**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 1. | General – Section 408 compliance | -- | Comments prepared by the US Army Corps of Engineers related to 408 compliance are provided in a separate table. Please note that EPA does not expect LDWG to perform advance dredging where dredging is currently planned to meet the depth requirements in the ROD. | Comment noted. Responses to USACE comments are provided at the end of this table. |
| 2. | General – Roundtable input | -- | EPA received input on the design during the December 4 Roundtable meeting and in a separate meeting with the Georgetown Open Space Committee. EPA has considered the input and incorporated it into EPA comments below. EPA notes that additional community input should be sought, particularly as design continues in areas that are in or near public access areas. EPA encourages LDWG members representing the City of Seattle and King County to engage other parts of the government (SDOT, Parks, Public Health) to discuss whether there are or could be plans to enhance habitat (such as connecting the inlet at RM2.2W to inland retention ponds, see DRCC comments) or public access areas (such as at boat launches, road ends). | Comment noted.<br>LDWG has begun community engagement activities within the Duwamish Valley, using various approaches such as public drop-in sessions, mailers, surveys, and social media postings. The results of these efforts are summarized in a draft *Community Impacts Mitigation Plan*, which is Appendix K of the Intermediate (60%) RD BODR. |
| 3. | General – Bank stabilization | -- | EPA encourages LDWG to evaluate the cost of bank protection similar to what the Port of Seattle has employed, including laying back slopes where possible, using large woody debris to stabilize the banks, and planting native vegetation, particularly where the land is publicly owned (Myrtle, 8th Ave, SMA 26, SMA 8, SMA 29). Even where existing slopes are covered in large rock armoring, remediation presents an opportunity for habitat and access improvement, potentially at comparable cost. | Comment noted. |
| 4. | General – Lessons from Upper Reach | -- | EPA believes that LDWG's experience implementing the upper reach design has informed the middle reach design in some respects. We would like to discuss the following topics to ensure that they have been or will be factored into future middle reach design submittals, as they seem likely to be particularly important for the middle reach: sheen characterization and response plans; procurement and management as environmental cleanup contract versus civil contract work; options for faster, more effective barge dewatering options (such as hay bales or floating filter boxes); ENR stability on side slopes. Consider more prescriptive sequencing and specifications due to the presence of sediments that are not Subtitle D waste. | Comment noted.<br>The design team has held multiple meetings with the construction management team regarding lessons learned from upper reach construction, and those are being factored into design for the middle reach. Additionally, the Phase III PDI includes testing that will provide information necessary to finalize the waste profiles for sediments dredged from each RAA. The results from those analyses will be considered in developing the specifications as part of the Pre-Final (90%) RD. |
| 5. | General – Soil > RAL | -- | There are areas with soil contamination (exceeding RALs) above MHHW. Many are in MTCA sites and may be addressed through soil cleanup. Some are near RAAs. With sea level rise, these areas will be exposed to tidal erosion. Identify these areas and discuss the potential for erosion in the BODR. | Upland properties adjacent to RAAs that are known or suspected to have contaminants present are summarized in Appendix A. There are four primary cleanup sites (three under separate Agreed Orders with Ecology and one currently discussing oversight options with Ecology) that are considered in the Intermediate (60%) RD: Duwamish Marine Center, Douglas Management Dock, Industrial Container Services, and Gateway Park. RALs apply to areas waterward of MHHW. Upland sites should address any contamination of concern for the waterway as source control measures. The Intermediate (60%) RD reflects what is know about the status of those cleanups; the Pre-Final (90%) RD will integrate information about the final cleanup actions planned at those properties and will consider factors that could cause recontamination of an RAA, such as long-term bank stability. |
| 6. | General – Port Coordination | -- | The Port of Seattle is no longer a LDWG member, but their role includes owning land, including some upland slivers within the waterway, assessing transloading options, operating a mitigation bank, managing (often with others) upland cleanup work, and performing bank stabilization using green practices. EPA encourages LDWG to re-engage with the Port to advance transloading facility planning, sliver discussions, and habitat restoration goals. shoreline restoration efforts. | Comment noted. |
| 7. | General - Gaps | -- | EPA comments identify some small gaps within and between RAAs. Specific comments identify most of them, but as a general point, consider the uncertainties, the benefit of simpler designs for remedial areas, and the risk of construction impacts (residuals, erosional patterns) to such areas if not included. | Specific comments are addressed as they appear throughout this document. RAAs have been defined considering many factors, including constructability, as described in BODR Section 5. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 8. | General - berths | -- | Berth footprints are not delineated in most figures/maps. We understand LDWG is obtaining additional information from owners and operators of berths, but the 60% BODR text and figures needs to explicitly state how RALs were applied in berth areas, show RAAs relative to such areas, state how ROD requirements are incorporated in the design, and track dredge depths where RAAs overlap with berths. State what LDWG's responsibilities are if RALs are not exceeded in RAL intervals but deeper sediments (within or at the z-layer) exceed surface RALs. | Permitted berths have been added to the Figure 7-1 series.<br>RALs were applied in permitted berth areas according to water depth, consistent with other non-FNC areas of the waterway. Additional ROD requirements (e.g., top of cap restrictions) would apply if capping or PD&C were the selected technology within a permitted berth. Capping is not the selected technology within any permitted berth areas. The ROD does not require application of an active remedial technology for areas where RALs are not exceeded. Addressing buried contamination within a permitted berth would be the responsibility of the permit holder in the future. |
| 9. | General - FNC | -- | A. For the PDI Phase III QAPP, include a map and table to identify locations within the federal navigation channel where maintenance dredging z-layer samples were collected, which samples were analyzed, and what the results are relative to RALs. For areas outside PD&C RAAs, understanding what is observed at the same depth horizon is important. In areas where shoaling may in future prompt maintenance dredging, additional information may be needed.<br>B. For areas of the federal navigation channel south of RM2 (areas where authorized depth is -20 or -15), describe in text how the sediment is protected from tugboat scour and storm erosion that could redistribute contaminants in other parts of the waterway.<br>*Note: List formatting added to this comment to match the LDWG response.* | A. Information regarding locations in the FNC where the z-layer samples were analyzed were provided in the DER – see both DER Map 2-3 (which include core profiles) and Section 3 of DER Appendix A.<br>B. Refer to BODR Sections 9.3 and 10.6 and BODR Appendices I and M. |
| 10. | General – data needs | -- | EPA agrees with the preliminary data needs identified on Table 17-1, except cells marked "none." In addition to any comments below, EPA may identify additional data nee ds during review of the Phase III QAPP addendum than the preliminary gaps identified on Table17-1. | Comment noted. |
| 11. | General - ENR | -- | ENR is included in the 30% design for several areas of the Middle Reach. EPA's expectation is that areas subject to ENR must retain the material placed during remedial action for long enough to benefit from the benthic recolonization and bioturbation that mixes the clean material into the existing sediments and leads to the long-term success of this remedial technology. Indicate how this will be assessed and assured. | ENR material is anticipated to redistribute and mix into and adjacent to the area that ENR is placed on top of. The ROD restricts ENR from application in RC 1 areas (which were re-evaluated and assigned during Phase I and II DER) where there is an expectation that significant erosion occurs that may prevent ENR from being effective. In Recover Category 2 and 3 areas, ENR is allowed, and LDWG anticipates that there will be distribution and mixing of ENR materials through natural and human-made forces. Mixing through only bioturbation is not the only mechanism for mixing. When placing ENR on relatively flat grades (flatter than 3H:1V), use of sands is considered to be sufficiently stable to be effective as the ENR material. Through observations of ENR placed in areas steeper than 3H:1V in the upper reach, LDWG recognizes that a coarser ENR mix may be warranted to increase the stability of ENR material on the slope. The Specifications developed during Pre-Final (90%) RD will account for these observations. Performance is then tracked through post-construction and long-term monitoring. |
| 12. | General – intertidal cleanup levels | -- | Add text to discuss whether the design will result in achievement of clean up levels in identified beach play, particularly those where active remediation is planned (Beach 6, Beach 4, 6). If active remediation is not indicated or is not area-wide based on remedial action level comparisons (such as at Beach 5), but the sediment concentrations exceed the human health risk-based cleanup levels, discuss whether remedial action as proposed could be effective at achieving safe, unrestricted use of such areas in the near term. The ROD assumption of natural recovery assumes deposition of clean sediments over ten years. EPA encourages LDWG to consider post-ROD sediment data and the greater certainty of meeting cleanup levels if areas of known contamination are addressed through active measures. | As described in the *Lower Duwamish Waterway Pre-Design Studies Data Evaluation Report* (Windward 2020) (and considering the updated CULs for cPAHs in the ESD [EPA 2021]), the three beach play areas in the middle reach exceed the CUL for one or more COCs. Middle reach beach play areas include Beach 4, Beach 5 and Beach 6, with active remediation planned within approximately 75%, 30%, and 85% of the footprints of each beach area.<br>• Beach 4: Exceeds CUL for DFs and arsenic. Includes portions of RAL exceedance areas 21, 24, 27, and 28<br>• Beach 5: Exceeds CUL for cPAHs and arsenic. Includes portions of RAL exceedance areas 6, 8, and 17<br>• Beach 6: Exceeds CUL for dioxins/furans, cPAHs, and arsenic. Includes portions of RAL exceedance area 9<br>In each area, the combination of the planned active remediation and post-construction natural recovery period are expected to be effective in achieving beach play area-wide CULs. Based on this review, no adjustments were made to RAA boundaries. Monitoring of these beach play areas to evaluate compliance with the CULs will occur as part of the LTMMP after construction is complete. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 13. | General | -- | While the purpose of ENR is for the material to mix in and dilute concentrations of COCs rather than to isolate contaminated sediment, the ENR material must stay in place long enough for mixing to occur. ENR use in low-slope areas is acceptable (if erosion potential has been evaluated and minimized) and it appears to be effective in some of the pilot study areas. These areas have not been monitored after the pilot study post-construction Year 3 monitoring.<br>ENR use on steep banks armored with riprap or quarry spalls is not necessarily acceptable. Dilution isn't likely, because as observed in EMJ and upper reach SMA 13, the substrate is not benthic habitat and most of the ENR material erodes away. Some may enter interstitial voids, and if it remains in place can be helpful from a habitat standpoint. EPA requests that LDWG consider alternative methods to address such areas and discuss with EPA. If additional data collection can support this use, EPA is open to a demonstration that it remains in place on and between the armoring. | See response to Comment No. 11. For slopes shallower than 3H:1V, sand and sand and gravel mixes will remain in place long enough for mixing to occur. On steeper slopes, ENR material that may be placed over existing armoring is still considered effective because the armor material will have interstitial areas between the armor rock where the ENR sand or sand and gravel mix will be retained over the embedded sediment. In these steeper slope areas, LDWG may also consider amending the ENR material with AC to reduce the bioavailability of the underlying sediment. |
| 14. | Coordination with planning for Gateway Park North | -- | Following the Roundtable meeting, EPA was contacted by a representative of the Georgetown Open Space Committee regarding coordination of park planning with cleanup of adjacent sediments and any MTCA cleanup affecting the shoreline of 8th Ave/Gateway Park North. In particular, safer access for kayak launching is sought. Currently, the access point is from behind the upstream wingwall. While the (creosoted wood) wingwalls are likely included with the pumphouse on the National Register of Historic Places, EPA would like to engage historic preservation experts to discuss potential removal of the wingwall structures. The structures are currently hindering sediment removal. The aging structure may become a source of creosote. Evaluations would be needed to determine if removal would lead to beach erosion. | Comment noted.<br>BODR Section 3.9 has been revised to include supplemental information about the Georgetown Steam Plant Pump Station. LDWG and the design team also routinely meets with Seattle Parks and Recreation and SDOT for status updates regarding the upland cleanup of this area and the progression of the park design. |
