UCL95	0 – 45 cm
Arsenic (mg/kg dw)	NA	7	NA	background	LDW-wide	UCL95	0 – 10 cm
	NA	7	NA	background	All Clamming Areas[c]	UCL95	0 – 45 cm
	NA	7	NA	background	Individual Beaches[d]	UCL95	0 – 45 cm
cPAH (µg TEQ/kg dw)	NA	380	NA	RBTC	LDW-wide	UCL95	0 – 10 cm
	NA	150	NA	RBTC	All Clamming Areas[c]	UCL95	0 – 45 cm
	NA	90	NA	RBTC	Individual Beaches[d]	UCL95	0 – 45 cm
Dioxins/Furans (ng TEQ/kg dw)	**2**	37	NA	background (RAO 1) RBTC (RAO 2)	LDW-wide	UCL95	0 – 10 cm
	NA	13	NA	RBTC	All Clamming Areas[c]	UCL95	0 – 45 cm
	NA	28	NA	RBTC	Individual Beaches[d]	UCL95	0 – 45 cm

NOTE: where there are multiple cleanup levels for a cleanup area, the lowest cleanup level is shown in bold.

a. Background – see Table 3 and Section 5.3.4.1; RBTC – Risk-based threshold concentration (based on 1 in 1,000,000 excess cancer risk or HQ of 1)

b. In intertidal areas including beaches used for recreation and clamming, human-health direct contact cleanup levels (for PCBs, arsenic, cPAHs, and dioxins/furans) must be met in the top 45 cm because in intertidal areas exposure to sediments at depth is more likely through digging or other disturbances. Human health cleanup levels for RAO 1 (seafood consumption) and ecological cleanup levels must be met in surface sediments (top 10 cm). In subtidal areas, cleanup levels for all COCs must be met in surface sediments (top 10 cm).

c. Clamming areas are identified in Figure 6.

d. Beach play areas are identified in Figure 6.

e. The UCL 95 is the upper confidence limit on the mean. The determination of compliance with RAOs 1, 2 and 4 cleanup levels will be made by one of two methods: 1) comparison of the UCL 95 of LDW data with the RBTC or background-based cleanup level, or 2) for background-based cleanup levels, a statistical comparison of the distribution of LDW data to the OSV BOLD study background dataset (USACE et al. 2009) may be used. In either case, testing will use an alpha level of 0.05 and a beta level of 0.10. For details, see ProUCL technical manual (EPA 2013b) or most current version). For either method, a sufficient number of samples must be collected to assure statistical power for the test.

Table 20. Sediment Cleanup Levels for Ecological (Benthic Invertebrate) COCs for RAO 3[a]

Benthic COC	Cleanup Level for RAO 3[a]	Benthic COC	Cleanup Level for RAO 3[a]
Metals, (mg/kg dw)[c]		***OC-normalized Organic Compounds (continued) (mg/kg OC)***	
Arsenic	57	Total PCBs	12
Cadmium	5.1	Benzo(g,h,i)perylene	31
Chromium	260	Chrysene	110
Copper	390	Dibenz(a,h)anthracene	12
Lead	450	Indeno(1,2,3-cd)pyrene	34
Mercury	0.41	Fluoranthene	160
Silver	6.1	Fluorene	23
Zinc	410	Naphthalene	99
Dry Weight Basis Organic Compounds, (µg/kg dw)		Phenanthrene	100
4-methylphenol	670	Pyrene	1,000
2,4-dimethylphenol	29	HPAH	960
Benzoic acid	650	LPAH	370
Benzyl alcohol	57	Bis(2-ethylhexyl)phthalate	47
Pentachlorophenol	360	Butyl benzyl phthalate	4.9
Phenol	420	Dimethyl phthalate	53
		1,2-dichlorobenzene	2.3
OC-normalized Organic Compounds, (mg/kg OC)[b]		1,4-dichlorobenzene	3.1
Acenaphthene	16	1,2,4-trichlorobenzene	0.81
Anthracene	220	2-methylnaphthalene	38
Benzo(a)pyrene	99	Dibenzofuran	15
Benz(a)anthracene	110	Hexachlorobenzene	0.38
Total benzofluoranthenes	230	n-Nitrosodiphenylamine	11

a. Cleanup Levels for RAO 3 are based on the benthic SCO chemical criteria in the SMS (WAC 173-204-562). Benthic SCO biological criteria (WAC 173-204-562, Table IV) may be used to override benthic SCO chemical criteria where human health-based RALs are not also exceeded.

b. PCBs and arsenic are also human health COCs; see Table 19.

No sediment cleanup levels were identified for arsenic or cPAHs for the human health seafood consumption pathway (RAO 1). Seafood consumption excess cancer risks for these two COCs were largely attributable to eating clams. However, data collected during the RI/FS showed little relationship between concentrations of arsenic or cPAH in sediment and their concentrations in clam tissue. EPA will define the sediment cleanup footprint based on other cleanup levels, then use the clam target tissue levels (Section 8.2.3) to measure reduction in arsenic and cPAH concentrations in clams. Research will be conducted during the remedial design phase to study the relationships between sediment concentrations for arsenic and cPAHs and concentrations in clam tissue and methods to reduce concentrations of these contaminants in clams. If EPA determines, based on these studies, that additional remedial action is needed to reduce clam tissue arsenic and cPAH concentrations for the purpose of achieving RAO 1, EPA will document and select those actions in a future decision document.

The sediment cleanup levels for PCBs and dioxins/furans (RAO 1) and for arsenic (RAO 2) are set at natural background consistent with the SCO for human health risks (HH SCO). Modeling conducted during the RI/FS could not predict that long term LDW COC concentrations would achieve natural background. This is because the concentrations of these contaminants in incoming sediments (suspended solids) from the Green/Duwamish River are currently higher than natural background and current practical limitations on control of sources within the LDW and Green/Duwamish River drainage basins may not allow sufficient future reductions in these incoming concentrations. The term cleanup objective was used in the FS to mean the PRG or as close as practicable to the PRG (sediment PRGs in the FS and Proposed Plan are cleanup levels in the ROD). This ROD uses the term "FS cleanup objective" when referring to the term as it was used in the FS to distinguish it from the new term SCO in the 2013 SMS. For the purposes of comparing alternative remedies, the lowest model-predicted concentration was used as a surrogate for "as close as practicable to the PRG" when the PRG was not predicted to be achieved within a 45-year period.

These long-term COC concentrations predicted by the model are highly uncertain. As discussed in the FS (LDWG 2012a), concentrations of COCs coming in to the LDW from upstream and lateral sources vary over time and are difficult to predict; therefore, the values used to represent these COC concentrations, used as model inputs, are uncertain. In particular, the data used to estimate Green/Duwamish River surface water and sediment inputs to the RI/FS models were relatively sparse and highly variable. In addition, it is difficult to predict what concentrations in upstream and lateral-source sediments will be many years in the future. High and low bounds on these inputs were evaluated in the FS to portray model sensitivity. For example, RI/FS models predict that all alternatives will reduce PCB concentrations in LDW sediments to approximately 40 – 45 µg/kg in 40 years using mid-range model input parameters (Table 5). In contrast, the sensitivity analysis indicates that future PCB sediment concentrations could range from 9 – 100 µg/kg. The great majority of this range is due to varying assumptions about incoming suspended sediment concentrations. Ecology and King County are currently conducting studies to refine estimates of contaminant inputs from the Green/Duwamish River, and to better understand upstream sources of contamination. Ecology in coordination with EPA will use this information to further assess upstream source control. EPA is retaining natural background, along with the risk-based values (RBTCs), as the basis for cleanup levels for LDW sediments.

8.2.2 ARARs

ARARs are legally applicable or relevant and appropriate substantive (as opposed to administrative) standards, requirements, criteria, or limitations under any federal environmental law, or promulgated under any state environmental or facility siting law that is more stringent than under federal law. This section discusses MTCA and surface water quality requirements; these ARARs are also discussed in Sections 10.1.2 and 14.2, and a complete list of ARARs is in Table 26.

8.2.2.1 Sediment Quality ARARs

The most significant ARARs for developing cleanup levels during the RI/FS and for the Proposed Plan for the In-waterway Portion of the Site were in MTCA and its rules in WAC 173-340 for Washington cleanup sites generally, and the SMS rules for sediment cleanups in WAC 173-204, which are referred to in the MTCA general cleanup rules (WAC 173-340-760). Major portions of the SMS were revised in September 2013, after the Proposed Plan was issued, in part to update sediment cleanup requirements in Part V (Sediment Cleanup Standards) of the SMS and harmonize Part V requirements with the

requirements in MTCA. The 1991 SMS was promulgated under several authorities including both MTCA and the state Water Pollution Control Act. However, Part V of the 2013 SMS was promulgated solely under MTCA. See "What are the Sediment Management Standards?" on page 26 for a summary of the 2013 SMS. As a matter of substance, the MTCA and SMS-based sediment PRGs set forth in the Proposed Plan using the 1991 SMS remain unchanged as cleanup levels in the ROD, though the method for deriving them (applying the substantive requirements of the 2013 SMS) is different, as explained below. This section describes the derivation of the cleanup levels in this ROD in terms of the revised SMS rules.

Sediment cleanup levels for RAOs 1 and 2 (for protection of human health) are calculated at the SCO level – risk-based threshold concentrations (RBTCs) of 1 x 10^{-6} excess cancer risk for individual carcinogens, 1 x 10^{-5} excess cancer risk cumulatively for multiple carcinogens, and noncancer HQ or HI of 1, consistent with the NCP and as required by the revised SMS (WAC 173-204-560 and 561). In accordance with the SMS, where RBTCs at SCO levels are more stringent than background levels, the SCO-based cleanup levels are set at the natural background level (see Section 5.3.4.1)[15].

Similarly, consistent with the revised SMS (WAC 173-204-562), cleanup levels associated with RAO 3 (protection of benthic invertebrates) are based on the SCO for the protection of benthic invertebrates (benthic SCO) of the SMS which are defined by chemical and biological criteria for specific hazardous substances as explained in Section 5.3.1.1. The benthic SCO chemical and biological criteria are the same as the 1991 SMS Sediment Quality Standards criteria used in the FS and Proposed Plan. EPA also considered risks to higher-trophic-level species (HTLS) (WAC 173-204-564) in setting a PCB cleanup level for river otter (RAO 4). Cleanup levels for the protection of human health and benthic invertebrates are also protective of HTLS.

The 2013 SMS (WAC 173-204-560) requires initial establishment of cleanup levels at the SCO level, but allows for the cleanup levels to be adjusted upward to CSL levels when it is not technically possible to achieve SCO levels, or if meeting the SCO will have a net adverse impact on the aquatic environment. CSL risk-based cleanup levels are the most stringent of the following: 1) for human health, an excess cancer risk of 1 x 10^{-5} for individual carcinogens and for multiple carcinogens cumulatively, and a noncancer HQ or HI of 1; 2) for risks to benthic invertebrates, chemical and biological criteria defined in WAC 173-204-562 (which are the same as the CSL criteria in the 1991 SMS); and 3) for risks to HTLS, the same no-observed-adverse-effects threshold as the SCO per WAC 173-204-564. The CSL is the highest of the risk based concentration, PQL, or regional background (a new term created by the 2013 SMS). There is insufficient information at this time to determine whether or not it is technically possible to achieve the SCO-based cleanup levels selected in this ROD, for the reasons discussed in Section 8.2.1. In addition, neither EPA nor Ecology has established regional background for the LDW.

If long-term monitoring data and trends indicate that some cleanup levels or other ARARs cannot be met, EPA will determine whether further remedial action could practicably achieve the ARAR. If EPA concludes that an ARAR cannot be practicably achieved, EPA will waive the ARAR on the basis of technical impracticability (TI) in a future decision document (ROD Amendment or ESD). For SMS SCO-based ARARs, EPA will first consider whether the criteria in the SMS for adjusting cleanup levels from

[15] The SMS also allows upward adjustment for cleanup levels that are below practical quantitation limits (PQLs); however, this is not applicable for the LDW, where natural background- and risk-based cleanup levels are higher than PQLs.

the SCO to the CSL (including regional background) can be met, as discussed above. If these criteria can be met, EPA will evaluate adjusting the relevant sediment cleanup levels upward to regional background or other CSL-based levels described in the SMS.

8.2.2.2 Surface Water Quality ARARs

Surface water quality ARARs consist of applicable promulgated state water quality standards and, in accordance with Section 121(d)(2)(A)(ii) and (B)(i) of CERCLA, federal recommended Clean Water Act Section 304(a) Ambient Water Quality Criteria (AWQC) guidance values where they are relevant and appropriate. The AWQC for human health include values to protect for consumption of organisms only, and those to protect for consumption of organisms and water. For the LDW, the relevant and appropriate AWQC for the protection of human health are those established for the consumption of organisms only because surface water within the In-waterway Portion of the Site is not a source of consumable water. The AWQC also include acute and chronic criteria values for the protection of aquatic life, including benthic organisms. State standards in Washington include those standards promulgated in WAC 173-201A and, for protection of human health, EPA's 1992 promulgated National Toxics Rule (NTR) standards (see Table 26 for legal citations). Consistent with Section 121(d) of CERCLA, the NCP, and MTCA at WAC 173-340-730(3)(b), ARARs are the most stringent of values from WAC 173-201A, NTR, and relevant and appropriate AWQC.