| 15. | General - Value Engineering | -- | Preliminary (30%) Basis of Design Report (BODR) text does not discuss value engineering. Confirm are the public members of LDWG required to complete value engineering for remediation projects? If so, provide conclusions from the value engineering screening in the 60% design as pertinent. | Internal quality assurance reviews include value engineering evaluations in preparation of the EPA deliverables. Internal reviews are not included in EPA deliverables. |
| 16. | General –unusable structures | -- | EPA received community feedback that they would like unusable and unstable structures removed from the waterway near public access points. Consider if there are information needs near these structures and if there are PAH concerns near structures made of creosoted wood. | Comment noted. Structures that inhibit the construction of the remedy will be demolished with concurrence from the adjacent landowner. An example of such a structure is the wharf located on the north side of the Inlet at RM 2.2W, on the Douglas Management Dock property. |
| 17. | General – potential habitat | -- | As noted in DRCC's comment, the WSDOT retention ponds for SR509/99 highway runoff are near the head of the inlet at RM2.2W. Discuss whether the ponds are fresh or salt water and consider whether connecting them to the waterway at the head of the inlet could serve multiple goals, including water storage during upland flooding and additional off-channel habitat. | Comment noted.<br>LDWG is coordinating with WSDOT to obtain as-built documents for the wetland areas that are connected to the waterway at the inlet that is located below the southern portion of the 1st Avenue S Bridge. The connection to the head of the inlet at RM 2.2W is a freshwater overflow for the West Seattle Reservoir (located at Westcrest Park). |
| 18. | General - WRIA9 | -- | DRCC would like LDWG to consider King County's Water Resource Inventory Area 9 (WRIA 9) goals. This plan highlights the need to restore 100 acres of shallow water habitat in this stretch and to evaluate the benefits of reuse of dredge materials for habitat restoration. EPA recommends considering the WRIA 9 goals when designing the remedy in addition to required actions. | Comment noted. |
| 19. | General - Risk Register | -- | Confirm if a risk register was prepared to document the project risks and potential mitigation measures. If a risk register has been prepared and is being regularly updated, identify how the risk register is being used to inform the design and cost estimate. If no risk register has been prepared to this point, EPA strongly recommends one is prepared and maintained to support the project and shared with the EPA. | The City of Seattle has prepared a risk register for its internal use. Internal management tools are not included in EPA deliverables. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 20. | General - Cost Estimating | -- | Neither the BODR nor Appendix M indicate what class cost estimate is presented and the expected accuracy range based on the project definition and cost estimating methodology. Include the estimate class for the Opinion of Probable Cost (OPC) based on ASTM E2516-11[2019] Standard Classification for Cost Estimate Classification System or AACE International Recommended Practice No. 107R-19 – Cost Estimate Classification System - As Applied in Engineering, Procurement, and Construction for the Environmental Remediation Industries. Address this in future design submittals. | Per the Standard Classification for Cost Estimate Classification System (ASTM E2516-11, 2019), the Intermediate (60%) RD Opinion of Probable Cost is classified as a Class 2, based on the degree of LDW middle reach project definition at the Intermediate (60%) RD. This was added to Appendix N (formerly Appendix M). |
| 21. | General - Schedule | -- | EPA understands this is the preliminary design and that the schedules are not clear yet. By the 60% design, EPA expects to see more detailed timeframes, schedule constraints, sequencing, and commitments. EPA requires enforceable commitments to dates for key milestones in the final design. | A conceptual construction schedule will be prepared for Contract 1 at the Pre-Final (90%) RD phase.<br>A detailed project sequencing schedule (by construction season) will be developed by the contractor in its RAWP and will describe anticipated start/finish dates of all construction activities associated with each SMA. As with any construction contract, the contractor's schedule is maintained and updated throughout construction. |
| 22. | General - Schedule | | Describe in the BODR how the schedule will provide time for tribal review of remedial action work plans and construction quality assurance plans related to protecting water quality, sediment quality, endangered species and impacts to habitat that may require mitigation. EPA recommends that this description be readied for discussion with the tribal fisheries representatives and EPA in early 2026 to ensure agreement on what is reasonable and adequate. | Comment noted. LDWG will discuss review schedules with EPA prior to submitting the Pre-Final (90%) RD. |
| 23. | General - LTMMP Issues | | Please note that comments on the Middle Reach 30% design, or lack thereof, do not represent an approval of any kind for the Long-Term Monitoring and Maintenance Plan (LTMMP), or items in this design that reference the LTMMP. | Comment noted. |
| 24. | General - ESA compliance | | Add a table to the Middle Reach design which crosswalks Biological Assessment (BA)/Biological Opinion (BiOp) requirements to the design and references sections that demonstrate compliance with various requirements, and that is refined as the BA is developed/submitted and the BiOp is received. | A table of conservation measures by remedial activity will be included in the forthcoming BA that cross-references the sections of the BODR that describe each proposed conservation measure. LDWG will submit the BA to EPA in 2026, between Intermediate (60%) and Pre-Final (90%) RD, as discussed with EPA. The BiOp is prepared by the Services and likely will be obtained around completion of Final (100%) RD. If the BiOp includes new conservative measures, LDWG will incorporate new requirements into design requirements for the contractor, as applicable. |
| 25. | General - ICIAP | | Given the likely construction duration, discuss how institutional controls for capped areas will be implemented in time to ensure their protection in this active waterway. | The reader is referred to the draft Sitewide ICIAP regarding the process for establishing institutional controls in cap areas. The revisions to the ICIAP will be submitted to EPA per the Unilateral Administrative Order and pending Consent Decree. |
| 26. | Abbreviations | 11 | AST stands for both Aboveground Storage Tank (according to abbreviations list) and Area Specific Technology (according to text). Address this inconsistency. | The abbreviations list has been updated to correctly define AST as area-specific technology. AST does not refer to aboveground storage tank in this document. |
| 27. | 1.1 Orders Governing the Work | 14 | At the end of the first paragraph, include text to state that an Explanation of Significant Differences was issued in 2021. | Footnote added to this section. |
| 28. | 2.1.1 *Site Description* | 17 | "Although each reach is being designed separately, some design overlap at the boundaries between reaches is necessary to transition remedial actions between reaches." Add text regarding the inclusion in the Middle Reach RD of an area of the upper reach that was postponed. | Footnote added to this section to describe the concept of areas being deferred to future reaches. |
| 29. | 2.1.2 Remedy Summary | 18 | Revise footnote 6 for clarity and consistency with current project status. Revise the footnote text to read, "…and the *Explanation of Significant Differences (EPA 2021)* for carcinogenic polycyclic aromatic hydrocarbons (cPAHs). Notably, the ROD RALs for cPAHs is being adhered to, rather than the cPAH RALs from the Explanation of Significant Differences, based on community concerns." | The suggested text revisions do not accurately represent LDWG's approach; therefore, no changes were made.<br>RAL exceedance areas (and RAAs) were developed based on the RALs in the ESD for cPAHs. In addition, LDWG is voluntarily preparing a separate cleanup footprint design that considers additional cPAH-only RAL exceedance areas identified using the 2014 ROD RALs for cPAHs (pre-ESD). This design is summarized in Appendix E. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 30. | 2.2.1 Upland Source Control Sufficiency | 19 | In footnote 8, correct the website link. | The link in the footnote has been corrected. |
| 31. | 2.2.1 Upland Source Control Sufficiency | 19 | The timing and coordination described is appropriate. "Ecology is currently working on its source control sufficiency evaluation for the upland cleanup sites adjacent to the LDW middle reach and is tentatively planning to submit the evaluation to EPA in December 2025. The design team has requested a copy of Ecology's evaluation when it is submitted to EPA." Update this section as RD progresses. EPA note that the sufficiency evaluation report is not complete at this time, and EPA and Ecology are discussing scope and schedule. We anticipate that a meeting of EPA, Ecology, and LDWG will be scheduled for March 2026.<br>Source control sufficiency is not only focused on upland cleanup sites. Recommend rephrasing sentence as: "Ecology is currently working on its source control sufficiency evaluation for upland sources of Contaminant of Concern (COC) adjacent to the LDW middle reach…" | Comment noted.<br>Text has been edited to address this comment. |
| 32. | 2.2.1 Upland Source Control Sufficiency | 19 | Discuss how the City of Seattle's Source Control Plan for the Lower Duwamish Waterway (2026 – 2031) will be incorporated into the middle reach design. | The City of Seattle's source control program is not part of the middle reach design. Source control is part of Ecology-led programs. |
| 33. | 2.2.4 LDW Upper Reach Deferred Area and Table 17-1 Preliminary Phase III data gaps | 25 | "At the time of the Final (100%) RD for the LDW upper reach…" Practically speaking, upper reach SMA 10 was deferred earlier than 100% RD, as it was not advanced beyond preliminary design. Confirm timing or omit time marker.<br>Table 17-1 does not identify preliminary phase III data gaps for this upper reach SMA 10 area. EPA expects to see sampling to better define the depth and lateral extent of contamination, characterization of the potential for dredging to mobilize the contamination, the contaminant mass in soil, groundwater, sediment, porewater outside the proposed permeable reactive barrier (PRB), potential changes in mobility that may result from installation and operation of the proposed PRB, included effects of tidal pumping, and how design and construction will be integrated with wall installation and permanent removal of fill in the adjacent upland "Port sliver" within the Commercial Waterway District boundary. | The text has been updated to address comment on timing.<br>Appendix D of QAPP Addendum No. 3 (Anchor QEA and Barr 2026) describes the Phase III PDI for SMA 10, which includes additional vertical extent cores, sediment geochemistry data, and elutriate testing. The RD for SMA 10 will be advanced based on the results of the Phase III PDI and in coordination with upland investigation and design efforts led by Boeing. |
| 34. | 2.4.2 Federal Navigation Channel | 24 | "…the authorized FNC width varies between 150 and 200 feet, and the depth varies from -15 to -30 feet MLLW…" Insert "authorized" before "depth" for clarity. Specify the three depths and add station numbers to text indicating where the authorized navigation depths change. Note whether this affects the types of vessels | The wording of the text has been revised to include the word "authorized." The three authorized depths and associated station numbers were added into Section 2.4.2.<br>The authorized and maintained depth of a channel, as well as the tides and degree to which a vessel is laded, will limit the operational draft of a vessel traveling within the FNC. No text has been revised to state this fact. |
| 35. | 2.4.3 Infrastructure | 27 | In the last sentence of the page, revise the reference to Section 8 (instead of Section 9) for additional information about infrastructure. | The text has been updated accordingly. |
| 36. | 2.4.4 Waterway Usage | 28 | "Public Shoreline Access: Public shoreline access locations are considered in the RD in order to maintain public safety and reduce the impacts of construction on the public." Add "Existing" to public shoreline access. State where these locations are identified. Add and reference a section in next BODR submittal to discuss how they are considered. Consider whether there are potential future public access locations that should be considered, such as at road ends? EPA notes that Seattle's 2019 Shoreline Master Program, which has three required policy goals: preferred shoreline uses, environmental protection, and public access, was due for a 2025 update. | The text has been edited accordingly. Public access locations have been added to Figures 2-3a and 2-3b.<br>It is noted that that the Shoreline Master Program has been updated. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 37. | 2.4.4 Waterway Usage | 28 | In the fourth bullet of waterway uses, revise "waterway-dependent users" to "waterway users". In the RD Work Plan (RDWP), waterway-dependent users are specifically defined; waterway users include waterway-dependent users, recreational use businesses and associations, and owners of residential and waterfront properties without water-dependent facilities.<br>Editorial: Correct the typo at the end of the bullet to remove the extra semicolon. | The wording has been updated accordingly, and the typo was fixed. |
| 38. | 2.4.5 Upland Land Use | 28 | In this section briefly mention the role of fill and how the prior river course and fill over mudflats bears on the land use. | A sentence has been added to Section 2.4.5 to address the comment. |
| 39. | 2.4.9 Erosive Forces | 30 | Potential effects of erosive forces and influences on capping areas are discussed in Section 9.3.2.3 not Section 10.3. Revise the document to correct the reference. | The reference has been corrected. |