Surface water will not be directly remediated but will be improved by implementation of the Selected Remedy and by source control to be implemented as discussed in Section 4.2. Surface water is a key exposure pathway for consumption of aquatic organisms by humans or wildlife. Surface water quality data will be compared to these ARAR values to measure progress towards achieving RAOs 1 and 4, and evaluated as discussed in Section 8.2.2.1.

8.2.3 Fish and Shellfish Target Tissue Concentrations

EPA has established fish and shellfish target tissue concentrations to measure progress toward achieving RAOs 1 and 4. Controlling sources of contamination to the LDW along with remediating contaminated sediments will reduce COC concentrations in surface water and in fish and shellfish tissue in addition to reducing COC concentrations in sediment. Table 21 lists resident fish and shellfish (crab and clam) target tissue concentrations for RAO 1. They are based on the higher of: the RBTC at 1×10^{-6} excess cancer risk or HQ of 1 for the adult Tribal RME scenario; or the current concentrations in non-urban (background) Puget Sound data. Fish and shellfish target tissue concentrations have been developed consistent with the criteria for developing the sediment cleanup levels (which are based on the 2013 SMS) to measure protectiveness for humans, including sensitive subpopulations.

Target tissue concentrations are not cleanup levels; they will be used for informational purposes to assess ongoing risks to people who may consume resident LDW fish and shellfish. Tissue monitoring data will also inform the content or degree of any potential future fish advisories, other ICs intended to minimize risk to the LDW fishing community, or other response actions that may be identified in a ROD Amendment or ESD.

As discussed in Section 5.3.4.2, fish and shellfish target tissue concentrations based on background data are uncertain because they were developed with a limited dataset. Additional fish and shellfish background data will be collected during the remedial design phase to increase understanding of non-urban tissue concentrations of the human health COCs.

The FS used the BCM to predict post-cleanup sediment concentrations for various alternatives and the FWM to predict fish and shellfish tissue PCB concentration associated with these changed sediment concentrations. Together, these models predicted that background-based fish and shellfish target tissue PCB concentrations will not be met in the long term due to the same assumptions subject to the same uncertainties described in the last paragraph of Section 8.2.1. Further, while the same approach was used to develop target tissue concentrations and sediment cleanup levels, it is not known whether achievement of sediment cleanup levels would result in the achievement of target tissue levels. Sediment and tissue background data were not collected concurrently or at the same locations, and food web relationships in the Puget Sound bays where the natural background samples were taken are likely to be different than in the Duwamish estuary.

Table 21. LDW Resident Fish and Shellfish Target Tissue Concentrations

Species Group and Tissue Type	Species[a,b,]	Target Concentration	Source of Target Concentration [c]
PCBs (µg/kg ww)			
Benthic fish, fillet	English sole	12	Non-urban background
Pelagic fish, whole body	Perch	1.8	Species-specific RBTC[d]
Crab, edible meat	Dungeness crab	1.1	Non-urban background
Crab, whole body	Dungeness crab	9.1	Non-urban background
Clams	Eastern softshell clam	0.42	Non-urban background
Inorganic arsenic (mg/kg ww)			
Clams[e]	Eastern softshell clam	0.09	Non-urban background
cPAH TEQ (µg/kg ww)			
Clams[e]	Eastern softshell clam	0.24	Species-specific RBTC[d]
Dioxin/furan TEQ (ng/kg ww)			
Benthic fish, whole body	English sole	0.35	Non-urban background
Crab, edible meat	Dungeness crab	0.53	Non-urban background
Crab, whole body	Dungeness crab	2.0	Non-urban background
Clams	Eastern softshell clam	0.71	Non-urban background

a Substitutions of similar species may be made if sufficient numbers of the species listed here are not available.
b. For non-urban background statistics, see also Table 4. Non-urban background is based on UCL95.
c. The statistic used to compare site data to target tissue concentrations will be based on the UCL95 for each compound listed for fish and crabs collected throughout the waterway; and each compound for clams collected across all clamming areas in the waterway.
d. Species-specific RBTCs were used to determine target concentration when RBTCs exceed background, or background data were not available.
e. Only clam tissue values are shown for inorganic arsenic and cPAH TEQ because most of the risk associated with these COCs was associated with consumption of clams.

13 Selected Remedy

Based on consideration of the requirements of CERCLA, the detailed analysis of remedial alternatives, and consideration of public comments, EPA has selected Alternative 5C Plus as the Selected Remedy, with modifications summarized in Section 12, for the In-waterway Portion of the Site. This section provides EPA's rationale for the Selected Remedy, and a description of its anticipated scope, how the remedy will be implemented, and its expected outcomes.

13.1 Summary of the Rationale for the Selected Remedy

The Selected Remedy is protective of human health and the environment, complies with ARARs, and provides the best balance of tradeoffs among the balancing criteria. It reduces risks within a reasonable time frame, is practicable and cost-effective, provides for long-term reliability of the remedy, and minimizes reliance on institutional controls. It will achieve substantial risk reduction by dredging and capping the most contaminated sediments, reduce remaining risks to the extent practicable through ENR and MNR, and manage remaining risks to human health through institutional controls.

EPA considered several options for surface sediment and subsurface sediment RALs that determine where active (dredging, capping, ENR) and passive (MNR) response actions will be applied. EPA selected the RALs listed in this ROD because alternatives with higher RALs would remove less subsurface contamination, resulting in less certainty in achieving cleanup goals. Alternatives with lower RALs and more emphasis on dredging would remove more subsurface contamination at higher cost and potentially greater short-term risks, with uncertain associated increases in long-term protectiveness. More than other alternatives, the Selected Remedy emphasizes a combined-technology approach, including removal of shallow subsurface sediments with higher concentrations of PCBs, while allowing MNR in areas with lower concentrations of other COCs. The Selected Remedy provides better long-term effectiveness than other alternatives by adding remediation of sediments in subtidal areas with high concentrations of PCBs in the top 2 ft below the surface of the sediment in Recovery Category 2 and 3 areas, whereas other alternatives propose remediation of subtidal contamination in the top 2 ft below the sediment surface only in Recovery Category 1 areas. This addition provides better protection for releases of contamination that may occur due to infrequent events, such as vessels traveling outside of frequent lanes of operation, vessels operating with excessive propeller power in berthing areas or elsewhere, barge groundings, emergency maneuverings, changes in the patterns of site use, and maintenance of overwater structures. It also addresses contamination in sediments in the navigation channel that may otherwise be released during maintenance dredging.

For all of these factors, the Selected Remedy provides greater permanence in comparison to other alternatives of similar cost and construction duration. Less costly alternatives rely on technologies such as ENR and MNR to address areas with higher COC concentrations, resulting in greater uncertainty as to their long-term effectiveness. In more costly alternatives, the additional costs are not proportional to the overall increase in long-term effectiveness.

The Selected Remedy provides the best balance of minimizing short-term risks due to a comparatively short 7-year construction period, while maximizing long-term effectiveness by dredging or capping the most contaminated sediments. The Selected Remedy will utilize treatment to reduce the toxicity and bioavailability of contaminants in the form of ENR with in situ amendments if pilot testing is successful.

13.2 Description of the Selected Remedy

The Selected Remedy addresses all areas where contaminant concentrations exceed the cleanup levels through a combination of active cleanup technologies, monitored natural recovery, and institutional controls. See Section 8 for a discussion of cleanup levels. The approximate areas that would be remediated through dredging, partial-dredging and capping, capping, or ENR and ENR/in situ treatment, and areas where COC concentrations would be reduced through MNR both above and below the benthic SCO, are shown in Figure 18 on page 137.

In summary, the Selected Remedy consists of the following elements:

Apply active cleanup technologies in a total of 177 acres, as described in Figure 19 and Figure 20**:**

- Dredge or partially-dredge and cap approximately 105 acres of highly contaminated sediments (approximately 960,000 cubic yards).
- Place engineered sediment caps on approximately 24 acres of highly contaminated sediments where there is sufficient water depth for a cap.
- Place a thin layer (6 to 9 inches) of clean material (referred to as enhanced natural recovery [ENR]) on approximately 48 acres of sediments in areas that meet the criteria for ENR.
- Apply location-specific cleanup technologies to areas with structural or access restrictions (e.g., under-pier areas and in the vicinity of dolphins/pilings, bulkheads, and riprapped or engineered shorelines).

Implement monitored natural recovery (MNR) in approximately 235 acres of sediments where surface sediment contaminant concentrations are predicted to be reduced over time through deposition of cleaner sediments from upstream. MNR will apply to those areas that are not subject to active remediation, using either MNR To Benthic SCO or MNR Below Benthic SCO, as described in Section 13.2.2 and in Figure 21.

Sample the entire LDW (441 acres) as part of baseline, construction, post-construction, and long-term monitoring. Conduct sampling and analysis to establish post-EAA cleanup baseline conditions during remedial design, and conduct construction, post-construction, and long-term monitoring, as described in Section 13.2.3.

Provide effective and appropriate institutional controls (ICs) for the entire waterway to reduce human exposure to contaminants, ensure remedy protectiveness, and protect the integrity of the remedy, while minimizing reliance on ICs, particularly seafood consumption-related ICs, to the extent practicable, as described in Section 13.2.4.

The estimates of areas, volumes, time to reach cleanup objectives, and cost for the Selected Remedy in this ROD are based on RI/FS data and other information included in the Administrative Record. Remedial design sampling will be conducted after cleanups are completed in the Early Action Areas. Results from remedial design sampling will be used to refine delineation of areas to be remediated by varying remediation technologies and the remediation technologies to be applied, and inform source control activities. This section describes how data collected in the future will be used to revise the delineation of areas requiring cleanup and the technologies applied to each area.

13.2.1 Application of Cleanup Technologies

The RALs listed in Figure 22 and Figure 23 (above) and Table 27 and Table 28 (page 125)will be applied in intertidal and subtidal areas in Recovery Category Areas 1, 2, and 3 to identify areas for active remediation, as described and in Figures 19 and 20. Recovery Category areas are shown in Figure 12. Figure 17 shows Recovery Category 1, and potential scour areas in Recovery Categories 2 and 3. All of this information will be used to determine the appropriate compliance depth for application of RALs and technology to be applied at a particular location, as described in this section.

Table 27. Selected Remedy RAO 3 RALs

SMS Contaminant of Concern for RAO 3	RAL for Recovery Category 1 Areas[a] (Benthic SCO)	RAL for Recovery Category 2 & 3 Areas (2 x Benthic SCO)[b]
Metals (mg/kg dw)		
Arsenic	57	n/a
Cadmium	5.1	10.2
Chromium	260	520
Copper	390	780
Lead	450	900
Mercury	0.41	0.82
Silver	6.1	12.2
Zinc	410	820
PAHs (mg/kg OC)		
2-Methylnaphthalene	38	76
Acenaphthene	16	32
Anthracene	220	440
Benzo(a)anthracene	110	220
Benzo(a)pyrene	99	198
Benzo(g,h,i)perylene	31	62
Total benzofluoranthenes	230	4650
Chrysene	110	220
Dibenzo(a,h)anthracene	12	24
Dibenzofuran	15	30
Fluoranthene	160	320
Fluorene	23	46
Indeno(1,2,3-cd)pyrene	34	68
Naphthalene	99	198
Phenanthrene	100	200
Pyrene	1,000	2,000
Total HPAHs	960	1,920
Total LPAHs	370	740

SMS Contaminant of Concern for RAO 3	RAL for Recovery Category 1 Areas[a] (Benthic SCO)	RAL for Recovery Category 2 & 3 Areas (2 x Benthic SCO)[b]
Phthalates (mg/kg OC)		
Bis(2-ethylhexyl)phthalate	47	94
Butyl benzyl phthalate	4.9	9.8
Dimethyl phthalate	53	106
Chlorobenzenes (mg/kg OC)		
1,2,4-Trichlorobenzene	0.81	1.62
1,2-Dichlorobenzene	2.3	4.6
1,4-Dichlorobenzene	3.1	6.2
Hexachlorobenzene	0.38	0.76
Other SVOCs and COCs, (µg/kg dw except as shown)		
2,4-Dimethylphenol	29	58
4-Methylphenol	670	1,340
Benzoic acid	650	1,300
Benzyl alcohol	57	114
n-Nitrosodiphenylamine, mg/kg OC	11	22
Pentachlorophenol	360	720
Phenol	420	840
PCBs (mg/kg OC)		
Total PCBs	12	n/a

Notes:
General:

- PCBs and arsenic are also human health COCs (see Table 28 for RALs for human health COCs), and RALs for the the human health category take precedence over RAO 3 RALs. The surface sediment (10 cm) Recovery Category 1 RALs for PCBs and arsenic are the same for human health and benthic invertebrates, but the 2 X SCO Recovery Category 2 and 3 criteria are not applicable to PCBs and arsenic. Figure 22 and Figure 23 list all RALs for human health COCs.
- Table 23 describes Recovery Categories and Figure 12 shows Recovery Category areas.

a. The RAL applies to the 10 cm and 45 cm depth intervals for intertidal areas and to the 10 cm and 60 cm depth intervals for subtidal areas. See Figure 22 and Figure 23 .
b. For Recovery Category 2 and 3 areas, the RAL applies to the 10 cm depth interval. See Figure 22 and Figure 23.

Relationship Between RALs, ENR Upper Limits, and Cleanup Levels

Remedial Action Levels (RALs) — RALs shown in Tables 27 and 28 will be used during remedial action to delineate areas that require active remediation (dredging, capping, or ENR). Exceedances of RALs are evaluated at each sampling station; they are not averaged over an area. RALs apply to specific locations and depths, as described in the tables.

Enhanced Natural Recovery (ENR) Upper Limits — ENR upper limits (Table 27) are higher concentrations than RALs. They will be used during remedial action to delineate the areas that require capping or dredging, but are not suitable for ENR.

Cleanup Levels — Cleanup levels shown in Table 19 for RAOs 1, 2, and 4, and Table 20 for RAO 3 are generally lower than RALs (but in some cases, RAO 3 RALs are the same as the cleanup levels). Cleanup levels are based on state or federal standards (whichever value is more stringent) and if no standard exists then risk-based concentrations are developed. At this site cleanup levels for sediment are based on Sediment Cleanup Objectives (SCOs) from the State Sediment Management Standards (SMS). See text box on page 26 for more information about the SMS. These levels must to be achieved post-construction, or after a period of monitored natural recovery (MNR). Achievement of cleanup levels for RAOs 1, 2, and 4 is measured by averaging sample results over specific areas using the UCL95 value (see Table 19). Achievement of cleanup levels for RAO 3 are measured at each sampling station (see Table 20).

13.2.1.1 Dredging and Capping

Dredging or partially dredging and capping will be used in areas that have a potential for erosion and where sediments are more highly contaminated (COC concentrations are higher than ENR upper limits; see Section 13.2.1.2 and Table 28), and where it is necessary to maintain water depth for human use and compatibility with current and reasonably anticipated future human use, or to maintain habitat, as described below and presented as flow diagrams in Figure 19 and Figure 20. EPA will gather detailed information during remedial design about COC concentrations, potential for scour or disturbance, and waterway use in specific areas to determine locations for dredging, capping, and ENR. Dredging is required under the conditions described below:

- Shoaled areas in the navigation channel (where the bottom elevation is currently shallower than the authorized navigation depth) will be dredged if COC concentrations exceed human health RALs (for PCBs, cPAHs, arsenic or dioxins/furans) or the benthic SCO at any depth above the maintenance depth (defined as 2 ft below the authorized depth) (Table 28). [23]

- The post-dredging sediment surface must not exceed human health RALs (for PCBs, cPAHs, arsenic or dioxins/furans) or the benthic SCO. If these levels cannot be achieved through dredging, an ENR layer will be applied to the post-dredge surface.

- If the ENR upper limits are exceeded after dredging, the area must be capped. If 1 ft or less of contamination would remain at concentrations greater than the human health RALs or the benthic

[23] Shoaled areas in the navigation channel must be dredged during the implementation of the remdial action where contaminant concentrations in the top 2 ft exceed RALs. Where contaminant concentrations exceed RALs only at depths below the top 2 ft, cleanup may be deferred if USACE determines it is not currently an impediment to navigation, but must be dredged in the future if USACE determines that the area has become an impediment to navigation.

SCO after dredging to sufficient depth to accommodate a cap, all contaminated sediments will be dredged. If greater than 1 ft of contamination would remain after dredging to sufficient depth to accommodate a cap, sediments will be partially dredged and capped.

- All post-remedy surfaces within the federal navigation channel will be maintained at or below their current authorized depths. In order to avoid damage to a cap or ENR layer during federal maintenance dredging, the top of any ENR layer will be at least 2 ft and the top of any cap will be at least 4 ft below the authorized federal navigation channel depth. For areas outside the navigation channel where depths are maintained by private or public entities (called berthing areas in this ROD, but could include slips, entrance channels, or restorations areas) the top of any cap or ENR layer will be a minimum of 2 ft below the operating depth.

- In habitat areas[24], post-remedy surfaces will be maintained at their current depth and backfilled or capped with suitable habitat materials.

- Dredging may be required in some areas that would otherwise be designated for capping if ICs required to prevent damage to a cap (such as prohibitions on tug maneuvering or use of spuds [vessel-mounted poles that are sunk into sediment for stabilizing vessels]) are not compatible with the current or reasonably anticipated future use of that area. See Sections 13.2.3 and 13.2.4. An additional 10 ft (lateral) of dredging outside of the federal navigation channel will be included to assure that side slopes are stable and do not slough into the channel.

Dredged materials will be transported via truck or rail for disposal at a permitted upland off-site landfill facility.[25]

Engineered sediment caps will be placed in areas where sediments are more highly contaminated (COC concentrations are higher than ENR upper limits; see Section 13.2.1.2, and Table 28) where there is sufficient water depth for a cap. Caps in intertidal clamming areas must include a minimum 45 cm clam habitat layer. EPA estimates that caps in intertidal clam habitat areas will generally be 4 ft thick. In other areas, cap thickness will generally be 3 ft. Cap thickness will be evaluated during remedial design in accordance with EPA and USACE (1998). In habitat areas, the uppermost layers of caps will be designed using suitable habitat materials. Other materials, such as activated carbon or other contaminant-sequestering agents, may be used to reduce the potential for contaminants to migrate through the cap.

[24] For the FS, all areas above -10 ft MLLW were assumed to be habitat areas for the purpose of developing remedial alternatives. As part of the remedial design, EPA, in coordination with natural resource agencies and Tribes, will determine what areas are considered habitat areas for the purpose of complying with ESA and Section 404 of the CWA (see Table 26). EPA will also determine what elevations and what substrate materials will be required for caps, ENR, or placement of backfill materials in any identified habitat area.

[25] Some clean materials may be dredged as part of the cleanup; for example, in order to maintain appropriate sideslopes at the edge of a dredge cut. Sediments that pass the Dredged Materials Management Program's criteria may be disposed at an open-water disposal site.

Table 28. Remedial Action Levels, ENR Upper Limits, and Areas and Depths of Application

			Intertidal Sediments (+11.3 ft MLLW to -4 ft MLLW)				Subtidal Sediments (-4 ft MLLW and Deeper)				
			Recovery Category 1 RALs, ENR ULs, and Application Depths		Recovery Category 2 and 3 RALs, ENR ULs, and Application Depths		Recovery Category 1 RALs, ENR ULs, and Application Depths		Recovery Category 2 and 3 RALs, ENR ULs, and Application Depths		Shoaled Areas[b] in Federal Navigation Channel
Risk Driver COC	**Units**	**Action Levels**	Top 10 cm (4 in)	Top 45 cm (1.5 ft)	Top 10 cm (4 in)	Top 45 cm (1.5 ft)	Top 10 cm (4 in)	Top 60 cm (2 ft)	Top 10 cm (4 in)	Top 60 cm (2 ft)[c]	Top to Authorized Navigation Depth Plus 2 ft
Human Health Based RALs											
PCBs (Total)	mg/kg OC	RAL	12	12	12	65	12	12	12	195	12
		UL[a] for ENR	--	--	36	97	--	--	36	195	--
Arsenic (Total)	mg/kg dw	RAL	57	28	57	28	57	57	57	--	57
		UL[a] for ENR	--	--	171	42	--	--	171	--	--
cPAH	µg TEQ/kg dw	RAL	1000	900	1000	900	1000	1000	1000	--	1000
		UL[a] for ENR	--	--	3000	1350	--	--	3000	--	--
Dioxins/Furans	ng TEQ/kg dw	RAL	25	28	25	28	25	25	25	--	25
		UL[a] for ENR	--	--	75	42	--	--	75	--	--
Benthic Protection RALs											
39 SMS COCs [d]	Contaminant-specific	RAL	Benthic SCO	Benthic SCO	2x Benthic SCO	--	Benthic SCO	Benthic SCO	2x Benthic SCO	--	Benthic SCO
		UL[a] for ENR	--	--	3x RAL	--	--	--	3x RAL	--	--

a. The ENR Upper Limit (UL) is the highest concentration that would allow for application of ENR in the areas described. For areas with no ENR limit listed, ENR is not a currently designated technology (see Section 13.2.1.2 for further discussion).

b. Shoaled areas are those areas in federal navigation channel with sediment accumulation above the authorized depth including a 2 ft over-dredge depth that USACE uses to maintain the channel for navigation purposes. The authorized channel depths are (1) from RM 0 to 2 (from Harbor Island to the First Avenue South Bridge), 30 ft below MLLW; (2) from RM 2 to RM 2.8 (from the First Avenue South Bridge to Slip 4), 20 ft below MLLW; and (3) from RM 2.8 to 4.7 (Slip 4 to the Upper Turning Basin), 15 ft below MLLW. For shoaled areas, the compliance intervals will be determined during Remedial Design; these are typically 2-4 ft core intervals. For areas in the channel that are not shoaled, Recovery Categories 1 or 2 & 3 RALs apply as indicated in the other subtidal columns.

c. Applied only in potential vessel scour areas. These are defined as subtidal areas (i.e., below -4 ft MLLW) that are above -24 ft MLLW north of the 1st Ave South Bridge, and above -18 ft MLLW south of the 1st Ave South Bridge (see Figure 17).

d. There are 41 SMS COCs, but total PCBs and arsenic ENR ULs are based upon human health based RALs only (see Table 20).

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In Recovery Category 1 areas, **dredging, capping, or a combination thereof** is required when any of the conditions listed below have been met:

- In intertidal and subtidal areas, in Recovery Category 1, any sediment COC concentration averaged over the top 10 cm is greater than any of the benthic protection RALs (benthic SCO criteria, see Table 27) or greater than any of the four human health RALs (PCBs, arsenic, cPAHs, dioxins/furans, see Table 28 and Figures 22 and 23).
- In intertidal areas in Recovery Category 1, sediment COC concentrations averaged over the top 45 cm are greater than any of the four human health RALs.
- In subtidal areas in Recovery Category 1, sediment COC concentrations averaged over the top 60 cm are greater than any of the benthic protection RALs or greater than any of the four human health RALs.

In Recovery Category 2 and 3 areas, **dredging, capping, or a combination thereof** is required when COC concentrations exceed the criteria for application of ENR described in Section 13.2.1.2. See Figure 19 and Figure 20.

13.2.1.2 ENR

A thin layer (6 to 9 inches) of clean material will be placed (referred to as enhanced natural recovery [ENR]) in areas that meet the criteria for ENR as described below. Suitable habitat materials will be used in habitat areas. ENR may include in situ treatment using activated carbon or other amendments, and engineered designs for sediment stability. The effectiveness and potential impacts of using in situ treatment or amendment technologies, as well as the areas best suited for these technologies, will be evaluated in pilot studies performed during remedial design.

In Recovery Category 2 and 3 areas, ENR with or without in situ treatment will be selected based on sediment COC concentrations and the potential for sediment scour (Table 28 and Figure 17):

- In intertidal areas in Recovery Categories 2 and 3, ENR will be applied when any sediment COC concentration averaged over the top 10 cm is between 1 and 3 times the top 10 cm intertidal RALs (e.g., 12 – 36 mg/kg OC PCBs), or when any sediment COC concentration averaged over the top 45 cm is between 1 and 1.5 times the intertidal RALs for the 45 cm interval (e.g., 65 – 97 mg/kg OC PCBs).
- In subtidal areas in Recovery Categories 2 and 3, ENR will be applied when any sediment COC concentration in the top 10 cm is between 1 and 3 times the top 10 cm subtidal RALs. In potential vessel scour areas[26] (Figure 17), sediment concentrations of PCBs averaged over the top 60 cm must also be less than 3 times the CSL chemical criterion (195 mg/kg OC). There are no RALs for the top 60 cm in Category 2 and 3 areas in deeper water depths; in these areas, RALs are applied only to the top 10 cm.
- Pilot testing will be performed to determine whether ENR/in situ treatment is effective in reducing toxicity and bioavailability of COCs while avoiding unacceptable impacts to biota. If pilot testing shows that ENR/in situ treatment can meet these objectives, EPA will consider, in coordination with the state and Tribes, the locations where ENR with in situ treatment will be applied. These areas may include some of the Recovery Category 1 areas where it can be

[26] Subtidal areas in Recovery Categories 2 and 3 deemed to be potentially subject to vessel scour especially by tugboats are: north of the 1st Avenue South Bridge (located at approximately RM 2) in water depths from -4 to -24 ft MLLW, and south of the 1st Avenue South Bridge, in water depths from -4 to -18 ft MLLW. These depths are based on the size of tugboats that normally operate in these areas.

demonstrated that ENR with in situ treatment will maintain its stability and effectiveness in these areas over time; for example, areas where vessel- and flood-related scour were shown by the STM and FS scour analysis to be minor. 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.