| 40. | 2.4.10 Presence of Debris | 30 | Map 3-1g of the Pre-Design Investigation Data Evaluation Report (DER) does not clearly show identified debris in the Middle Reach. Include a figure showing areas of identified debris with the Middle Reach design, if there is any other than the sunken and beached barges. | Generalized outlines of identified debris have been added to the existing conditions plans in the Drawings. |
| 41. | 2.4.10 Presence of Debris | 30 | Clarify if the sunken barge is intended to be removed from the remedial action area (RAA). The beached barge (whi2ch may include painted or treated wood) is not in an area slated for remedial action; however, removal of unnecessary structures like this might provide habitat improvement that should be considered when assessing the need for mitigation. | Removal of the sunken barge is discussed in Sections 5 (Table 5-2) and 9.1.2.4. No text edits have been made in Section 2.4.10.<br>The beached barge is currently used by the adjacent property owners. |
| 42. | 2.4.10 Presence of Debris | 31 | Revise "handle debris" to "remove debris" when discussing buried debris in dredge areas. Indicate whether there are some areas where more debris is like than others. | Terminology was altered in Section 2.4.10. Identified debris has been added to the Drawings. |
| 43. | 2.4.11 Existing Habitat Conditions and maps 2-5a and 2-5b | 31 | The sentence order needs adjusting. "The ROD defines "habitat areas" as all areas of the waterway with elevations above -10 feet MLLW and establishes requirements for remediation in such areas (EPA 2014)" should come before ROD-defined "habitat areas" are referenced (currently the reference is in the first sentence following the bullets listing habitat types).<br>Note on the 2-5 maps what bathymetric data set is used ("ROD-defined" suggests something from 2014 or before). | The text has been revised to address this comment.<br>The source for the bathymetric data has been added to the footnotes in Figures 2-5a and 2-5b. |
| 44. | 2.4.11 Existing Habitat Conditions | 31 | In the 60% design, include discussion of the extent of the historical floodplain and current connectivity of habitat areas under the existing habitat conditions.<br>"Overall, where present, the bank vegetation consists of a mix of native, landscaping, and non-native trees and shrubs." For 60% RD submittal, show the locations of mature trees (whether native or non-native) on maps; they are important to the community, Seattle's canopy goals, and habitat, and a specific replacement ratio may apply. | The text has been updated to reflect floodplain connectivity changes to historical conditions.<br>The locations of mature trees and species were identified during the Phase III PDI and will be reflected in the Pre-Final (90%) RD and BODR. These tree surveys cover only areas of potential upland disturbance, so the Intermediate (60%) RD BODR does not include locations or species of mature trees in all areas of the middle reach. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 45. | 2.4.11 Existing Habitat Conditions | 31/32 | Add "wood" to the list of bulkhead types in brackets [sheet pile, concrete].<br>Cross reference Map 2-5b in the text when introducing the bulleted list of existing habitat restoration projects. Revise the text to note which type of habitat projects each of these are (NRDA or CWA 404 mitigation projects), what party performed it, and whether they have credits for sale for the purposes of understanding whether any habitat debits for the Duwamish cleanup may be purchased here.<br>For example: "First Avenue Bridge Boat Ramp, RM 2.0E, which planted native vegetation at the top of bank under the First Avenue Bridge." Who did this planting, is it established, and is it to be maintained?<br>"Approximately 19 acres of the middle reach were identified in the ROD as potential clamming areas based on bathymetric elevations (i.e., shallower than -4 feet MLLW), substrate, and salinity conditions (EPA 2014). Potential clamming areas are a subset of the intertidal areas." Note that the ROD does not make this distinction regarding cleanup levels for intertidal clamming areas: the cleanup levels apply to intertidal areas sitewide. | The text has been revised to add wood to the list of bulkhead types. Figure 2-5b is now appropriately referenced. Additional information was added in the last paragraph of the section regarding the purpose of the known restoration projects. However, it should be noted that it is not possible for LDWG to obtain all project details (e.g., the WSDOT wetlands). Additionally, LDWG was not able to confirm "First Avenue Bridge Boat Ramp, RM 2.0E" as a restoration project and has corrected it to be listed as public access only. The Boeing Plant 2 Habitat Restoration NRDA project has no available credits for sale.<br>The ROD Table 19 (with RAO 2 cleanup levels) note c states clamming areas are identified in Figure 6 of the ROD (EPA 2014). This figure does not show all intertidal areas as potential clamming areas. Thus, no change to the text was made. |
| 46. | 2.5 Basemap Development | 33 | "The vertical datum for the basemap is in feet MLLW (based on the 1983 to 2001 tidal epoch)." Is a more current tidal epoch nearing a close and likely to provide a different estimated MLLW?<br>An update to the tidal epoch (2002-2020 is expected after 2027. When this is released confirm whether an updated MLLW will change the design. | It is the design team's understanding that the new tidal epoch will not be released until after completion of the middle reach Final (100%) RD. Future changes to MLLW with a new tidal epoch are expected to be on the order of 0.3 foot. The middle reach design will be completed and construction will be executed using the current datum. |
| 47. | 2.5.1 Bathymetric and Topographic Surveys | 33 | For larger areas with bathymetric and topographic data gaps, clarify if a Phase III topographic survey will be conducted to fill these gaps. | Phase III topographic survey will not be collected to fill these gaps. Sufficient data have been collected within and adjacent to RAAs to complete RD. |
| 48. | 2.5.3 Utilities | | "Finally, a review of available documents, such as as-builts from recent construction projects in or near the site, was also completed." Does this specifically refer to outfalls and utilities? Add text to specify if so. | Section 2.5.3 text has been updated. |
| 49. | 3.1 Hazardous Substance Cleanup and Sediment Quality | 35 | Revise the first three sentences to state: "Specific cleanup levels and RALs are identified in ROD Sections 8.2.1 and 13.2.1, respectively (EPA 2014). The RALs are being used to delineate areas where remedial action is necessary. Implementing remedial actions (e.g., dredging, capping, ENR) will not, by itself, address the ARARs associated with cleanup standards, including Sediment Management Standards. MTCA is Washington's environmental cleanup law (Revised Code of Washington [RCW] 70.105D, Washington Administrative Code [WAC] 173-340) and implements sediment standards under WAC 173-204." This aligns with the language and sentence structure used in the Upper Reach 90% design report. | Section 3.1 text has been updated. |
| 50. | 3.2 Surface Water Quality | 36 | In the fourth paragraph of Section 3.2, indicate in which document the WQMP is found. | The draft WQMP will be submitted with the Pre-Final (90%) RD per the RDWP and AOC5. |
| 51. | 3.3 Waste Management | 37 | "Any hazardous/dangerous waste removed from the middle reach will be managed at facilities operating in conformance with their operating permits; facility compliance will be confirmed with the appropriate EPA Off-Site Rule Contact prior to shipping any waste from the site." The Off-Site Rule applies to all CERCLA waste, not only hazardous/dangerous and TSCA waste. Revise text and move this reference out of the HW/DW discussion. | The discussion of the Off-Site Rule was removed from the paragraph discussing hazardous/dangerous waste and moved to a paragraph that discusses general removal of material from the site to clarify that all receiving facilities for material from the remedial action will be operating in compliance with the Off-Site Rule. |
| 52. | 3.3 Waste Management | 36 | The text states, "…is referred to as TSCA waste for the purposes of this BODR."<br>Revise text to more explicitly refer to it as TSCA Subtitle C waste. | LDWG disagrees with this comment. Although TSCA waste is often disposed of in a RCRA Subtitle C landfill, TSCA and RCRA are separate statutes. Combining the designations is not correct terminology. The requested revision has not been made. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 53. | 3.4 Dredge/ Fill and Other In-Water Construction Work | 37 | In the first sentence in the second paragraph of Section 3.4, add "CWA" in front of "Section 401"; ensure this is also done for all other uses of Section 401 and Section 404 in the text. | Section 3.4 text and other related text have been updated. |
| 54. | 3.4 Dredge/ Fill and Other In-Water Construction Work | 37 | "EPA will use this information to develop specific water quality monitoring requirements in EPA's Section 401 Water Quality Certification." Revise the second paragraph to clarify that EPA issues a CWA section 404 ARAR memorandum defining the requirements for CWA section 401 compliance. Revise the fifth sentence in this paragraph to indicate that EPA will issue a finding that substantive requirements of the CWA Section 404 ARAR Memorandum have been met. | Section 3.4 text has been updated. |
| 55. | 3.5 Fisheries, Wildlife, and Endangered Species | 39 | In the 60% design, provide a detailed description of the conservation calculator that will be used to determine whether compensatory mitigation will be needed to offset unavoidable project impacts to habitat. | Section 3.5 text has been updated to provide a detailed description of the conservation calculator and compensatory mitigation and the approach being used to evaluate the need for mitigation. |
| 56. | 3.5 Fisheries, Wildlife, and Endangered Species | 39 | EPA understands that the LDWG plans to consider the need for compensatory mitigation for the upper, middle, and lower reaches of the LDW as a whole. However, compensatory mitigation projects should be performed as close to the point of disturbance as possible and thus, habitat impacts within the middle reach of the LDW should be mitigated within the middle reach. In the 60% design, identify opportunities for compensatory mitigation projects within the middle reach, even if they may not be implemented until the lower reach design is complete. If habitat calculations for the middle reach design result in a negative score but compensatory mitigation is not performed until the remedial action phase of the lower reach, extended temporal impacts will increase the total amount of compensatory mitigation required. | Comment noted. Project impacts, including temporal impacts, and potential need for mitigation is being evaluated in the forthcoming draft BA that will be submitted after the Intermediate (60%) RD. The middle reach design has the goal of avoiding the need for mitigation as a result of the middle reach cleanup, as practicable.<br>If near the end of the LDW site-wide cleanup there is an overall need for mitigation, the engineers and biologists will assess the opportunities available at that time. |
| 57. | 3.5 Fisheries, Wildlife, and Endangered Species | 39 | The middle reach will take many more seasons than the Upper Reach. The cleanup will have permanent and temporary impacts to habitat. Temporary habitat impacts will occur over multiple seasons and should be quantified and mitigated within each season the impacts are occurring. | LDWG is evaluating the impacts across the entire middle reach and not on a smaller area-by-area basis. The temporary and permanent impacts will be evaluated across all seasons and all areas as part of the habitat evaluation in the forthcoming draft BA.<br>See also the response to Comment No. 56. |
| 58. | 3.5 Fisheries, Wildlife, and Endangered Species | 39 | In the 60% design, detail the steps that will be taken to protect migratory bird habitat and to avoid disturbances of their nests and eggs. | Section 3.5 text has been updated to clarify the need to visually monitor for nesting migratory birds during nesting season for upland construction activities. |
| 59. | 3.7 Shoreline Management | 41 | The text states, "It is expected that removing contaminated sediment material and capping it with clean materials and the removal of in-water debris will result in a net gain in ecological function."<br>This statement is speculative and may not account for temporal impacts. Delete until analyses have been done to confirm.<br>Note that the Shoreline Master Programs reflect policy goals of the SMA at 90.58.020 and are not limited to ecological function, and add a discussion of these elements:<br>a) The utilization of shorelines for economically productive uses particularly dependent on shoreline location or use<br>b) The utilization of shorelines and the waters they encompass for public access and recreation<br>c) Protection and restoration of the ecological functions of shoreline natural resources<br>d) Protection of the public right of navigation and corollary uses of waters of the state<br>g) Prevention and minimization of flood damage<br>h ) Recognizing and protecting private property rights | The analyses performed as part of the forthcoming BA confirm the conclusions presented in Section 3.7.<br>Section 3.7 text has been updated and additional text provided at the end of the section to discuss consistency with additional SMA use preferences per RCW 90.58.020. The list of elements requested in the comment are a portion of the general policy goals listed in WAC 173-26-176. The general policy goals were considered when developing the summary of consistency with the use preferences in RCW 90.58.020. |
| 60. | 3.8 Air Emissions and Noise | 41 | Revise the text to note that SMC Chapter 25.08 is not an ARAR from Table 26 in the ROD but that it will be complied with where possible. | Section 3.8 text has been updated to remove local code references. Instead, it states "The remedial action is being designed to be consistent with local air and noise ordinances." |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 61. | 3.9 Historic Resources | 42 | Revise the text to note that SMC Chapter 25.12 is not an ARAR from Table 26 in the ROD but that it will be complied with where possible. | Section 3.9 text has been updated. |
| 62. | 3.9 Historic Resources | 42 | This section needs review and revision to reflect the consultation requirements under NHPA Section 106 and the role of Tribes. EPA will define in advance areas of potential effect where the remedial work may disturb historical or cultural materials and will convey this in a consultation letter. The consultation letter will go to affected Tribes (Tribal Historic Preservation Officers, when available]. As written, the text and sequence suggest consultation with Tribes occurs only if cultural materials are unearthed.<br>Revise: "[Insert: During RD,] the [insert: potential] effect of the remedial activity on any district, site, building, structure, or object included or eligible for inclusion in the National Register of Historic Places [insert: or of archaeological/cultural significance] will be evaluated [insert: and described in correspondence with State and Tribal Historic Preservation Officers as part of EPA's Section 106 consultation process.] between EPA and the State Historic Preservation Office during RD."<br>Also state that EPA will also share the draft Archaeological Monitoring and Inadvertent Discovery Plan with the THPOs of affected Tribes.<br>Revise: "An archaeological monitoring and inadvertent discovery plan will be prepared [insert: and shared with SHPO and THPO] during Pre-Final (90%) RD. [Insert: The MIDP will] to be implemented by LDWG or the contractor during construction." State which party implements the MIDP (text deleted only pending this clarity). | Section 3.9 text has been updated. |
| 63. | 3.9 Historic Resources | 42 | Include information and dates for when consultation/coordination is expected to be completed. Provide the names of agencies and Tribes along with this information.<br>Revise final paragraph, which starts with "If … materials are unearthed as part of the remedial actions…" – change "are" to "may be" (the Area of Potential Effect identifies where this may occur). | It is LDWG'S understanding that EPA is responsible for conducting the Section 106 consultation. The text in Section 3.9 has been updated. |
| 64. | 4.1 Horizontal Extents of Contamination | 44 | The figure 4-2 series only presents the subsurface sample locations and RAL exceedances. Figure 4-1 shows that there are two surface samples within this RAA that should have an exceedance factor greater than 1. Revise the figures to include all sample locations driving RAA/SMA delineation, or discuss in the text the reason for omitting these samples from Figures 4-2a and b. | Surface sediment locations were inadvertently not displayed on this figure because of a mapping symbology issue. This has been corrected. |
| 65. | 4.1 Horizontal Extents of Contamination | 44 | Although EPA has agreed to using the 50% probability band as the RAL in the Middle Reach as was done in the Upper Reach, EPA requests a leave-one-out cross-validation analysis on the indicator kriging to confirm the reasonableness of this choice. This was also done on the Upper Reach.<br>In addition, EPA requests that the QAPP addendum for Phase III include proposed sample locations outside of 50% RAA boundaries where there are broader areas of RAL exceedance probability above 30% to 40% (in other words, in areas near RAA boundaries with higher uncertainty). For example, Phase II indicator kriging showed a substantial area of >40% probability in surface sediment between 1405 and 1408. Another candidate location is subsurface sediment between LDW24-SC1558 and 1221. | See response to Comment No. 5 on the middle reach QAPP Addendum No. 3 (Anchor QEA and Barr 2026). As discussed with EPA during the finalization of the QAPP Addendum No. 3 (and documented in the comment response for that document), additional samples were added to the QAPP Addendum No. 3 to help confirm the results of the PCB interpolation (which provide an empirical validation of the interpolation).<br>EPA stated "EPA accepts that the additional sampling LDWG agreed to complete in response to our comments on the draft final QAPP for Phase III will reduce uncertainty, reducing the concern for LOOCV in the middle reach. However, we believe it is important to validate the results of the indicator kriging for the sampling methods being used in middle and lower reach, compared to the approach used in the upper reach" (EPA 2026).<br>EPA and LDWG agreed that QAPP Addendum No. 3 could be finalized while this issue is being resolved. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 66. | 4.2 Vertical Extent of Contamination | 46 | The text states, "For example, an area where partial dredging and capping will be applied may not need additional information regarding depth of contamination."<br>Per the ROD, "If 1 ft or less of contamination would remain at concentrations greater than the human health RALs or the benthic 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." The text in the BODR needs to reflect this nuance of the ROD and specify that in areas of partial dredging and capping, greater than 1ft of contamination remains. Otherwise, additional characterization and dredging (depending on the results) may be required. | Section 4.2 text has been updated. |
| 67. | 5.1.2 Site Physical Conditions | 48 | Clarify what type of utility is associated with the identified crossings in RAAs 9K and 30C. Given the uncertainty in the horizontal alignment of the utility corridor, specify what horizontal buffer was used to define the boundary of the ASTs in these two RAAs to avoid striking the utility. Clarify if there are additional plans to locate the utility with more certainty during future phases of design or construction. | Additional information on the utility crossings has been added to Section 2.5.3, including new findings that have been discovered as part of the Intermediate (60%) RD effort. Reference to that section is included in Section 5.1.2, along with updated text that includes more information about impact to RAAs. |
| 68. | 5.1.2 Site Physical Conditions | 48 | The text states, "The elevation of the utility crossing at 8th Avenue South crossing is unknown…".<br>Explicitly call this out as a data gap and if there are plans to do additional investigation to verify the utility depths. | Text has been added to note this as a data gap. The design team continues to try to determine more about these crossings via communications with utility companies (AT&T, Lumen, and Comcast) and field locate techniques. |
| 69. | Section 5.1.3 Adjacent Early Action Areas, Upland Site Cleanup, and Habitat Restoration Area Conditions | 49 | In preparation of 60% RD, discuss whether and where RAL exceedances extend to the shoreline or overlap with habitat restoration areas, including intertidal and subtidal areas subject to conservation easements. If there is not sufficient horizontal delineation, include additional data collection to delineate the remedial work in/adjacent to such areas. | There are no known conservation easements adjacent to middle reach RAAs. Section 5.1.3 has been revised to provide information about the one area (RAA 8A) that is adjacent to the ta ł ałucid Park restoration area. |
| 70. | 5.1.3 Adjacent Early Action Areas, Upland Site | 49 | The text lists three adjacent upland cleanup areas, but the last sentence in bullet two states four sites. Confirm or revise for consistency and accuracy. | Inconsistency updated. |
| 71. | 5.1.3 Adjacent Early Action Areas, Upland Site Cleanup, and Habitat Restoration Conditions | 49 | Create a single figure that shows RAAs including side slopes, adjacent EAAs, upland cleanup sites, and habitat restoration areas. | Figures 5-1a through 5-1e have been revised to include these areas. |
| 72. | 5.1.4 Review of Other Available Engineering Information that Informs the Physical Conceptual Site Model | 50 | Clarify how information listed in Section 5.1.4 was used in considering RAA boundaries and which specific RAA boundaries were adjusted with this information. | An example was provided to the end of Section 5.1.4. |
| 73. | 5.2 Review of Adjacent Chemistry Results | 50 | Provide a figure showing the locations noted in footnote 20 with respect to the RAAs and technology assignments presented in Section 5. | Note that footnote 20 was deleted and the explanation was included within the main text. The revised text describes the technology assignments adjacent to each sample location. The Figure D1-1 map series, which includes RAA boundaries, shows samples with exceedance factors between 0.9 and 1. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 74. | 5.2 Review of Adjacent Chemistry Results | 50 | It is not clear when reviewing the DER Figure 3-1 series, the DER Appendix J Figures, or the Figure 5-1 series of the 30% design that locations cited in footnote 20 will be sufficiently addressed by RMC placement areas. These and other locations suggest significant uncertainty in areas outside of RAAs, especially when the CSM, recovery categories, likelihood of future disturbance (e.g. by maintenance dredging or vessel scour), surface data, and core data suggest that these areas may be very similar to areas within RAAs. EPA encourages additional sampling to validate that areas represented by RAL EFs 0.9 to 1 are in fact different or expanded dredging and/or RMC footprints.<br>Examples of inconsistencies are as follows:<br>The text states that SS1332 and SS1055 will be addressed by an RMC cover associated with either the cap and dredge proposed in the navigation channel (RAA 30F), or the ENR proposed along the intertidal area (RAA 32). The current preliminary design on Figure 5-1a shows the side slopes of RAA 30F within the navigation channel dredge and cap area extending across the navigation channel toward the adjacent bank. The terminus of each side slope cut appears to be approximately 60 to 65 feet off the adjacent bank in the vicinity of SS1332 and SS1055. However, SS1332 and SS1055 are situated between approximately 20 to 25 feet from the adjacent bank, thus the side slopes do not extend to these locations. Further, it is not clear when reviewing Figure 5-2a that the ENR area associated with RAA 32 extends to SS1332 or SS1055.<br>Considering these measurements, the side slope cuts, and ENR extent, it is not clear how an RMC in this area would address the surface RAL exceedances at locations SS1332 and SS1055.<br>Additionally, the exceedance at SS1144 is situated within the navigation channel directly between RAA 22 and 23, both of which are subject to cap and dredge with side sloping planned from RAA 22 and extending towards the center of the navigation channel. However, SS1144 appears to be outside both cap and dredge zones, and the side slopes associated with RAA 22 do not appear to extend to SS1144. It is not clear how an RMC in this area would address the surface RAL exceedance at SS1144.<br>Revise the text to expand on this discussion and include details to support the statement that an RMC will address the locations cited in footnote 20, as part of the design. | Additional sampling requirements are addressed in QAPP Addendum No. 3.<br>The perimeter RMC is depicted in the material placement sheets included in the Drawings provided in Volume III. Responses for the specific areas are as follows:<br>• The RAA 30F dredge plan was re-evaluated during Intermediate (60%) RD and has been revised (refer to Bullet 4 in Section 5.1.2). Samples SS1055 and SS1332 are greater than 100 feet from the nearest RAA (RAA 30F) and therefore will not be addressed by perimeter RMC. The ROD does not require application of active remedial technologies in areas where RALs are not exceeded. The BODR text has been updated accordingly.<br>• SS1144 does not exceed the PCB surface RAL. It is approximately 20 feet from the top of the RAA 22 dredge slope and would be covered by required RMC and potentially by contingent RMC depending on post-dredging sampling. |
| 75. | 5.3 Constructability | 50 | Provide a list of RAAs that were reduced in footprint due to equipment access limitations. Create a figure that shows where RAAs were modified due to constructability. | Section 5.3 text was revised to clarify that no areas have been reduced due to constructability related to equipment access.<br>As noted in the text, review of constructability is a holistic consideration that has overlaps with engineering considerations. Expansion of RAA footprints occurs for several parallel reasons. Because of this, a figure specific to constructability considerations is not feasible to produce; however, Figures 5-1a through 5-1e provide insight into the adjustments. For example, RAL exceedance area 1 was expanded and divided into RAAs 1A and 1B based on constructability considerations and information generated as part of the LDW upper reach and Boeing early action projects. Another example is the structural offsets required to protect the 1st Avenue S Bridge. |