- ENR will not be applied to Recovery Category 1 areas unless EPA approves it, as discussed above.

13.2.1.3 Other Considerations for Application of Cleanup Technologies

EPA will apply location-specific cleanup technologies to areas with structural or access restrictions (e.g., under-pier areas and in the vicinity of dolphins/pilings, bulkheads, and riprapped or engineered shorelines). Debris and pilings will be removed throughout the LDW as necessary or as required by EPA to implement the remedy, and materials will be disposed at a permitted off-site facility.

13.2.2 Monitored Natural Recovery

MNR will be applied in all areas of the LDW that are not remediated through capping, dredging, or ENR. For all areas where MNR is applied, long-term monitoring of surface sediments (top 10 cm) will be implemented to evaluate whether the RAO 3 cleanup levels (benthic SCO criteria) are being achieved in a reasonable timeframe or are not met within 10 years after remediation. The STM and BCM, supported by data collected during the RI/FS, were used to estimate the amount of time required to reduce COC concentrations in sediments through natural recovery. The STM and BCM natural recovery predictions will be reevaluated using data collected during remedial design.

- MNR To Benthic SCO will be applied where the concentration of any of the 39 RAO 3 COCs (i.e., excluding the human health COCs PCBs and arsenic) is less than the RAL but greater than the RAO 3 cleanup levels (benthic SCO criteria; Table 27 and Figure 21), and modeling results indicate the COC will be reduced to the benthic SCO criteria within 10 years of the completion of remedial action. More intensive long-term monitoring will be conducted in these areas, and should MNR not achieve RAO 3 cleanup levels or progress sufficiently toward achieving them in 10 years, additional actions (dredging, capping, or ENR) will be implemented. Those actions will be determined using the same approach set forth in this decision document as described in Section 13.2.1 and illustrated in Figures 19 and 20.
- MNR Below Benthic SCO will be applied where the concentration of all COCs is less than the RAL and the RAO 3 cleanup levels (benthic SCO criteria), but greater than the human health-based (RAO 1 and 2) cleanup levels (which are measured on an LDW-wide or area-wide basis, see Table 19 and Figure 21). Less intensive monitoring will be conducted in these areas. If cleanup levels are not achieved, additional cleanup actions may be considered and selected in a future decision document, see Section 13.4.

13.2.3 Monitoring

The entire LDW will be sampled as part of baseline, construction, post-construction, and long-term monitoring.

- **Remedial design sampling and analysis** will be conducted to establish post-EAA cleanup baseline conditions. Remedial design sampling data will be used to refine the cleanup footprint shown in Figure 18 using the decision criteria described in Figure 19 through Figure 22. Results will also be used to evaluate of the effectiveness of EAA cleanups and the degree to which natural recovery has occurred since the RI/FS sampling, to serve as a baseline for comparison to

post-cleanup data, and to aid in the evaluation of source control effectiveness. Remedial design sampling will include:

- Establishing baseline contaminant concentrations in surface and subsurface sediments, surface water, and porewater. Sediment samples will be analyzed for all RAO 1, 2, 3, and 4 COCs (Table 19, Table 20, and Table 21); and a subset of sediment samples will be analyzed for other contaminants not selected as COCs but identified in the HHRA as posing an excess cancer risk of greater than 1×10^{-6} or noncancer HQ of 1 at the adult Tribal RME consumption rate (see Table 14), to assess their reduction over time, as well as to determine conventional and engineering parameters. Biological testing (benthic community toxicity and abundance) will be included as determined during remedial design. Surface water samples will be initially analyzed for all analytes in Washington WQS (WAC173-201A), AWQC (CWA Section 304[a]) and NTR (40 CFR 131.36(b)(1) as applied to Washington, 40 CFR 131.36(d)(14)). Following the first few sampling rounds, the surface water analyte list will be reduced to the contaminants that exceeded AWQC, NTR, or Washington WQS values.
- Sampling to better understand the concentrations of incoming suspended sediments from the Green/Duwamish River that deposit in the LDW, in order to refine the RI/FS BCM predictions and inform the long-term monitoring program.
- Measuring contaminant concentrations in fish and shellfish tissue in the LDW to inform fish advisories and to provide a baseline to measure the success of the remedial action in reducing fish and shellfish tissue concentrations (RAO 1). Samples will be analyzed for PCBs, arsenic, cPAHs, and dioxins/furans; and a subset of tissue samples will be analyzed for other contaminants not selected as COCs but identified in the HHRA as posing an excess cancer risk of greater than 1×10^{-6} or noncancer HQ of 1 at the adult Tribal RME consumption rates (see Table 14). Additional fish and shellfish tissue data will also be collected in non-urban areas in Puget Sound to refine the non-urban background values (see Table 4) that will be used for comparison to Site data to measure progress in reducing tissue concentrations.
- Conducting research to further assess the relationship between arsenic and cPAH concentrations in sediment and in clam tissue, and to assess whether remedial action can reduce clam tissue concentrations to achieve RAO 1. EPA anticipates that implementation of the Selected Remedy, along with implementation of source control actions, will achieve the RAO 2 (direct contact) cleanup levels for arsenic and cPAHs, which will also result in lower clam inorganic arsenic and cPAH concentrations that will achieve RAO 1 the extent practicable; however, at this time, the amount of reduction is uncertain. If EPA determines, based on these studies, that additional remedial action is needed to reduce clam tissue arsenic and cPAH concentrations for the purpose of achieving RAO 1, EPA will document and select those actions in a future decision document.

- **Recovery Category areas will be re-evaluated during remedial design.** The criteria for Recovery Categories (Table 23) were applied in the FS (LDWG 2012a) based upon best available knowledge using best professional judgment. EPA will use additional information and analysis and the criteria in Table 23 to change Recovery Category assignments in specific areas of the LDW where appropriate. Information EPA will consider in deciding whether to modify recovery categories include the following:

- A survey of waterway users, including tribal members exercising their treaty rights, will be conducted to gather detailed information about waterway use, including tribal fishing; maneuvering and anchoring of ships, barges and tugs; use of spuds; and other activities such as berth and wharf maintenance. Information about such activities may change Recovery Categories of some areas.
- EPA will also consider other information such as refined sedimentation rates and contaminant trends based upon new data. EPA will also reconsider areas where the Recovery Category designation in the FS appears to have deviated from the criteria in Table 23.

- **Monitoring during and after construction** will include environmental monitoring to ensure compliance with RALs and ARARs, and monitoring of physical as-built conditions (e.g., bathymetry) to ensure compliance with construction standards and project design documents.
- **Long-term monitoring** of sediments, surface water, porewater, fish and shellfish tissue and benthic community toxicity and abundance will be conducted to ensure protectiveness of human health and the environment, to ascertain attainment of cleanup levels and compliance with ARARs, to protect the integrity of the remedial actions, and to aid in the evaluation of source control effectiveness.
- If any habitat areas are constructed as part of the remedial action to comply with CWA Section 404, baseline and long-term monitoring will include appropriate habitat monitoring.

The details of long-term monitoring and maintenance, including performance standards, sampling density and frequency, interim benchmarks, and associated additional actions, as well as maintenance of remedy elements such as caps, ENR areas, and habitat areas, will be provided in a long-term monitoring and maintenance plan to be developed in remedial design. Samples will be analyzed for the analytes listed above for baseline sampling, with the list modified during remedial design based on baseline results.

13.2.4 Institutional Controls

Institutional controls will be required for the entire waterway to reduce human exposure to contaminants, and protect the integrity of the remedy. However, reliance on ICs, particularly seafood consumption-related ICs, will be minimized to the extent practicable. ICs include proprietary controls in the form of Washington Uniform Environmental Covenants Act (UECA)-compliant environmental covenants, and informational devices including fish and shellfish consumption advisories to reduce human exposure from ingestion of contaminated resident fish and shellfish. EPA anticipates relying on the existing WDOH fish and shellfish consumption advisories (see Section 6.2), and information obtained through the ongoing study of fishing and fish and shellfish consumption patterns (Fishers Study: LDWG 2014b) will be used to develop appropriate and effective ICs, which will include other measures to provide additional protectiveness, such as outreach and education programs.

As noted in Section 13.2.3, EPA will gather detailed information in remedial design about waterway use in specific areas, including impacts on tribal treaty rights. EPA will use that information to develop location-specific use restrictions (environmental covenants or governmental controls, such as restricted navigation areas designated by the Coast Guard) that would prohibit activities that may damage caps such as tug maneuvering and spudding. If such ICs interfere with waterway activities required for use of a particular area, dredging may be required instead of capping to allow for fewer restrictions on the use of the area.

13.2.5 Use of Green Remediation Practices

To the extent practicable, the remedial action should be carried out consistent with EPA Region 10's Clean and Green policy (EPA 2009b), including the following practices:

- Use renewable energy and energy conservation and efficiency approaches, including Energy Star equipment.
- Use cleaner fuels such as low-sulfur fuel or biodiesel, diesel emissions controls and retrofits, and emission reduction strategies.
- Use water conservation and efficiency approaches including Water Sense products.
- Use reused or recycled materials within regulatory requirements.
- Minimize transportation of materials and use rail rather than truck transport to the extent practicable.

13.2.6 Role of EAAs in the Selected Remedy

Dredging, capping, ENR, and MNR as described above apply to 412 acres of the LDW. An additional 29 acres of the most contaminated sediments in the LDW have been or will be addressed by cleanups in Early Action Areas (described in Sections 2.3 and 4.1). EPA has reviewed the EAA cleanup actions subject to implementation under EPA Consent Orders (for the Slip 4, Terminal 117, Boeing Plant 2, and Jorgensen Forge facilities), and has determined that the completed Slip 4 EAA is consistent with the Selected Remedy and requires no further active remediation. The other planned EAA cleanups conducted under EPA oversight are similarly expected to require no further active remediation if they achieve their stated objectives. For the cleanups conducted under the 1991 Natural Resource Damages Consent Decree (Norfolk CSO/SD and Duwamish/Diagonal CSO/SD), EPA will conduct a review during the remedial design phase to determine whether additional work is needed to make these cleanup actions consistent with the remedy selected in the ROD. EPA will review the IC plans and long-term monitoring plans for all of the EAAs and will require that the EAAs be incorporated into plans for the rest of the LDW as necessary to make them consistent with the Selected Remedy.

13.2.7 Role of Source Control in the Selected Remedy

The Selected Remedy will be implemented while a comprehensive source control program is managed by Ecology, as described in the Source Control Strategy, which will be updated after completion of the ROD. EPA and Ecology will coordinate before initiating active in-waterway cleanup to ensure that sources have been sufficiently controlled to prevent or minimize the likelihood that sediment will be recontaminated before initiating active remediation in any portion of the waterway (see Section 4.2). The coordination process is further explained in a 2014 Memorandum of Agreement (MOA), and in Ecology's Source Control Strategy. EPA's draft Implementation Plan, which was provided to Ecology in 2013, provides additional details on the coordination process among EPA offices and with Ecology.

This ROD addresses the In-waterway Portion of the Site only and does not impose requirements on or in any way limit Ecology in its implementation of source control under State law, including MTCA and the WPCA. Furthermore, this ROD does not limit Ecology's implementation of Clean Water Act delegated authorities. Over time, the integrated approach of CERCLA and longer-term clean water actions are expected to result in attainment of applicable surface water criteria and uses under the Clean Water Act.

13.2.8 Addressing Environmental Justice concerns

Environmental Justice concerns will be addressed before, during, and after implementation of the remedy through means that include the following:

- Reducing human health risks as quickly as practicable, while also providing for long-term effectiveness and permanence.
- Conducting the Fishers Study (LDWG 2014b) to learn more about the affected community (those who consume LDW resident fish and shellfish) in order to enhance outreach efforts. As noted in Section 10.3.3, EPA has already started implementing this recommendation as part of the RI/FS.
- Continuing to engage the community throughout remedial design and implementation of the cleanup, including convening an advisory group as a means for the affected community and local agencies to work together on mitigating the impacts of the cleanup on the affected community.
- Continuing consultation with affected Tribes on recommendations for the remedy.
- Reducing the impacts of the cleanup on residents through green remediation techniques, as discussed in Section 13.2.5.