| 76. | 5.4 Consideration of Interpolation Uncertainties in RAA Boundaries | 51 | Revise the text to explain the effect of changes in RC1 or shoaled areas to RC2 areas. Specifically mention the non-shoaled areas between RAA 22 (shoaled) and RAA 23 (RC1), as well as the southern boundary of RAA 30 (RC1) and surrounding unshoaled RC2 areas. Changes in RALs at RC1 and shoaling area boundaries affect the interpolation dramatically. Discuss available data for 60 cm interval in RC2 areas and the basis for expecting that these areas will not be disturbed or, if disturbed through Corps or private maintenance dredging, that contaminated material will be managed and that surface conditions post-dredging conditions will comply with SCOs. | A supplemental analysis was performed to determine if the effect of designating a certain area as RC1 versus RC2 or RC3 would have a significant impact on the extent of the interpolated RAL exceedance areas. Specifically, the concentrations of each 0- to 60-cm PCB result from samples collected within RC2 or RC3 areas were evaluated against the RC 1 PCB RAL. Of the ninety-one 0- to 60-cm samples collected in RC2/3 areas, seventy were at or below the RC1 RAL, and nine were less than 2 times the RC1 RAL (i.e., less than 24 mg/kg-OC). The remaining 12 samples were either co-located with a clean surface sample and confirmed to be in an area consistent with RC2/RC3 expectations for recovery or were located within the footprint of an RAA where active remediation would occur. LDWG disagrees that a new paragraph in Section 5.4 is needed. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 77. | 5.5 Remedial Technology Assignments, Table 5-1 and Figures 5-2a, b. | 52 | A. RAA1: South of 1a is the upper reach cleanup area 18. Confirm that the two areas are contiguous by showing it on Figure 5-2b (If not, given a RAL EF 0.93 at SC502, recommend extending 1a to 18.<br>B. Area 1a and 1b are adjacent, but vertical contaminant distributions are different. Recommend an additional V core at current boundary between them, to refine the extent of PD&C.<br>C. The RC1 FNC area west of RAAs 1a and 1b is not well characterized. Given depth of contamination at vertical core 1582, these RAAs should extend to the western boundary of the navigation channel or Phase III data obtained (potentially including analysis of V core 1580 and 1584. Though not currently shoaled, sediments in the -15 to -17 interval could be dredged by USACE if shoaled in the future, exposing the deeper (uncharacterized) intervals. For both, z-layer intervals should be analyzed.<br>D. RAA2: The delineation of RAA 2 should consider the presence of the 60 cm PCB RAL of EF 0.92 to the south. This area is RC1.<br>E. RAA 3 and Slip 4 generally: The data in most of the outer part of Slip 4 are below Recovery Category 2 RALs. RAA 3 and RAA 5 are within a berthing area, and Map DER I-3 shows an apparent vessel "track," but this area was not proposed for inclusion as a RC1 area. Consider the suitability of RC2. Discuss the berth operating depth and how this area will be managed in the event of future berth maintenance dredging?<br>F. RAA3 and a number of other areas under or adjacent to a structure are slated for amended cover. Note that material placed in such areas will require monitoring as a cap. Also consider Phase III field investigation that involves getting under the structure to assess whether seeps are present and whether the area has visible debris piles.<br>G. RAA 9L, 9M: change "requires protection" to "may require protection." The topic will require further discussion. The footprint for 9E should extend to shoreline: while the 0-10 cm sample SS1546 is at EF 0.98, the V core here (1546) is over 3X the surface RAL in multiple intervals (B, C, E, F), and nearby V cores (1545 and 1547) were not analyzed. EPA is not confident that this area will not be disturbed by future users.<br>H. RAA 10: the basis for the shape of this interpolation area isn't clear. If it is sampled and goes away, that won't matter. Similarly, the space north of RAA9F requires further characterization.<br>I. RAA 11 (and RAA 14) have exceedance at the western FNC boundary. An additional 10' offset should be dredged to the same depths.<br>J. RAA12: The V core here (1508) hit refusal at 60 cm and the shoreward edge is based on RC2 boundary. With total PCBS at 248 ug/kg in the 60 cm interval, how will depth be bounded?<br>K. RAA 20A: Confirm whether Myrtle Bay includes a berthing area and if so whether this is compatible with a cap. An amended cover (AST) may make sense on the rip rap slope, but any cover must remain in place. AST doesn't modify the slope and thus doesn't require bank vegetation improvements for engineering reasons, but this area may present opportunities for habitat improvement: part of the Myrtle Bay is on SDOT property (please confirm: SIM parcel may include an anomalous triangular area), and the slope could potentially be laid back, without affecting road access and use, and planted. EPA understands this area is being evaluated for stormwater improvements. Green infrastructure here could enhance in-water work. Consider also whether RAA 20B and 20C could be modified to create a protected area to provide better off-channel habitat as was done at the north end of Boeing Plant 2. The portion of RAA 20 outside the inlet is on similar riprap and partially under a dock, so will require Phase III data.<br>*Note: List formatting added to this comment to match the LDWG response.* | A. The areas are contiguous. SMA 18 has been added to Figures 5-1e and 5-2b.<br>B. Additional vertical (1727) information will be collected during the Phase III PDI.<br>C. Additional subsurface RAL (1726 and 1728) information will be collected during the Phase III PDI.<br>D. Additional subsurface RAL (1725) and vertical (1724) information will be collected during the Phase III PDI.<br>E. As documented in Appendix I of the DER (Anchor QEA and Windward 2025), the vessel track shown on DER Map I-3 was considered in the re-evaluation of recovery categories and was not considered to be of significant depth to warrant a change. The last permitted dredging event included dredging to elevation -15 feet MLLW (refer to BODR Appendix A). Future maintenance dredging at RAA 3 is the responsibility of the property owner.<br>F. The selected technology at RAA 3 is ENR without amendment, not amended ENR. Regardless, per the draft site-wide LTMMP, ENR and amended ENR will not be monitored as a cap. Previous PDI activities included visual inspections to identify potential seeps or debris; none were noted during the Phase I or Phase II shoreline inspections.<br>G. The Georgetown Pump Station and adjacent wingwall structures were listed on the National Register of Historic places in 1979 and were later upgraded to National Historic Landmark status. This landmark status generally requires avoidance of impact (protection). Expansion and deepening of RAA 9E east to address buried contamination at vertical core 1546 would likely require a significant offset from the former intake structure. The RAA 9E dredge and backfill footprint has been extended to terminate approximately 30 feet from the edge of the structure. LDWG would like to understand EPA's schedule for the consultation process associated with this structure so that requirements regarding protection can be known prior to preparing the Pre-Final (90%) RD for the surrounding RAAs.<br>H. Additional vertical (1701) information will be collected at RAA 10, and additional surface and subsurface RAL (1705) information will be collected north of RAA 9F during the Phase III PDI.<br>I. RAA 11 and 14 fully encompasses the RAL exceedance areas. The contamination at 1509 will remain buried with an additional 2 feet of RMC. Tier 2b and 2c data show that the vertical core 1515 surface is clean and the post-maintenance-dredging surface is clean.<br>J. Additional vertical (1699) information will be collected during the Phase III PDI.<br>K. Myrtle Bay is used as occasional moorage for empty barges. A design for any cap within RAA 20A will consider information obtained from the local tug operators regarding how barges are maneuvered in this area and the range of expected vessel impacts. There is no room to lay back the slopes within Myrtle Bay without impacting private property or active public streets. Additional data are being collected during the Phase III PDI. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 78. | 5.5 Remedial Technology Assignments | 52 | During the Middle Reach data gaps meeting on November 17, 2025, RAA 14 was identified as a potential candidate for dredge only with RMC placement. Include RAA 14 in Table 5-1 if it has potential to change technology assignment. | Based on Tier 2b/c data, this area has been broken into RAAs 14A and 14B. RAA 14A is PD&C, and RAA 14B is dredge. These areas are likely to be updated further following receipt of Phase III PDI data. Table 5-1 was updated accordingly. |
| 79. | 5.5 Remedial Technology Assignments | 53 | Clarify how upland remedies in RAAs 24E through 24G may change the selected remedy. Specifically, identify if there is currently any information regarding the upland remedy that LDWG believes will make dredging infeasible. | The final upland remedies are not expected to make dredging/excavation infeasible within the Inlet at RM 2.2W; however, the details of the upland remedy are necessary to finalize the design in these RAAs and determine if a portion of the shorelines may require a cap. |
| 80. | 5.5 Remedial Technology Assignments | 53 | Clarify if the remedy in RAA 29 would be changed to ENR if BBP were to be removed as a COC for the RAL exceedance area based on bioassay testing results. | This is correct and will be clarified in the Phase III data report and Pre-Final (90%) RD BODR. If the Phase III sample collected in RAA 29 passes for toxicity testing, the technology in this area would change to ENR (i.e., toxicity testing would override the BBP RAL exceedance but not the PCB RAL exceedance). Text added to Table 5-1 to clarify. |
| 81. | Figure 5-2A and Section 5.3 | Figure pdf page 22 and BODR page 50 | For portions of RAA 34A where dredging was not feasible due to equipment access, describe if (and which) other AST technologies were considered. | As addressed in Section 5.3, no RAAs were reduced based on equipment access limitations alone. The RAA 34A boundary is primarily driven by structural limitations and associated dredge offset. This area will be reviewed in more detail following receipt of Phase III PDI data (chemistry and geotechnical data). |
| 82. | Table 5-1 | 53 | For RAAs within which an AST is partially applied, list the primary technology as well. For example, RAA 3 lists that ENR will be placed in a portion of the area but does not list the primary technology assignment for the rest of the RAA. | Text updated for RAA 3. All other ASTs apply to the entire subarea. |
| 83. | 7.2 Subsurface Stratigraphy | 60 | When describing gradation, clarify whether the reported percentages of sand, gravel, silt, and clay are average values determined from sieve and hydrometer analyses. | Clarification added. |
| 84. | 7.2 Subsurface Stratigraphy | 60 | Report the range and average SPT N-values in addition to the friction angle when presenting the SPT test results. | Range and average corrected SPT N-values have been added to the text. |
| 85. | 7.2 Subsurface Stratigraphy | 60 | Provide the general USCS classification(s) for each stratum. | USCS classifications have been added to the text. |
| 86. | 7.2.1 Fill | 60 | Where the text indicates that the unit weight of fill materials is assumed to vary provide an estimated range of soil unit weights based on the available SPT and CPT sounding data. | Additional text has been added to address this comment. |
| 87. | 7.2.1 Fill | 60 | Clarify whether the stated unit weight (125 pounds per cubic foot) is assumed or based on laboratory test results. If it is based on laboratory data, specify how the direct shear test results were used to determine the unit weight. | The text states “assumed” based on review of laboratory test results. Additional discussion has been added comparing the assumption to correlated SPT results. |
| 88. | 7.2.2 Recent Sediments | 61 | Where the text describes that the thickness of the recent sediments unit varies widely across the site provide the range of observed thicknesses. | Range of observed thickness has been added to the text. |
| 89. | 7.2.2 Recent Sediments | 61 | Where the text describes the plasticity of the recent sediments provide a range for the PI and LL of this material. | This information has been added to the text. |
| 90. | 7.2.3 Alluvium | 61 | Where the text describes that the alluvium unit was the deepest layer encountered during the geotechnical PDI report the range of thickness for the alluvium and specify whether bedrock or another stratum is expected beneath this stratum. | Because the bottom of the layer was not reached, discussion of the thickness of alluvium would be speculative. A more general statement has been added about the underlying units based on the geologic discussion provided in the feasibility study. |
| 91. | 7.3.1.1 Dredge Prism Slope Stability | 62 | Specify the target factor of safety for the pseudo-static slope stability analyses and identify the seismic coefficient used in the analyses. | Target seismic factors of safety have been added to BODR Section 7.3.2.1, as well as Appendix F. Seismic coefficients are already presented in Section 7.3.2.1 as well as Appendix F. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 92. | 7.3.1.1 Dredge Prism Slope Stability | 62 | The text states, "…preliminary assessments suggest that using armor rock can achieve acceptable safety factors…".<br>Provide a cross reference in the text to this supporting analysis. | Reference to Appendix F has been added. Additional text has been added to Appendix F to address this specific comment. |
| 93. | 7.3.5 Geotechnical Recommendations for Piling | 67 | Reference the Puget Sound BMPs for pile removal in the first paragraph. | Text has been added to this section. |
| 94. | 7.3.6.2 Backfill Slope Stability | 67 | Specify in this section that backfill in habitat areas will be placed to return the area to the original grade. | Text has been added to this section. |
| 95. | 8.1 Structure Types | 70 | None of the figures provided show the location of the structures relative to the RAAs. Include a figure (or figures) similar to Figure 2-2 and/or Figures 2-3a and 2-3b. | Figures 5-2a and 5-2b were modified to include outfalls and structures. |
| 96. | 8.1.1<br>Overwater/ In-Water structures | 70 | The second paragraph states: "… the majority of existing structures evaluated within the LDW middle reach lack as-built record drawings, and the design and current load capacities are unknown." It is possible to estimate load-carrying capacities of structures without as-built drawings, but detailed physical measurements, material testing, and non-destructive testing would be required. If doing such additional investigation is planned or is beyond the scope and needs of the design, this should be stated. | At this time, the design team has not identified the need for additional testing to confirm load capacities of existing structures. |
| 97. | 8.2.4 Overhead Structure Vertical Clearance | 76 | "Overhead vertical clearance in the closed position (open to traffic) is posted at 48 feet MLLW." Note in text what construction related vessels (barges, tugs, cranes) are/are not likely to require the 1st Ave Bridge to be in open position. Based on upper reach experience, bridge windows for commuting affect construction scheduling and if the bridge must in open position for the construction, this will affect many parties (including bus service) and requires thoughtful implementation. | Comment noted. Coordination with WSDOT, SDOT, and other relevant agencies will occur during Pre-Final (90%) RD to inform the contractor specifications and establish initial coordination requirements. Edits were also made to Section 8.2.4. |
| 98. | Table 8-1 | 71 | The notes below Table 8-1 do not include Note 1 and begins with Note 2.<br>Clarify if Note 2 should be Note 1 or otherwise correct this discrepancy. | The error has been corrected. It now reads "Note 1." |
| 99. | Table 8-1 and 8-2 | 71 | In the PDI Report dated July 2025, structures were given WUS numbers based on a 2018 Waterway User Survey. Clarify why WUS numbers were not included in the design. | Consistent with upper reach, the design team chose to use a reach-specific numbering scheme. |
| 100. | Table 8-2 | 73 | Document the known flow rates for the outfalls listed in Table 8-2. | Flow rates are not known for all the outfalls. If they require replacement, they will be replaced using the same diameter pipe as currently installed. |
| 101. | Section 8.2.5 | 76 | Include text stating that erosion protection (beyond existing areas with bed erosion protection) must not affect habitat areas and that if impacts cannot be avoided, mitigation is required. Proposed habitat mitigation, if necessary, must be included in subsequent design submittals. | No outfalls requiring expansion or enhancement of armoring were identified during the Intermediate (60%) RD. |
| 102. | 8.2.6 Temporary Relocation or Demolition and Replacement | 76 | For structures that will be permanently removed, document whether the recommendation has been reviewed by the Owner of the structure.<br>EPA recently forwarded a permit application for dolphin replacement south of Seatac Marine, near or in Area 23A. Consider discussing with permit applicant whether work in this area be coordinated with cleanup.<br>In subsequent designs, support the assumption in this statement with field observations: "inactive/abandoned outfalls are assumed to have already been removed or are not expected to impede remediation activities." Identify any data needs associated with validating the assumption. | No structure will be permanently removed without permission of the owner.<br>Alaska Marine Lines maintains the dolphins located within the norther portion of RAA 23A, which is across the waterway from their Yard No. 2 operations. We have been coordinating with them on their construction plans. This outreach is documented in Appendix A.<br>There are no current data gaps related to the verification of inactive outfalls. Prior to construction activities, the contractor would be required to perform a utility locate to reverify the assumption. This requirement would be included in the specifications, which will be included with the Pre-Final (90%) RD. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 103. | 8.3 Summary of Structural Actions | 78 | Clarify how "future use of the structure" was considered in the recommended structural actions (i.e., whether the Owners of the existing structures were surveyed). | For locations where RAAs are adjacent to structures, the design team discussed the remedial approach with the applicable property owner. This outreach is documented in Appendix A. |
| 104. | Table 8-5 | 79 | Clarify what is meant by "material placement under structure" when several of these structures are pile-supported. Material cannot be placed below piles (but can be placed under decking).<br>For RAAs where the planned action is "material placement under structure", clarify this description with either 'amended' or 'unamended' material. | Table 8-5 has been revised to clarify the specific placement technology being applied. |
| 105. | Table 8-5 | 79 | Clarify what is meant by "Guide pile demolition and replacement" as well as "Material placement" for ST01 (second from last row of table). | All material placement types stated in Table 8-5 have been revised to clarify if ENR or amended ENR.<br>The "guide piles" referenced for structures ST15 and ST02 are the piles that secure the floating docks at Boyer and Duwamish Marine Center, respectively. During construction the floats will be detached, and the piles may require removal and reinstallation during construction. |
| 106. | 8.4.4 Structural Loads and Combinations | 84 | The design height for the coffer dam is noted as 12ft. Will this 12ft be sufficient to ensure no overtopping during high tide/storm periods? If overtopping is not a concern, state why and how water will be managed. | The final height of the cofferdam will be determined during Pre-Final (90%) RD. |
| 107. | 8.5 Pile Replacement | 84 | The depth of the piles is likely unknown, and though full pile removal is preferred and will be attempted, it may not be possible. Address this uncertainty in the design discussion. | The specific requirements for addressing piles that cannot be completely removed will be included in the Specifications, which will be included with the Pre-Final (90%) RD. |
| 108. | 9.1.2 Equipment Selection | 89 | Lessons learned from Upper Reach construction should be considered when developing performance specification s for Middle Reach construction. For example, establishing a minimum acceptable percentage of residual sediments that may be left above the established dredge cut to facilitate required real-time (i.e. screen share) EPA approvals following post-dredge surveys. | Lessons learned from upper reach will be incorporated into the Specifications and the CQAP, which will be prepared as part of Pre-Final (90%) RD. No revisions have been made to the BODR. |
| 109. | 9.1.2 Equipment Selection | 89 | Specifications should be written to consider green remediation goals when the RA contractor makes equipment selections. Include this expectation in the design narrative. | Specifications with green remediation requirements (targeted to meet sustainability goals) will be included in the Specifications that will be provided as part of the Pre-Final (90%) RD. In general, green remediation requirements will be established through performance-based specifications, similar to LDW upper reach.<br>As stated in Section 9.1.2, "remediation equipment selection will be done by the contractor to meet performance specifications that dictate the required environmental and green remediation outcomes." |
| 110. | 9.1.2.2 Mechanical Dredging Equipment and Bucket Selection | 91 | If known, included expected dredge material loss percentages for each type of bucket | Ranges for the specific equipment that may be used on the project are not known. A citation for documented ranges from literature has been added to the text after Exhibit 9-1. |
| 111. | 9.1.2.2 Mechanical Dredging Equipment and Bucket Selection | 91 | Environmental bucket specifications for Upper Reach construction were limited. This led to use of some buckets which generated avoidable turbidity. Refine the specifications for the Middle Reach to further define requirements for environmental buckets)e.g., snorkels must be included and equipped with functional with flap gates). Consider the use of a level-cut bucket for the Middle Reach design. | The Specifications in the Pre-Final (90%) RD will include dredge bucket requirements. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 112. | 9.1.3 Dredging Production Rates | 96 | The presented Middle Reach design assumes a derrick crane-mounted bucket while Upper Reach construction has used an articulated (fixed arm) bucket. While equipment selection will be determined by the RA contractor, the estimated production rates should be developed conservatively to present realistic schedules. Also, it is known that fixed arm buckets can be positioned far more accurately than crane mounted buckets. Data from Upper Reach construction should be incorporated into estimates of mechanical dredging rates for the Middle Reach (with modifications where appropriate). As an example, production rates observed for a single dredge during Upper Reach construction have been lower relative to what is currently presented as an assumption for the Middle Reach. | The dredging production rate calculation presented in Section 9.1.3 is a general example for one middle reach site condition (in open-water areas). It is anticipated that production rates will be variable depending site-specific conditions (five types of dredging/placement production rates have been assumed for RAAs or subareas of RAAs in Appendix N; see Tables N4-1 and N4-2).<br>Dredging/placement production rates will vary based on the contractor's selected equipment and personnel experience, water depth, sediment physical characteristics, site constraints (such as tidally restricted access, nearby vessel traffic, presence of structures, and steep slopes), and weather conditions. Specific equipment will be determined by the selected contractor in its RAWP.<br>Review of the Season 2 upper reach dredge production rates indicates an increase from Season 1, but actual rates achieved by the contractor were generally lower than those predicted in the contractor's RAWP. |
| 113. | 9.1.3 Dredging Production Rates | 97 | The text needs to explicitly state that additional options will be explored to reduce the currently estimated number of construction seasons. Consider options such as multiple concurrent dredges, directed sequencing, breaking the work into multiple contracts or including options, and more. | Comment noted. Text in Section 12 revised to note that additional options are being explored to reduce the estimated number of seasons. |
| 114. | 9.1.4 Post Dredge Elevation and Chemical Verification | 97 | EPA disagrees that areas where dredge thickness cuts are proposed are sufficiently consistent in their depth of contamination that they do not need missed inventory samples. While they may be more consistent than other areas, they nevertheless are part of a dynamic sediment site with heterogenous contamination. Revise the design to include missed inventory samples (with an appropriate frequency, including in comparison to other areas) for thickness cut areas. This should also be included when developing the CQAP. | Comment noted. The sampling design will be included with the draft CQAP included with the Pre-Final (90%) RD. |
| 115. | 9.2.1 Transload Facilities | 100 | The text states that sediments excavated by on land equipment will be loaded directly into trucks. This could have significant negative impacts on production rates, if direct truck loading is a production bottleneck. Upland staging and dewatering areas should be considered for RAAs with significant upland excavation (e.g., RAA 24, recognizing that this work may not be as seasonally limited). Discuss dewatering of TSCA material, whether dredged and taken by to a transloading facility or excavated from land-based equipment. | Direct truck loading is expected to be limited to RAAs 24B through 24D, which will be dewatered as the excavation progresses behind the cofferdam. Other areas (e.g., RAA 21A or portions of RAA 31C) could potentially be excavated from the land; however, this would not be a requirement to the contractor in the Specifications, it would be an option so that the contractor can optimize its work. In the case of a large area that includes TSCA material (e.g., RAA 31C), the contractor may elect to establish a location-specific treatment system that can support dewatering of this material prior to containerization and transport.<br>Per Section 9.2.1.1, all TSCA material will be containerized prior to transport by truck or barge to a transfer facility. |
| 116. | 9.2.1.2 Contractor Provided Transload Facility | 87 | EPA strongly supports LDWG identification of additional transloading facilities or inclusion in the contract incentives for development of a transload facility specifically for this project." The projected construction duration is too long mostly due to limited transloading capacity. | Comment noted. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 117. | BODR, Section 9.2.1.3 | 88 | "This project-specific transload facility may need to obtain permits if EPA determines that the work is not on-site and subject to substantive compliance with ARARs."<br>Please identify a candidate facility or facilities in close proximity to the Site in the 60% design submittal, or sooner if possible, so EPA can make a general determination. At a minimum, include in the 60% design a general design with required criteria (ARARs and operational needs, such as surface area, vessel access, equipment needs, stormwater controls, process water containment and management, access to rail lines and disposal facilities, other siting criteria, e.g.). We recommend this information be developed, discussed with EPA and others in project meetings, and included in the 60% design submittal. In addition, clarify in the text that the site boundary is the MHHW line. | As discussed during the March 26, 2026, meeting with EPA, a project-specific transload facility has not been identified at this point in time. LDWG continues to look into alternative options for transload facilities. |
| 118. | Waste Characterization 9.2.1.3 | 102 | Include requirements for barge to land transfer location and any permit requirements for storage and transfer of material containing greater than 50 parts per million total PCB. | Text has been added to Section 9.2.3.1 regarding the handling and transport of materials that contain greater than 50 parts per million total PCBs. The Specifications prepared during Pre-Final (90%) RD will include additional requirements to the contractor. |
| 119. | Section 9.2.3.1 Waste Characterization | 102 | The "20 times" TCLP screening procedure identifies sediments that contain the theoretical minimum contaminant mass required to exceed the Regulatory Level specified in § 261.24 and is expected to overestimate the volume of hazardous waste. Waste characterization sampling should be performed for the RAAs identified in Table 9-2 as having "Potential RCRA Hazardous Waste". Also, the "Potential RCRA Hazardous Waste" need to consider if PCBs are an Underlying Hazardous Constituent (UHC) as defined in § 268.2 that requires treatment prior to land disposal. Ensure that necessary characterization is included as a data need in Table 17-1. | This comment has been addressed as part of QAPP Addendum No. 3 for the Phase III PDI, which includes conducting sheen testing. See also response to Comment No. 145. Table 17-1 has been removed from the BODR. |
| 120. | Section 9.2.3.1 Waste Characterization | 102 | Clarify if TSCA waste will be segregated from non-hazardous RAL exceedance wastes Detail how this segregation will be managed. | The text has been revised to address comment. |