13.3 Cost Estimate for the Selected Remedy

The information presented in the cost estimate summary table for the Selected Remedy is based on the best available information regarding its anticipated scope. Changes in the cost elements are likely to occur as a result of the new information and data collected during remedial design. Major changes may be documented in the form of a memorandum to the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Table 25 compares costs for all alternatives and the Selected Remedy, using 0%, 2.3%, and 7% discount rates. Table 29 presents a detailed cost estimate for the Selected Remedy at the 2.3% discount rate.

Table 29. Cost Estimate Summary for Selected Remedy

ELEMENT	UNIT COSTS	UNIT	QUANTITY / SUBTOTAL
PRECONSTRUCTION			
Mob, Demob & Site Restoration (project)	$ 800,000	Lump Sum	1
Mob, Demob & Site Restoration (seasonal)	$ 120,000	YEAR	10.5
Land Lease for Operations & Staging	$ 250,000	YEAR	10.5
Contractor Work Plan Submittals	$ 100,000	YEAR	10.5
Barge Protection	$ 80,000	Lump Sum	1
Subtotal:			**$ 5,813,932**
PROJECT MANAGEMENT (CONTRACTOR)			
Labor & Supervision	$ 62,000	MONTH	48.3
Construction Office & Operating Expense	$ 21,600	MONTH	48.3
Subtotal:			**$ 4,037,006**
DREDGING			
Shift Rate	$ 25,963	DAY	924
Gravity Dewatering (on the barge)	$ 10	CY	950,664
Subtotal:			**$ 33,496,452**
SEDIMENT HANDLING & DISPOSAL			
Transloading Area Setup	$ 1,000,000	Lump Sum	1
Water Management	$ 10,000	DAY	924
Transload, Railcar Transport to & Tipping at Subtitle D Landfill	$ 60	TON	1,425,997
Subtotal:			**$ 95,799,820**
SEDIMENT CAPPING, DREDGE RESIDUALS, DREDGE BACKFILL			
Debris Sweep	$ 30,000	ACRE	2
Shift Rate (12 hours)	$ 12,500	DAY	501
Cap Material Procurement & Delivery (sand)	$ 27	CY	548,103
Subtotal:			**$ 21,121,281**
ENHANCED NATURAL RECOVERY			
Debris Sweep	$ 30,000	ACRE	5
Shift Rate (12 hours)	$ 12,500	DAY	46
Material Procurement & Delivery (sand)	$ 27	CY	28,824
Material Procurement & Delivery (carbon amended sand)	$ 161	CY	28,824
Subtotal:			**$ 6,143,912**
CONSTRUCTION QA/QC			
Construction Monitoring	$ 7,925	DAY	924
Subtotal:			**$ 7,322,700**
POST-CONSTRUCTION PERFORMANCE MONITORING			
Compliance Testing (Dredging)		PROJECT	$ 1,445,267
Compliance Testing (Capping)		PROJECT	$ 1,141,320
Compliance Testing (ENR)		PROJECT	$ 1,221,569
Subtotal:			**$ 3,808,157**
CAPITAL COSTS (base)			**$ 177,543,260**
CAPITAL COSTS (present value)			**$ 159,745,069**

ELEMENT	UNIT COSTS	UNIT	QUANTITY / SUBTOTAL
Construction Contingency	35%	PROJECT	$ 62,140,141
Sales Tax	9.5%	PROJECT	$ 16,866,610
Project Management, Remedial Design & Baseline Monitoring	30%	PROJECT	$ 53,262,978
Construction Management	10%	PROJECT	$ 17,754,326
TOTAL CAPITAL COST (base)			**$ 327,567,314**
TOTAL CAPITAL COST (present value)			**$ 294,729,653**
AGENCY OVERSIGHT, REPORTING, O&M, & MONITORING COSTS (base)			
Agency Review & Oversight		PROJECT	$ 10,200,000
Reporting		PROJECT	$ 1,900,000
Operations & Maintenance (Dredging)		PROJECT	$ 1,416,056
Operations & Maintenance (Capping)		PROJECT	$ 5,907,000
Operations & Maintenance (ENR)		PROJECT	$ 6,352,496
Operations & Maintenance (MNR>SCO)		PROJECT	$ 2,250,956
Operations & Maintenance (MNR<SCO)		PROJECT	$ 8,978,076
Long-term Monitoring		PROJECT	$ 5,775,580
Institutional Controls		PROJECT	$ 25,000,000
Subtotal (base):			**$ 67,780,164**
Subtotal (present value):			**$ 47,504,279**
TOTAL COST (Net Present Value) at 2.3% discount rate			**$ 342,233,932**

13.4 Estimated Outcomes of Selected Remedy

The intent of the Selected Remedy is, in conjunction with cleanup of the EAAs and with Ecology-led source control activities, to be protective of human health and the environment and to attain ARARs, although some ARARs may not be achieved for the foreseeable future. It is consistent with current and reasonably anticipated future uses of the waterway. It is intended to minimize reliance on fish and shellfish consumption-related institutional controls to the extent practicable; however, such controls will have to remain in effect to ensure protectiveness for the foreseeable future.

The goal of this CERCLA cleanup action and the Ecology-led source control program is to reduce in-waterway contamination and sources to the waterway to levels needed to achieve all cleanup levels and ARARs described in Section 8 and Table 19 and Table 20. RI/FS modeling results conclude that it may not be possible for any alternative to do so; however, as discussed in Sections 8 and 10, it is difficult to predict long-term Site conditions with any degree of accuracy.

The active remedy components of the Selected Remedy are expected to take 7 years to implement after completion of the EAAs and remedial design, and after sources have been sufficiently controlled to minimize recontamination (see Section 4.2). The Selected Remedy will be designed to maintain sufficient water depth for human use and habitat function and allow for future navigation dredging. During and after remediation current and anticipated future land and waterway uses, including industrial, residential, commercial and recreational uses, are expected to be able to continue, subject to the institutional controls and so long as sources of contamination are controlled or eliminated. EPA expects that direct contact risks (RAO 2) and risks to higher trophic level species (RAO 4) will be reduced to the cleanup levels (except as

noted in Section 10.1.2) and risks to benthic invertebrates (RAO 3) and human seafood consumers (RAO 1) will have been significantly reduced at the completion of active components of the remedy. EPA anticipates that another 10 years of natural recovery will be required to reduce COC concentrations sufficiently to meet RAO 3 and RAO 1 to the extent practicable.

The lowest contaminant concentrations in fish and shellfish tissue are predicted by modeling to be achieved in 17 years following the start of construction. EPA will review long-term monitoring data to assess the success of the remedy, including measuring contaminant concentrations in sediment, surface water, and fish and shellfish tissue. If long-term monitoring data show that RAO 3 cleanup levels (benthic SCO criteria) and human health-based RALs (see Table 27 and Table 28) are exceeded, additional actions will be taken to reduce COC concentrations to these levels. If monitoring shows that contaminant concentrations have reached a steady state at levels below the benthic SCO criteria or human health-based RALs but above the human health risk reduction or background-based cleanup levels, EPA will review the data and consider whether additional technically practicable cleanup actions would further reduce contaminant concentrations in sediments, tissue, or surface water.

EPA expects that, once the active components of the Selected Remedy (dredging, capping, ENR, and any additional actions needed to meet the benthic SCO criteria and human health-based RALs) have been completed and long-term monitoring shows COC concentrations have reached a steady state, COC concentrations will either be at cleanup levels for sediment and ARARs for water quality, or will represent practicable limitations in implementation of source control and active remediation. Data collection and analysis during long-term monitoring is intended to test this expectation.

However, if EPA determines that additional remedial action is appropriate for the In-waterway Portion of the Site, EPA will select such action in a ROD Amendment or ESD. If EPA or the State determines that further source control is appropriate, EPA or the State will address such sources with source control response action decisions separate from this ROD. If EPA determines that no additional practicable actions can be implemented under CERCLA to meet ARARs, EPA may issue a ROD Amendment or ESD providing the basis for a technical impracticability waiver for specified sediment and/or surface water quality based ARARs under Section 121(d)(4)(C) of CERCLA.

Implementation of the Selected Remedy, along with the EAA cleanups and source control, will substantially improve the quality of LDW sediments and surface water, reduce COC concentrations in waterway organisms, and result in an estimated 90% or greater reduction in seafood consumption risk. It should also address the key Environmental Justice concerns as discussed in Section 13.2.8.