| 121. | 9.3 Engineered Cap | 105 | Revise the text in this section for consistency with comments on Appendix H. | A consistency review between Section 9.3 and Appendix H was performed. |
| 122. | Design | 105 | Under the cap stability bullet item, the text states that for standard caps "the uppermost layer will likely include suitable erosion protection." Standard caps should be designed with appropriate erosion protection. Revise the text to clarify that if the standard cap design is not suitable to resist the calculated erosive forces, the cap will have an SMA-specific design appropriate for the present conditions. | The text has been revised to state that standard caps will include suitable erosion protection. |
| 123. | 9.3.1 General Cap Design Approach | 105 | As noted in DRCC comments include information on the development of the 45 cm habitat layer requirements and if it sufficient for the clams found in the Duwamish. Include if there will be long term monitoring of the clamming habitat layer. | Section 13.2.1.1 of the ROD establishes the 45-cm habitat layer requirement for engineered caps constructed in intertidal clamming areas. Per ROD Section 13.2.3, habitat monitoring is required for areas that are constructed as part of the remedial action to comply with CWA Section 404. Habitat monitoring of habitat layers over engineered caps is not anticipated. |
| 124. | 9.3.1 General Cap Design Approach | 106 | The text in this section only mentions risk to human health in relation to isolation layer design criteria. Revise the text to indicate that human health and ecological RALs were considered during cap design. | All RALs (human health and ecological) were considered during design. Text in Section 9.3.2.1 has been revised to clarify. |
| 125. | 9.3.2.1 Chemical Isolation Layers | 106 | Revise the text to include assumed amendment percentages in addition to cap TOC percentages. | This information has been added to Appendix H. A note documenting the assumption that 1% of AC would be equivalent to 10% TOC is included with footnote 2 of BODR Table 9-4. |
| 126. | 9.3.2.1 Chemical Isolation Layers | 107 | Editorial: Typo – delete "@" in first paragraph. | The typo has been fixed in Section 9.3.2.2. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 127. | 9.3.2.2 Bioturbation | 107 | In determining the stable particle size D50 at each RAA location, it seems possible that more than one erosive force (e.g., hydrodynamic 100-year and vessel wake) would occur in tandem. This should be considered for an added level of safety for the armoring layer median size and thickness, and balanced against habitat needs/requirements. | The stable particle sizes evaluated as part of this study consider a single erosive force occurring at a time. Erosive forces considered in the design (i.e., river currents, wake and propwash) are generally not additive forces because they act on the sediment bed in different physical ways. Therefore, they are generally not superimposed when evaluating stable sediment sizes in an area potentially subject to all of these forces. In addition, the results of this analysis (see Section 4) concluded that the near-bed current velocities due to vessels are approximately 10 times the forces associated with a 100-year flow event, which is not significant enough to change the calculated median stable particle size (reported as $D_{50}$) by more than 0.2 inch. |
| 128. | 9.3.2.3 Erosion Protection | 108 | Clarify the text to specify if the assumption was made that fetch length of the Middle Reach is shorter than the channel width. If not, describe the analysis performed to assess fetch length in the Upper Reach versus the Middle Reach to support using the same wind wave analysis. | The controlling fetch distance for the middle reach is the same as the upper reach; therefore, the analysis for the upper reach applies to the middle reach. |
| 129. | 9.3.2.3 Erosion Protection | 108 | Identify the D100 particle size as well as the D50. | The $D_{50}$ particle size is the calculated median stable sediment size, not $D_{100}$, and is therefore the required value to report. $D_{100}$ will be identified as part of the gradation specification for design. The draft Specifications will be developed as part of the Pre-Final (90%) RD. |
| 130. | 9.3.2.3 Erosion | 108 | While not yet established, the erosion protection layer minimum thickness should be the larger of two times D50 or D100. Include this at the 60% design stage. | The draft Specifications will be developed as part of the Pre-Final (90%) RD and will include final minimum layer thickness requirements. |
| 131. | 9.3.2.3 Erosion | 108 | Discuss if/how dredging and the final design will impact the overall hydrodynamics of the middle reach. | Refer to response to Comment No. 140. |
| 132. | 9.3.2.4 Habitat Substrate Considerations for Caps | 112 | Include a figure which presents intertidal clamming areas (see ROD Figure 6) overlain by RAAs (inclusive of side slopes) and elevation -10 feet MLLW. In areas where capping or backfill will impact existing benthic organisms, consider whether seeding clams would accelerate benthic recolonization. | Figure 10-1b includes intertidal clamming areas, ROD-defined habitat areas, and the Preliminary (30%) RD RAAs. The figure has been updated with the Intermediate (60%) RD RAAs.<br>Reseeding clams is not recommended because they are just one part of the benthic community that would be disturbed and there are multiple factors that facilitate benthic community recovery that clams would not impact (e.g., nearby source populations, flow, substrate). As such, reseeding is not expected to accelerate benthic recolonization. The loss of benthic invertebrates would be temporary and would naturally restore within a range of months to 2 years depending on the size of the disturbance area. |
| 133. | 9.3.2.4 Habitat Substrate Considerations for Caps | 112 | Habitat substrate warrants additional discussion, as fish mix may not be ideal in all settings. For now, EPA anticipates that the 60% specifications will require rounded rock for all habitat layers and included components. In low-slope mudflats where ENR is the applicable technology, it is likely that sandy material will be appropriate, but EPA recommends additional discussion of how/whether finer materials could be placed. | The cap erosion protection modeling performed for the middle reach (BODR Section 9.3.2.3 and Appendix H) indicates that gravel is required for long-term stability. Although the ROD requires that material placed in areas of existing elevations of -10 feet MLLW or shallower consist of suitable habitat material (e.g., fish mix/habitat mix), the specification needs to balance constructability and availability needs.<br>The model used to estimate stable particle size (Palermo et al. 1998), which is included in EPA's capping guidance, is overly conservative due to its limitations in shallow water depths. Additional modeling will be required during Pre-Final (90%) RD to determine whether sandy material can be placed on caps within these areas. The surface of the placed gravel materials will eventually be covered by naturally deposited sediment specific to each area placed, so in the long term (i.e., 1 to 5 years) the habitat surface will return to conditions reflecting what is naturally deposited from upstream. |
| 134. | Table 9-4 Engineered Cap Design Summary | 112 | Caps for RAAs 31B and 31C are listed as standard and no habitat layer was included despite being in sub and intertidal portions of the channel. Portions of the intertidal cap in these RAAs should be revised to include a habitat layer. | Because of the deep dredging within the adjacent FNC, it is not feasible to dredge the slope within RAAs 31B and 31C shallower than 3H:1V. Additionally, the preliminary stable armor size evaluation for this area requires a top layer of material with a $D_{50}$ greater than 4 inches in diameter. Until the final remedy for the adjacent upland MTCA project is known, further refinements to the design in this area are not possible. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 135. | 9.5.1 Material Types | 116 | The habitat layer should contain an admixture of organic material that can support a benthic community. An organic content of 10% organics by volume is a common amount but the specific amount should be based on existing channel bed sediment composition that is known to support species of interest. | Refer to response to Comment Nos. 133 and 154. |
| 136. | 9.5.2 Candidate Source Material Suppliers | 116 | The text states, "Specifications will require that each product have construction submittals of test results for acceptance by the Resident Engineer." Include EPA in this acceptance process.<br>"…beneficial use of clean dredged material is not included as part of the Preliminary (30%) RD assumptions and will be further evaluated in Intermediate (60%) RD." EPA recognizes the issues identified (and would add that invasive species may also be an issue) but encourages serious consideration of beneficial uses, particularly where intertidal areas are being addressed. | Material acceptance procedures will be specified in the draft CQAP, which will be prepared as part of the Pre-Final (90%) RD. The text was revised to focus on the specification to the contractor; the acceptance process will be included in the draft CQAP.<br>LDWG will continue to evaluate the potential for beneficial use of clean dredged material. No suitable sources have been identified at this time. |
| 137. | 9.5.4 Material Placement Methods | 117 | The placement methods described appear to include bulk placement by dropping materials at or above the water surface. EPA did not approve this method for Upper Reach construction due to concerns associated with turbidity generation and separation of carbon amendment from capping materials during settling. Remove this method from the Middle Reach design, unless specifically justified for certain areas and approved by EPA.<br>Exhibit 9-2 One or more of the photos depict placement of material with release above the water. This is not a preferred method for material placement. Add a note stating this method is only appropriate only in very shallow areas where bucket can't be submerged. Add a schematic showing release of material near the bottom. | Consistent with the approved upper reach Specifications, the design team believes that this is an appropriate placement method for materials that do not include carbon amendments. Although the upper reach contractor elected to use a different placement method, the middle reach conditions are different and require flexibility in method selection. The method for fanning out material placement from the water surface has been industry best practice for decades, including at other notable sediment cleanup projects the design team has worked on, such as Commencement Bay, Whatcom Waterway, Eagle Harbor, Todd Shipyards, Slip 4 Early Action, and Fox River. Placing materials from the water surface in subtidal water depths allows sands and fine gravels to fall through the water column at their critical settling velocity. This helps spread out the placed materials and helps reduce the energy of the placed materials hitting the riverbed, which minimizes disturbance of the post-dredge surface. Furthermore, allowing the operator to see movement of the bucket and rate of material distribution promotes consistent material placement for thin layer (ENR) placement and cap construction. Regardless of method, the contractor is still responsible for complying with water quality criteria during the placement activities of this clean material. |
| 138. | 9.6.4 Area-Specific Technology E: Capping on Grade | 121 | Add the approximate surface area to the text for RAA 26 and clarify if there is any debris removal planned | The text has been updated to include the surface area of RAA 26. Surficial debris will be removed prior to material placement. |
| 139. | 9.7.1 MNR to Benthic SCO | 123 | The text needs to explicitly state if the design plans to remediate for benzoic acid and phenol or not given the transient nature of these compounds. | The text has been revised to clearly state that active remediation will not occur for phenol or benzoic acid. |
| 140. | 9.9.1 No-rise Evaluation | 126 | While counter-intuitive, a greater volume of material dredged than fill volume placed does not necessarily equal no-rise. Because the report states that it is a tidally dominated reach this may diminish the impact of the project versus free flow. Add or reference figures that show the extent of the tidal influence and work extents which would influence the system hydraulics. Sample cross sections of the work along this reach would also illustrate the impact of the project. | The water surface elevations in the middle reach are tidally dominated. This means that the water surface elevations in the middle reach are determined by the tidal elevation in Elliott Bay and are not significantly influenced by flows in the river. This is illustrated in the FEMA flood map for the area (No. 53033C0645G, effective date August 19, 2020), which shows that the 100-year flood elevations are the same high tide elevation (+12 feet NAVD88) from Elliott Bay throughout the middle reach. Influence of river flows on 100-year water surface elevations begins just upstream of the middle reach project boundary. This information will be added to the text. |
| 141. | 9.9.2 Climate Change Design Considerations | 127 | The SLR discussion is vague ("next few hundred years") and lacks specific scenarios. Specify the SLR scenario(s) considered (for example, ~2 ft by 2100 likely, ~5 ft under a high scenario) and note whether the design was adjusted to accommodate those projections. | The last sentence of the second-to-last paragraph before Exhibit 9-3 states, "Based on the projections and using the 50% likelihood of occurrence estimate, the relative sea level is predicted to rise between 1.9 and 2.4 feet by 2100 for RCPs 4.5 and 8.5, respectively (black line, Exhibit 9-3; Miller et al. 2018)." It was not necessary to adjust the design to address predicted range of 1.9 to 2.4 feet because it did not impact the results in Appendix I for cap design (refer to Appendix I, Section 3.5). |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 142. | 9.9.2 Climate Change Design Considerations | 127 | The text mentions future higher water levels potentially reducing erosion but does not address extreme events. Add a statement confirming the design can withstand an extreme high-water event (major storm surge + high tide + ~2 ft sea-level rise) without unacceptable erosion or cap failure. | Text was added to address this comment. Extreme events in the middle reach are associated with higher water levels. Wind-waves due to extreme wind events are not a significant factor (at present or in future) in the middle reach due to limited fetch distances. Therefore, increased water levels due to sea level rise or a combination of sea level rise and extreme high water events (e.g., storm surge) will increase water depths and decrease potential for erosion of bed sediments due to vessel operations. Increased water levels will not impact cap design in shoreline areas because those remedies will run to the top of existing slope. |