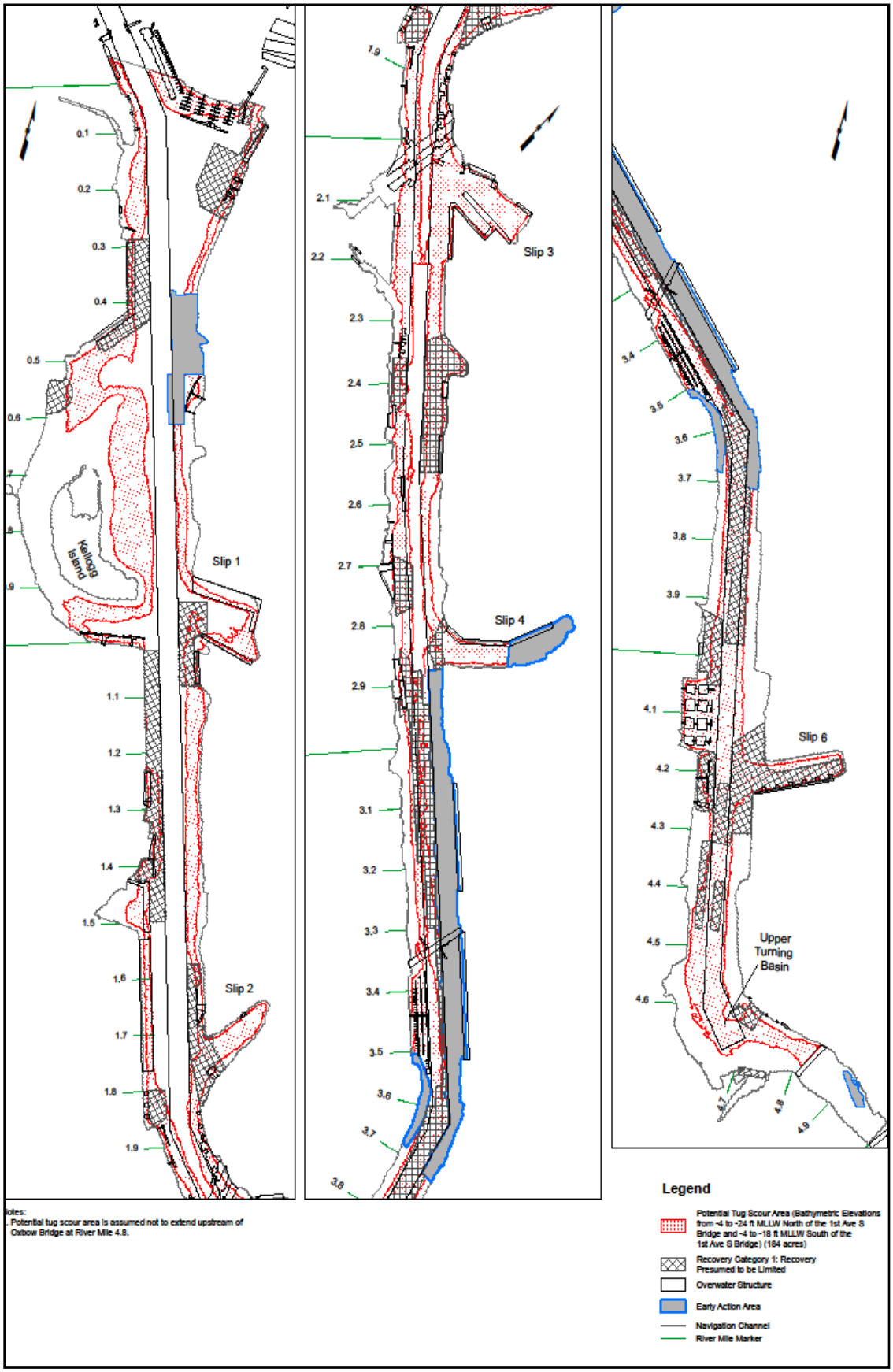

Figure 17. Recovery Category 1 and Potential Tug Scour Areas in LDW

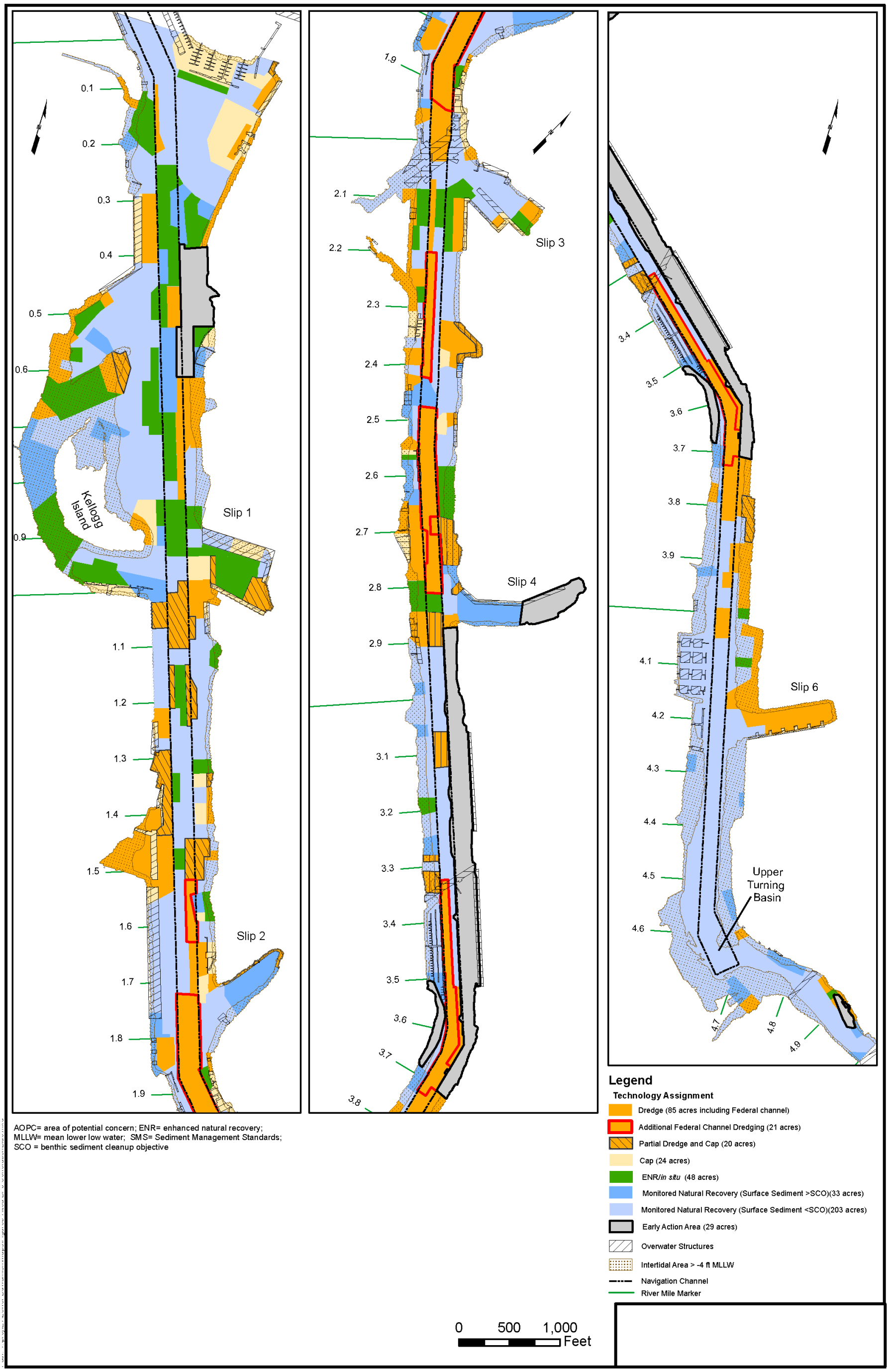

Figure 18. Selected Remedy

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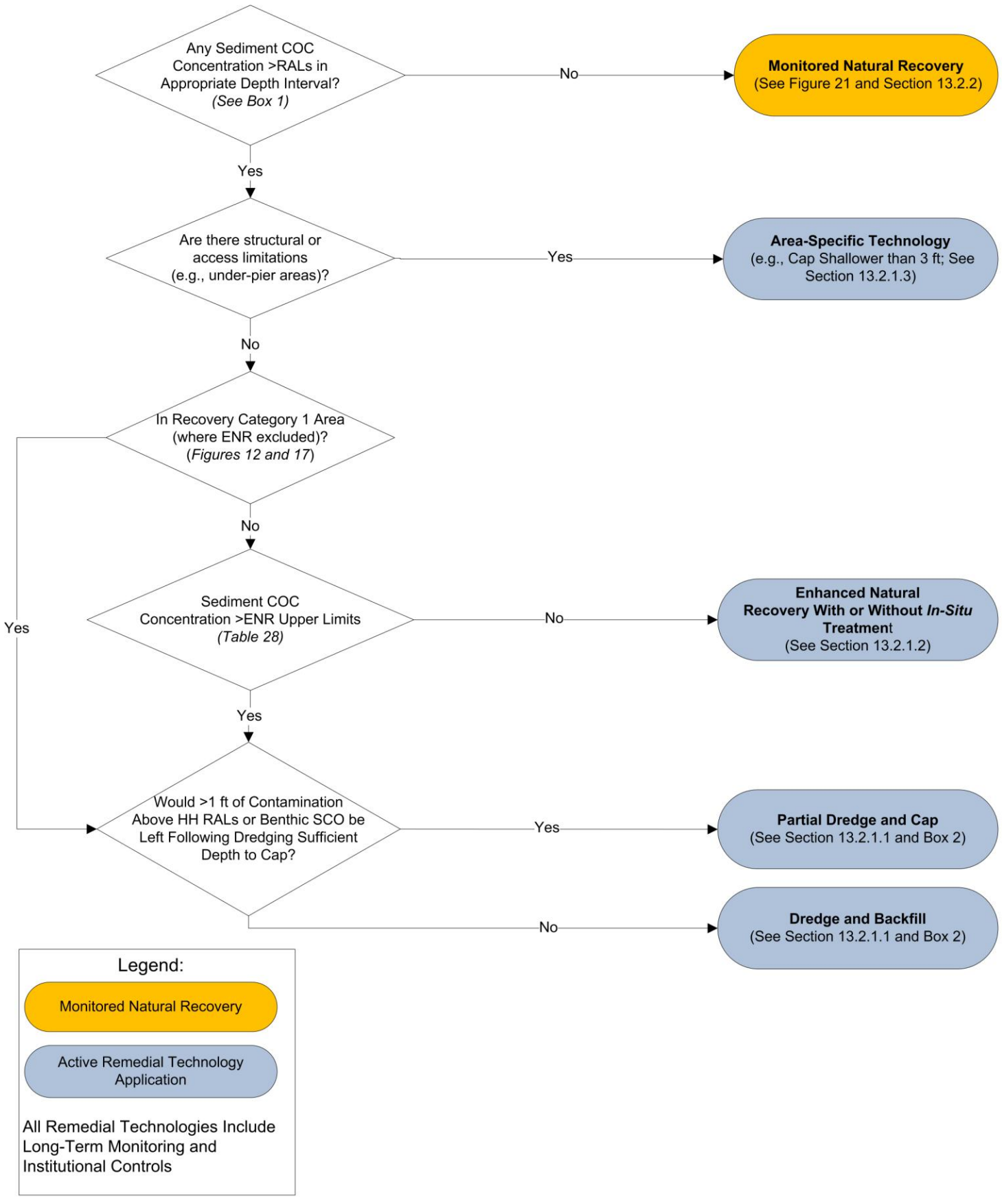

Box 1. Intertidal Sediments (+11.3 ft MLLW to -4 ft MLLW)

Remedial Action Levels (RALs) and Depth Interval to Which They Apply

Contaminant	Units	Recovery Category 1 Areas		Recovery Category 2 and 3 Areas		Risk Reduction Associated with RALs
		4 in (10 cm) depth interval	1.5 ft (45 cm) depth interval	4 in (10 cm) depth interval	1.5 ft (45 cm) depth interval	
PCBs (Total)	mg/kg-OC	12	12	12	65	Human Health [a,b,c,e]
cPAH	µg TEQ/kg-dw	1000	900	1000	900	
Dioxins/Furans	ng TEQ/kg-dw	25	28	25	28	
Arsenic (Total)	mg/kg-dw	57	28	57	28	
39 SMS COCs	Varies by COC	SCO (see Table 27)	--	2xSCO (see Table 27)	--	Ecological [d,e]

Notes:

1. The average concentrations in depth Interval (e.g., vertically composited samples) are compared to RALs.
2. Human Health RALs and RAO 3 RALs must be met immediately following construction.

[a] RAO 1 - Human health seafood consumption

[b] RAO 2 - Human health direct contact includes beach play, clamming, and netfishing

[c] RAO 4 - Ecological protection for river otter (addressed by meeting human health PCB RAL)

[d] RAO 3 - Ecological protection of benthic community

[e] There are 41 SMS COCs, but PCB and arsenic are principally RAO 1 COCs. SMS also lists toxicity test-out criteria using bioassays. Test-out is not allowed for PCBs or arsenic.

Box 2. Habitat Areas

Elevations of intertidal habitat areas are assumed to be unaffected by addition of 6-9" of suitable materials (i.e., ENR)

Cap,dredge and backfill,or partial dredge and cap to pre-construction grade; finish with suitable habitat layer

In clam habitat areas (Figure 6), caps will generally include 4 ft of suitable clean material Including a minimum 45 cm clam habitat layer

Figure 19. Intertidal Areas – Remedial Technology Applications

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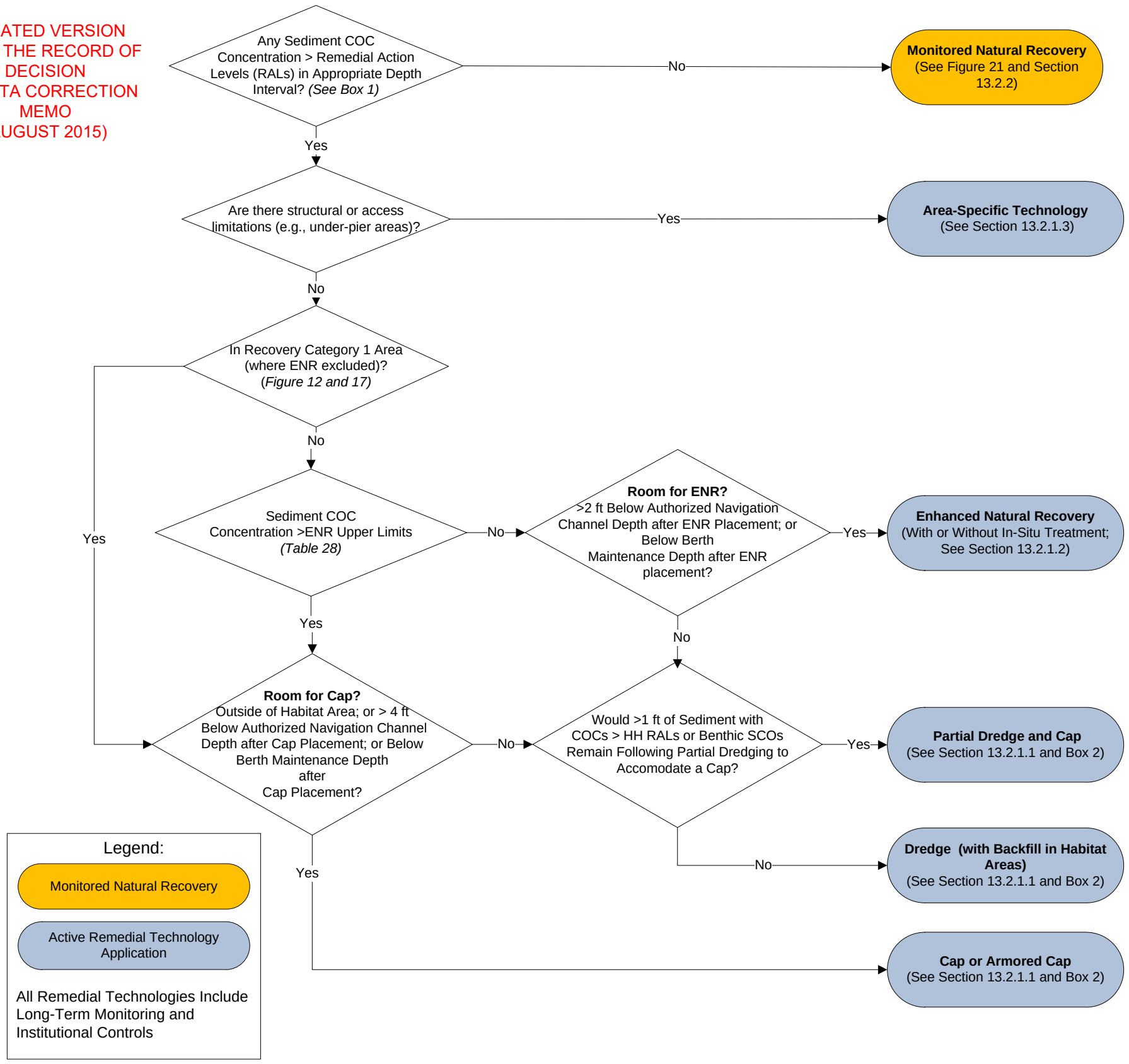
UPDATED VERSION FROM THE RECORD OF DECISION ERRATA CORRECTION MEMO (AUGUST 2015)



Box 1. Subtidal Sediments (-4 ft MLLW and Deeper)

Remedial Action Levels (RALs) and Depth Interval for Application of RAL

Contaminant	Units	Recovery Category 1 Areas		Recovery Category 2 and 3 Areas		Shoaled Areas of the Federal Channel	Risk Reduction Associated with RALs
		4 in (10 cm) depth interval	2 ft (60 cm) depth interval	4 in (10 cm) depth interval	2 ft (60 cm) depth interval-applied only at potential tug scour areas; See *Footnote 2* and Figure 16	See *Footnote 3*. To a depth of 2 ft below the authorized depth for waterway reach[f]	
PCBs (Total)	mg/kg-OC	12	12	12	195	12	Human Health [a,b,c]
cPAH	µg TEQ/kg-dw	1000	1000	1000	--	1000	
Dioxins/Furans	ng TEQ/kg-dw	25	25	25	--	25	
Arsenic (Total)	mg/kg-dw	57	57	57	--	57	
39 SMS COCs	Varies by COC	SCO (see Table 27)	SCO	2xSCO (see Table 27)	--	SCO (see Table 27)	Ecological [d,e]

Notes

1. The average concentrations in depth interval (e.g., vertically composited samples) are compared to RALs.
2. Potential Tug Scour Areas are Subtidal Elevations Potentially Susceptible to Propellor Wash (North of the 1st Avenue South bridge located at approximately RM 2 in Water Depths from -4 to -24 ft MLLW, and South of the 1st Avenue S Bridge, in Water Depths from -4 to -18 ft MLLW).
3. Shoaled areas are those areas in federal navigation channel with sediment accumulation above the authorized depth including a 2 ft over-dredge depth; see Table 28. For areas in the navigation channel that are not shoaled, Recovery Categories 1 or 2 & 3 RALs apply. Authorized depths are: (1) from RM 0 to 2, 30 ft below MLLW (from Harbor Island to the First Avenue South Bridge); (2) from RM 2 to RM 2.8, 20 ft below MLLW (from the First Avenue South Bridge to Slip 4); and (3) from 15 ft below MLLW from RM 2.8 to 4.7 (Slip 4 to the Upper Turning Basin).
4. Human Health RALs (and RAO 3 PRGs (Benthic SCOs) in Category 1 areas) must be met immediately following construction.

[a] RAO 1 - Human health seafood consumption

[b] RAO 2 - Human health direct contact includes beach play, clamming, and netfishing

[c] RAO 4 - Ecological protection for river otter (addressed by meeting human health PCB RAL)

[d] RAO 3 - Ecological protection of benthic community

[e] There are 41 SMS COCs, but PCB and arsenic are principally RAO 1 COCs. SMS Also lists toxicity test-out criteria using bioassays. Test-out is not allowed for PCBs or arsenic.

[f] Depth intervals to determine compliance will be determined during Remedial Design.

[g] Caps were assumed to be 3 ft for cost estimating purposes; cap thicknesses will be evaluated by EPA during Remedial Design in accordance with EPA and USACE (1998)

Box 2. Habitat Areas (see Section 13.2.1.1)

Elevations of intertidal habitat areas are assumed to be unaffected by addition of 6-9" materials (i.e., ENR)
Cap, dredge and backfill, or partial dredge and cap to pre-construction grade; finish with suitable habitat layer.

Revised Figure 20. Subtidal Areas – Remedial Technology Application

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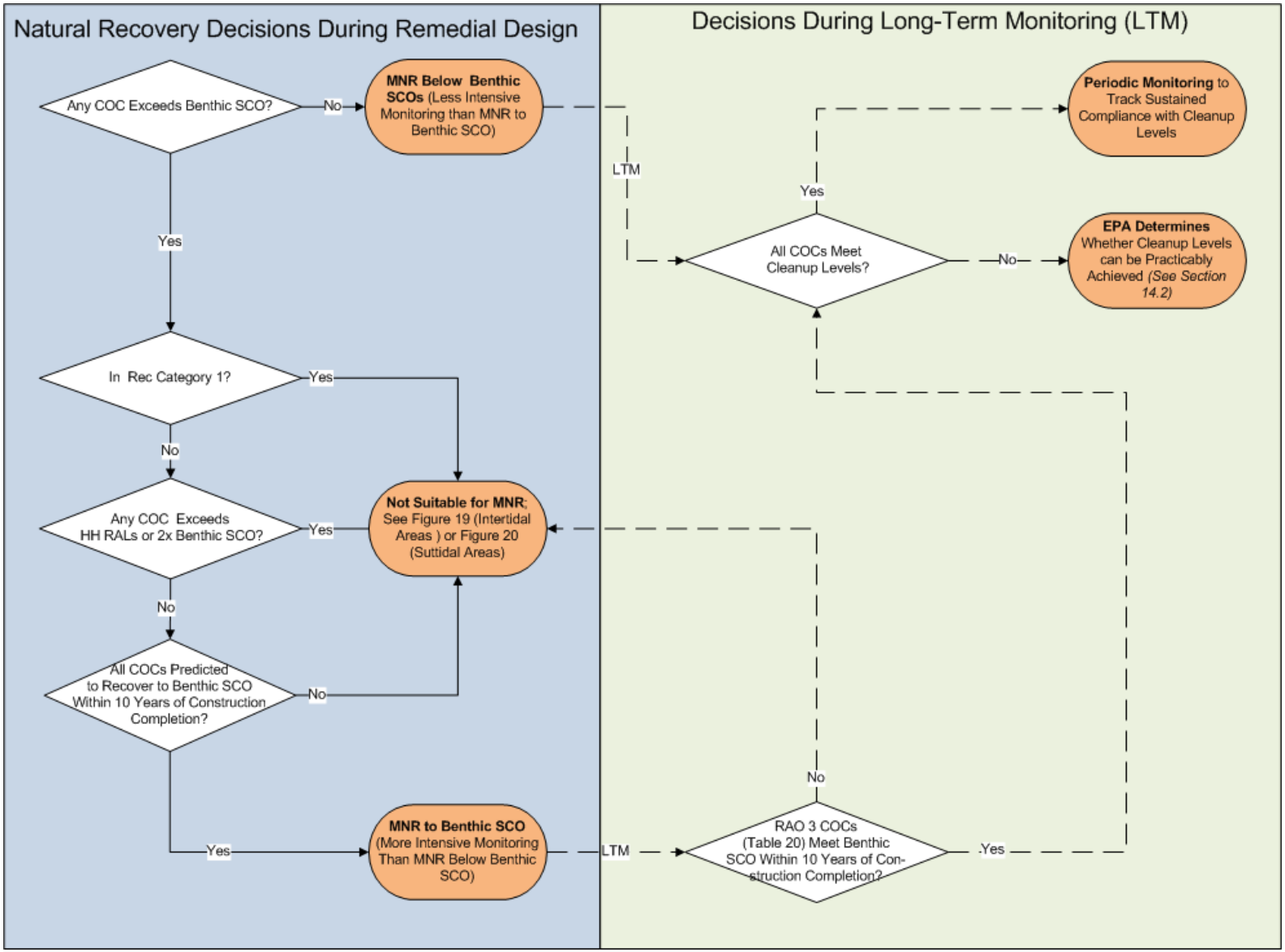

Figure 21. Intertidal and Subtidal Areas – Natural Recovery Application

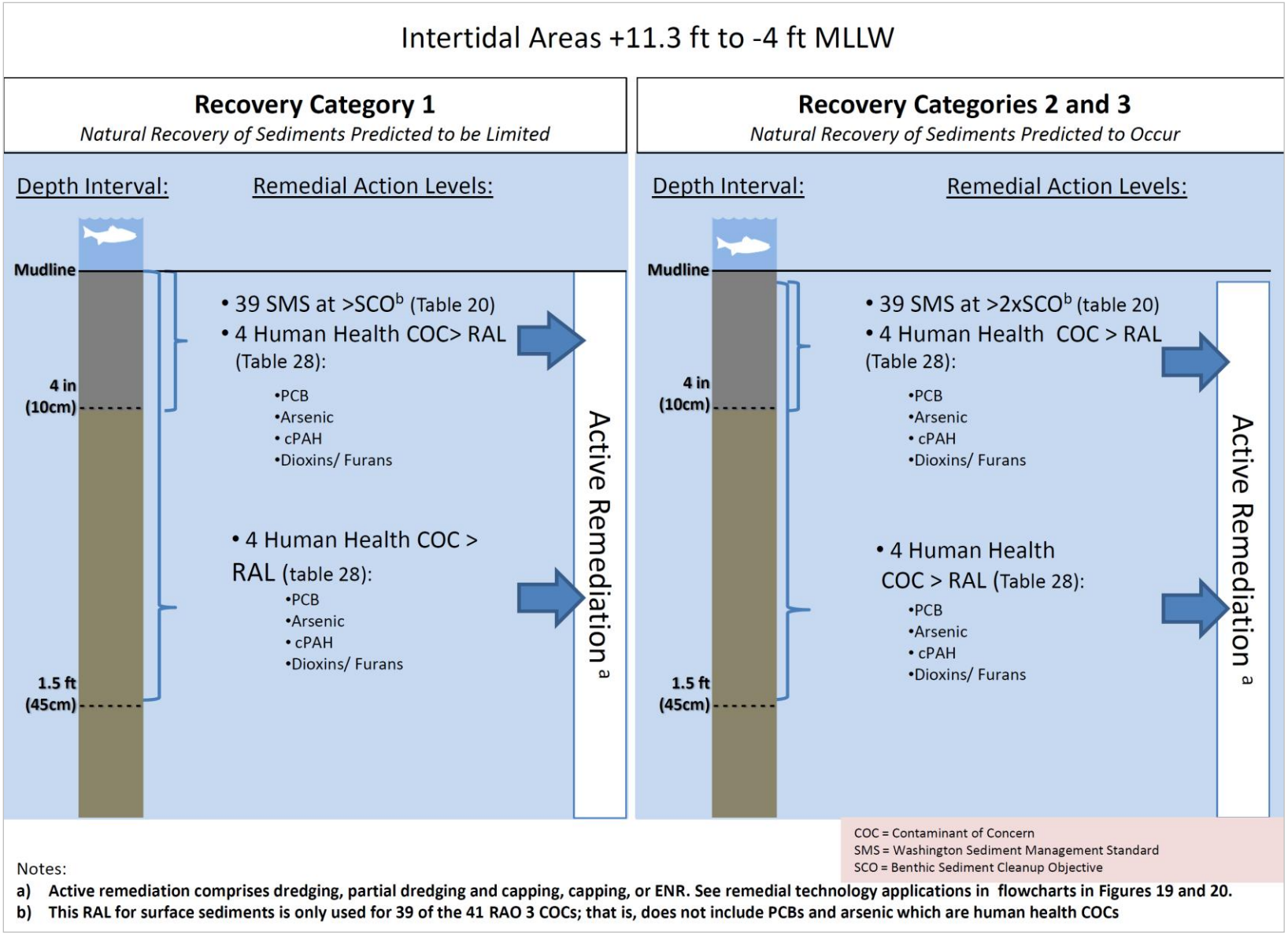

Figure 22. Intertidal Areas - Remedial Action Levels Application

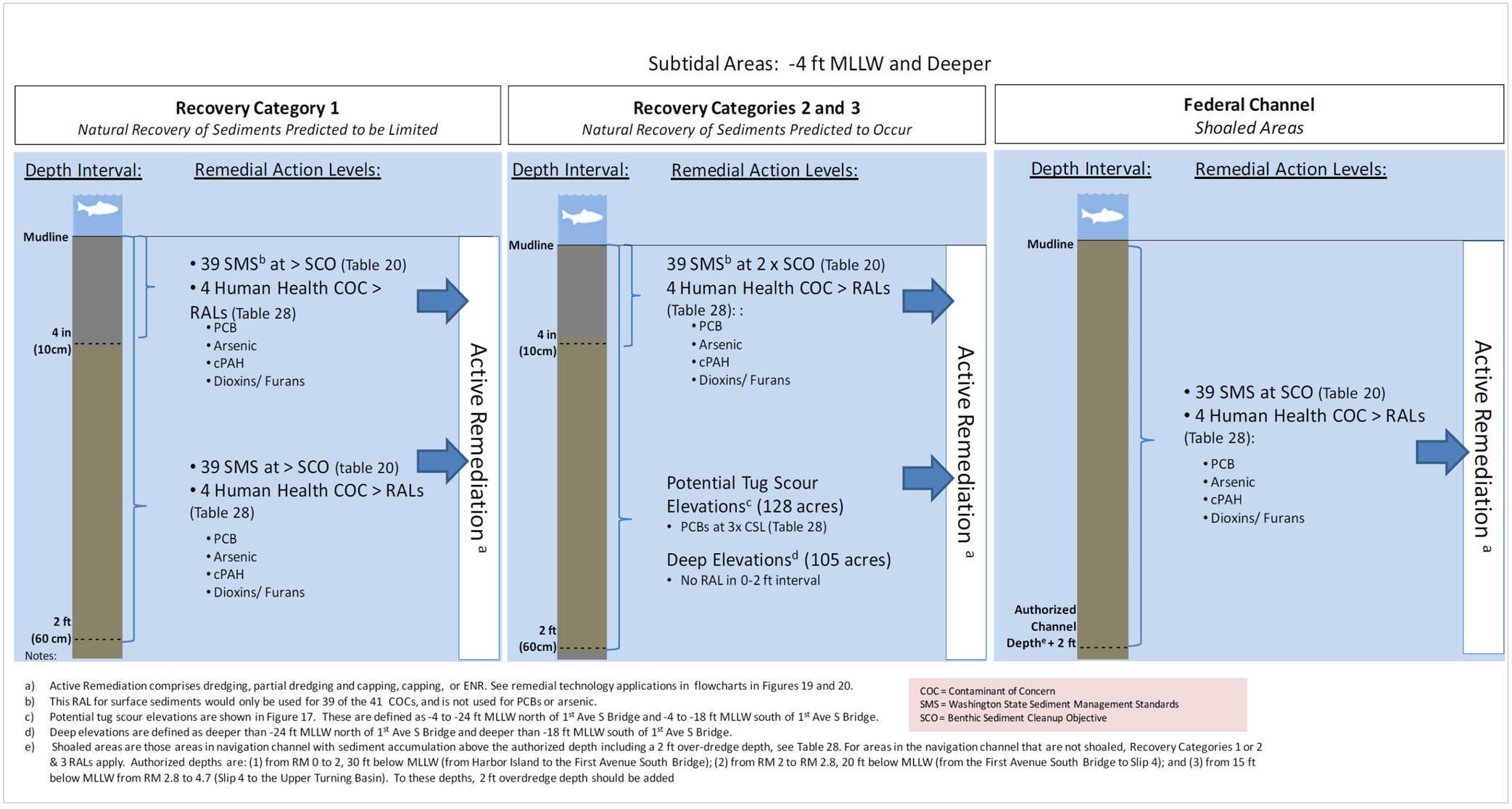

Figure 23. Subtidal Areas – Remedial Action Levels Application

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Appendix I: Glossary with Acronyms

Acronym	Definition
AOC	Administrative Order on Consent – Negotiated agreement between the EPA and Potentially Responsible Parties for work other than Remedial Action.
AR	Administrative Record – All documents that the EPA considered or relied on in selecting an action at a Superfund site. Actions include a Record of Decision for Remedial Action or an action memorandum for removal actions.
	Advisory – The Washington State Department of Health issues state-generated health advice to protect public health and provide information about risks from eating contaminated seafood (e.g., fish, shellfish). Fish advisories are based on the levels of contaminants in fish tissue and potential impacts on health. Advisories provide guidance on safe consumption rates for different fish species and locations to help people make informed decisions about consuming seafood from a specific waterbody. Advisories may provide recommendations to avoid or reduce consumption of seafood. They may also include suggestions like using fillet instead of whole fish, trimming fat tissue, or using cooking techniques to reduce exposure to contaminants in seafood.
ATSDR	Agency for Toxic Substances and Disease Registry, US Department of Health and Human Services.
	Capping – A technology to address contaminated sediment that places clean sand, gravel or other material (clay, carbon) over the contaminated sediment to isolate the contaminants from the surrounding environment.
	Carcinogen – A chemical or physical agent capable of causing cancer.
CAG	Community Advisory Group - A group that is made of representatives of diverse community interests. It provides a public forum for community members to present and discuss their concerns and needs related to the Superfund decision-making process.
CHSP	Community Health and Safety Plan – A plan that describes key health and safety personnel including detailed health and safety plans for protecting and informing the surrounding community when work is under way.
CIC	Community Involvement Coordinator (CIC) – CICs are EPA staff assigned to projects to assist communities in their interaction with the EPA and ensure that technical staff are aware of issues that concern the public in relation to the work the EPA is doing. As liaisons between technical project managers and the community, CICs provide opportunities for two-way communication throughout the life of a project.
CIP	Community Involvement Plan (CIP) – A CIP is a site-specific strategy to enable meaningful community involvement throughout the Superfund cleanup process. CIPs specify EPA-planned community involvement activities to address community needs, concerns, and expectations that are identified through community interviews and other means.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended – This law, enacted by Congress on December 11, 1980, created the Superfund program. Specifically, CERCLA (1) established procedures and requirements for the cleanup of uncontrolled or abandoned hazardous waste sites; (2) provided for liability of persons responsible for releases of hazardous substances at these sites; and (3) established a trust fund to provide for cleanup when, for example, no viable responsible parties are available to pay for or perform the work.
	Contaminants – Any physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, or soil.

Appendix I: Glossary with Acronyms *(continued)*

Acronym	Definition
	Contamination – Introduction into water, air, and soil of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the medium unfit for its next intended use.
	Dredging – The removal of material from the bottom of lakes, rivers, harbors and other bodies of water. Most dredging is done to maintain or deepen navigation channels or porting areas for the safe passage of boats and ships. Dredging contaminated areas site may also be performed for the express purpose of reducing the exposure of marine biota (plants and animals) and humans to contaminated sediments and/or to prevent the spread of contaminated sediments to other areas. This type of dredging is termed environmental dredging.
DRCC/TAG	Duwamish River Cleanup Coalition/Technical Advisory Group - DRCC/TAG is a 501(c)3 non-profit organization involved in all aspects of the cleanup of the Duwamish River, working to ensure the cleanup meets community standards by restoring environmental health and protecting the fishers and families who use the river as well as reflecting the priorities, values and will of the people who live and work in the region. The organization serves as the EPA-recognized community advisory group for the Lower Duwamish Superfund Site.
EAA	Early Action Area – Areas in the LDW that were identified early in the process as the most contaminated areas in the waterway and targeted for preliminary cleanup
Ecology	Washington Department of Ecology - A state environmental agency.
ECOSS	ECOSS is a nonprofit organization that encourages urban redevelopment and a healthy environment by providing education, resources and technical assistance to diverse businesses and communities in the Puget Sound region.
EJ	Environmental Justice - The EPA defines Environmental Justice (EJ) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies.
EPA	United States Environmental Protection Agency - A federal environmental agency.
ESD	Explanation of Significant Differences – The EPA publishes an explanation of the significant differences if the EPA determines that the remedial action at a site should differ significantly from the remedial action previously selected in the ROD. The EPA also publishes the reasons such changes are being made.
FS	Feasibility Study – Analysis of the practicability of a proposal; e.g., a description and analysis of potential cleanup alternatives for a site such as one on the National Priorities List. The feasibility study usually recommends selection of a cost-effective alternative. It usually starts as soon as the remedial investigation is under way; together, they are commonly referred to as the "RI/FS."
	Habitat – A place where the physical and biological elements of ecosystems provide a suitable environment including the food, cover, and space resources needed for plant and animal livelihood.
	Information Repository – An Information Repository is a location in a public building convenient for local residents, such as a public school, city hall, or library, that contains information about a Superfund site, including technical reports and reference documents.

Appendix I: Glossary with Acronyms *(continued)*

Acronym	Definition
IC	Institutional Controls - Methods to reduce exposure to contamination instead of or in coordination with cleanup.
LDW	Lower Duwamish Waterway Superfund Site - The lower five miles of the Duwamish River, in Seattle, Washington. The site was added to EPA's National Priorities List (NPL) in 2001.
MTCA	Model Toxics Control Act - Washington State's cleanup law. It identifies, investigates, and cleans up facilities where hazardous substances have been released. It defines the role of Ecology and encourages public involvement in the decision-making process.
NCP	National Contingency Plan - The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan or NCP, is the federal government's blueprint for responding to both oil spills and hazardous substance releases.
NPL	National Priorities List – The EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. The list is based primarily on the score a site receives from the Hazard Ranking System. The EPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.
	Pilot study – A small-scale experiment or set of observations undertaken to decide how and whether to launch a full-scale project or study.
PAHs	Polycyclic Aromatic Hydrocarbons – a group of toxic chemicals that are formed during the burning of substances such as coal, oil, gas, wood, garbage and tobacco and during the charbroiling of meat. Long periods of breathing, eating, or having skin contact with high levels of some PAHs may increase a person's risk of cancer.
PCBs	Polychlorinated Biphenyls (PCBs) – Human-made chemicals (for example, used in electrical equipment, transformers, caulk and paint) banned from use in most applications in 1979; PCBs stay in the environment for a long time and can build up in fish and shellfish.
PRP	Potentially Responsible Party – Any individual or company - including owners, operators, transporters or generators - potentially responsible for or contributing to a spill or other contamination at a Superfund site. Whenever possible, through administrative and legal actions, the EPA requires PRPs to clean up hazardous sites for which they are responsible.
PA/SI	Preliminary Assessment/Site Investigation - Once a contaminated site is identified, the EPA conducts a Preliminary Assessment/Site Inspection (PA/SI). For a PA/SI, the EPA generally reviews existing information, inspects the site, and may interview nearby residents to find out the history of the site and its effects on the population and the environment. The EPA also normally tests the soil, water, and air to determine what hazardous substances were left at the site and how serious the risks may be to human health and the environment.
	Proposed Plan – A plan for a site cleanup that available to the public for comment.
	Public comment period – The time allowed for the members of an affected community to express views and concerns regarding an action proposed to be taken by the EPA such as a rulemaking, permit, or Superfund remedy selection.
PHSKC	Public Health – Seattle and King County (local health department)

Acronym	Definition
	Public information session – Informal public sessions that often use poster displays and fact sheets and that include EPA personnel and contractors who are available to discuss issues and answer questions. Public information sessions offer the public the opportunity to learn about project-related issues and to interact with the EPA on a one-to-one basis. Public information sessions do not require the use of court reporters and transcripts, although meeting summaries may be issued through community updates.
	Public meeting – Formal public sessions that are characterized by a presentation to the public followed by a question-and-answer session. Formal public meetings may involve the use of a court reporter and the issuance of transcripts. Formal public meetings are required only for the Proposed Plan and ROD amendments.
ROD	Record of Decision – A public document that explains which cleanup alternative(s) will be used at National Priorities List sites.
RA	Remedial Action – The actual construction or implementation phase of a Superfund site cleanup that follows remedial design.
RD	Remedial Design – A phase of remedial action that follows the Remedial Investigation/Feasibility Study and ROD and includes development of engineering drawings and specifications for a site cleanup. The details of the in-waterway work will be decided and contractors selected to perform the cleanup.
RI	Remedial Investigation – An in-depth study designed to gather data needed to determine the nature and extent of contamination at a Superfund site, establish site cleanup criteria, identify preliminary alternatives for remedial action, and support technical and cost analyses of alternatives. The remedial investigation is usually done with the feasibility study. Together they are usually referred to as the "RI/FS."
RPM	Remedial Project Manager – The designated EPA or state official responsible for overseeing a Superfund cleanup project.
	Remedy – Long-term action that stops or substantially reduces a release or threat of a release of hazardous substances.
	Removal Action – Short-term immediate actions that address releases of hazardous substances that require expedited responses.
RCRA	Resource, Conservation and Recovery Act - This law, enacted by the US Congress, creates the framework for the proper management of hazardous and non-hazardous solid waste.
	Responsiveness Summary – A summary of oral and/or written public comments received by the EPA during a comment period on key EPA documents and the EPA's response to those comments.
	Sediment – Topsoil, sand, and minerals washed from the land into water, usually after rain or snowmelt. Sediment lying at the bottom of a river, lake, or other waterbody provides habitat for worms, clams, and other benthic organisms, which are part of the aquatic food web.
SC	Source Control - The control of sources of pollution to prevent contamination of the environment.
	Stakeholder – Any organization, governmental entity, or individual that has a stake in or may be affected by the Superfund program.

Acronym	Definition
	Superfund – The program operated under the legislative authority of CERCLA and Superfund Amendments and Reauthorization Act (SARA) that funds and carries out EPA solid waste emergency responses and removal and remedial activities. These activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.
SuperJTI	Superfund Job Training Initiative - This national EPA contract provides job training to communities affected by hazardous waste sites regulated by the Superfund and Resource Conservation and Recovery Act (RCRA) programs, as well as federal facility and Tribal removal sites.
TAG	Technical Assistance Grant - A Technical Assistance Grant (TAG) helps communities participate in Superfund cleanup decision-making. It provides funding to community groups to contract their own technical advisor to interpret and explain technical reports, site conditions, and the EPA's proposed cleanup proposals and decisions. This federal grant is awarded to an incorporated nonprofit organization of community members affected by the site.
	Toxicity – The degree to which a substance or mixture of substances can harm humans or animals.
TASC	Technical Assistance Services for Communities - The program provides independent assistance through a national EPA contract to help communities better understand the science, regulations, and policies of environmental issues and the EPA actions.