| 143. | 9.9.2.1 Sea Level Rise | 128 | The statement that deeper water depths are anticipated in the waterway as a result of climate change is a generalization of future climate conditions that only considers a "wetter" scenario. Desiccation of caps, habitat layers, and RMC is a concern, as drier and warmer summers are anticipated in the region, with the potential for reduced snowmelt that will impact recharge of the watershed. This is particularly a concern in the intertidal areas. It is not known whether the subtidal areas will be exposed for longer periods of time due to lower summer flows, and if sea level rise (SLR) will offset a potential reduction in MHW and MLW levels due to lower summer flows. Incorporate these concepts into the discussion of potential climate change impacts. | Text was added to address this comment. Water surface elevations in the middle reach are tidally dominated and will not be reduced by lower river flows in the future (QEA 2008; FEMA 2020). See response to Comment No. 140. |
| 144. | 9.9.2.2 Hydrodynamics | 130 | Similar to the SLR discussion, the hydrodynamics impact analysis does not consider future reduced flows resulting from drier/warmer summers, and reduced watershed inputs from decreasing snowmelt. Propeller wash, vessel scour, and flash flooding events during potentially reduced summer flow regimes could significantly impact erosive forces at the sediment bed. Acknowledge these considerations in the hydrodynamics discussion. | See response to Comment No. 143. |
| 145. | 10 Environmental protection during construction | General | Consider adding a subsection regarding sheen management and containment to incorporate measures such as those developed for SMA 12 B in the Upper Reach. The specifications will also need to be reviewed with this topic in mind. [See data gap comments below: EPA expects that the Phase III QAPP will discuss whether sheen related data needs have been identified for the Middle Reach. Likewise, Lower Reach pre-design investigation planning should incorporate evaluation of sediment samples for potential sheen risk.] | Sheen management: A new Section 10.2.3.5 was added regarding sheen management during construction.<br>Sheen testing: Sheen testing has been added to QAPP Addendum No. 3 for the Phase III PDI (Section 5.9; testing will include both Phase III samples and archived samples). |

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 146. | 10.2.1 Operational Controls to Reduce Sediment Resuspension and Volume 3 Specifications for the 60% | 137 | A. Revise the best practices list to include bottom to top filling to reduce the chance of slope failure.<br>B. The text states "Uneven filling and overfilling of barges beyond the top of the side rails will be prohibited to prevent spillage from barges." Revise this text to remove "beyond the top of the side rails" and replace with "beyond the required minimum freeboard." The barge should never be filled to a level at or near the side rails.<br>C. Revise to note that bucket dunking is a prohibited practice in the waterway.<br>D. Revise to include closing the bucket as slowly as possible on the bottom.<br>E. Revise to include pausing before hoisting the bucket off of the bottom to allow any overage to settle near the bottom, and include hoisting the load very slowly.<br>F. Revise to include "Once out of the water, the bucket should be moved quickly to the barge. Allowing the bucket to drip over water before placement in the barge will be avoided. "<br>G. Revise to note that dumping of partial or full buckets of dredged material back into the waterway is prohibited.<br>H. Ensure the 60% specifications include a specific requirement to have sorbent boom available with co-located harbor or swift current hard boom sized for the current (i.e. sorbent will not be deployed by itself except in rare exceptions as this is not effective to control sheen). Ensure the specifications are clear that multiple layers of sorbent may be required to soak up sheen and that without a hard boom the sheen likely cannot be contained with any water movement, per industry standard practices. | A. This requirement is described in Section 9.5.4, fifth bullet. A bullet with this BMP and reference to Section 9.5.4 has been added.<br>B. Text has been revised to address this comment.<br>C. Text has been added to address this comment.<br>D. This method has not been added. This requirement is restrictive and vague as a specification and may not be implementable depending upon the dredging equipment used. This requirement is also difficult to monitor and enforce. Control of bucket closure speed may only be effective with a hydraulic excavator because a bucket on a crane/cable system may not be easily controlled for closure speed. However, the density of material may end up dictating how a dredge equipment operator has to utilize their equipment, including bucket closure speed.<br>E. A new second bullet has been added under text for additional optional BMPs. Requiring the bucket to pause near the bottom for each dredging cycle will significantly increase the cycle time, slowing down the overall production rate. This BMP may be optionally applied if water quality criteria is not being met but should be left to the contractor to decide whether this method will be effective. Text on raising and lowering bucket speed was edited, but LDWG does not agree to require "hoisting the load very slowly" as a BMP. This action can be an optional BMP, which is already included, but dictating a very slow hoisting speed will significantly increase cycle time, resulting in lower production rates, and may not be necessary to meet water quality criteria.<br>F. Text has been added with some clarification. Please note that this BMP is somewhat subjective.<br>G. Text has been added to address comment.<br>H. Specifications for sheen control will be addressed in the draft Specifications developed as part of Pre-Final (90%) RD. Intermediate (60%) RD only includes an outline of the Specifications. However, sheen control specifications will be written as performance-based and not method specifications for sheen control. |
| 147. | 10.2.2.2 Silt Curtains | 140 | The second paragraph of this section provides a primarily opinion-based assessment of silt curtains. Given that silt curtains have not been extensively used in the Upper Reach construction effort, delete this paragraph to avoid presenting bias in the report. | The text in the second paragraph is referencing the *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (specifically pp. 6-24 and 6-25; EPA 2005). LDWG disagrees that the second paragraph presents a biased opinion and considers it important to note potential limitations for the use of silt curtains along with potential benefits. |
| 148. | 10.2.3.2 BMPs During Haul Barge Filling and Overwater Transportation | 144 | Revise the text to better describe how the barge will be "loaded evenly." Include whether there are any qualifications with respect to the nature of the material, e.g., tendency towards liquefaction. | Text in the first bullet has been revised. |
| 149. | 10.2.3.4 BMPs for Oil and Other Hazardous Substance Spillage Prevention and Control | 148 | This section (or a new section/subsection) needs to address the release of oil, sheen and other hazardous substances from dredging activities and other forms of sediment disturbance during construction. | A new Section 10.2.3.5 was added regarding sheen management during construction. |
| 150. | 10.3 Quality of Life Considerations | 150 | At the roundtable community members and business owners to shared their concerns on the Middle Reach clean up. Please add and discuss the following concerns to Section 10.3<br>• Given that the waterway is narrow in some parts of the middle reach how will marine traffic be impacted when the barge is turned or repositioned.<br>• Discuss if the 1st Ave Bridge will need to closed and how impacts to the community will be impacted<br>Flooding during active construction and exposure to contaminated sediment is a concern. Discuss if this is a concern and how it will mitigated. | To address this comment, a new Section 10.3.2 was added to provide an overview of other potential community impacts. Also, a new Appendix K (*Community Impacts Mitigation Plan*) covers in detail the process to identify community impacts during design and cleanup construction and ways to reduce those impacts. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 151. | 10.3.1.1 Air Quality | 150 | Given that "Engine idling restrictions for all construction equipment" is not practicable for dredging equipment, this should be limited or specified as applying to on road vehicles. | The Section 10.3.1.1 text was revised. |
| 152. | 10.3.1.1 Air Quality | 150 | Reference Air Quality BMPs included in Appendix K for green remediation. | A reference to Appendix L (*Green Remediation Evaluation and Implementation Approach*) was added to Section 10.3.1.1. |
| 153. | 10.4.3 Application of Green Remediation into Remedial Design | 156 | Revise the document to include use of specific water conservation BMPs that will be implemented to better satisfy Core Element 2 – Use of Water. | The second paragraph of Section 10.4.3 references Appendix L, which presents a comprehensive list of potential BMPs that might be applicable to each core elements, including use of water. |
| 154. | 10.5 Habitat Considerations and Evaluation | 157 | This section identifies the need to include habitat-specific elements in backfill materials, particularly the habitat layer, specified in Section 9.3 as a sandy gravel material. A clam habitat layer is identified but the materials that comprise this layer are not specified, nor are any other habitat materials other than the sandy gravel. While sandy gravel may be a sufficient base material that resists erosive forces, habitat-specific materials should be identified that will be added to this habitat layer base that can support species of interest. The amount of habitat-specific admixtures within the habitat layer should be based on existing channel bed sediment composition that is known to support species of interest. In addition, discussion should be included regarding how this layer will be placed. Section 10.5 identifies a telebelt®, which may be appropriate, but it is not clear that this approach can lay material that is relatively buoyant and prone to floating if not adequately secured. | See response to Comment No. 133. Selecting the appropriate habitat material type is a balance between providing substrate that is as similar as possible to pre-construction conditions and achieving constructability and environmental protection requirements during material placement. The amount of fines in the placed material is typically minimized to reduce turbidity to meet the water quality requirements, to also achieve the chemical concentration requirements for clean fill material, and for constructability reasons. Fine clean sediments (silts/clays) are very difficult to procure and place in a marine environment. The surface of the placed gravel materials will eventually be covered by naturally deposited sediment specific to each area placed, so in the long term (i.e., 1 to 5 years) the habitat surface will return to conditions reflecting what is naturally deposited from upstream. This text has been added to Section 10.5.2.<br>Also, see updates to Sections 9.3.2.4, 9.5.1, and 9.5.4 for more information on material types and placement methods. |
| 155. | 10.5 Habitat Considerations and Evaluation | | Review the schedule and discuss with EPA the review times for habitat-related evaluations (including the BA, CWA evaluations, and any mitigation plans required). EPA requests a discussion of the process and schedule with the affected Tribes at an upcoming project meeting focused on ensuring that they have an opportunity for meaningful participation. | The forthcoming draft BA is being prepared in parallel to the Intermediate (60%) RD and will be delivered to EPA prior to the Pre-Final (90%) RD. The BA includes the habitat evaluation as an attachment. The CWA Sections 404/401 and Rivers and Harbors Act Section 10 substantive compliance evaluation will include the BA habitat evaluation as an attachment and will be submitted as part of the Pre-Final (90%) RD. |
| 156. | 10.5.2 Design Considerations for Remedial Activities in ROD-Defined Habitat Areas | | EPA anticipates tribal review of habitat substrates to be specified. Please include this topic for discussion with the tribes at a monthly check-in meeting, or in a separate call. | Comment noted. |
| 157. | 10.5.2 Design Considerations for Remedial Activities in ROD-Defined Habitat Areas | 158 | A. The last paragraph of this section states that "the remediation is expected to avoid the need for mitigation," however, the second paragraph of the subsequent section (10.5.3) states "Mitigation for the cleanup in the LDW middle reach may be required to offset unavoidable adverse impacts to habitat…" Revise future design documents consistent with the fact that compensatory mitigation avoidance through inclusion of beneficial design features must still be confirmed.<br>B. There is no proposed sampling or survey to establish baseline habitat conditions. The ROD states that the entire reach should be sampled to establish baseline conditions, however there is no discussion on this in the BODR. Provide a revision to this portion of the 30% such that preliminary habitat calculations can be provided as part of the 60% design.<br>C. In the 60% design, provide details of a habitat monitoring plan to ensure areas with remediated habitat, including those areas with a habitat layer, are becoming successfully established and performing as needed to provided benefits to listed and native species. | A. The language has been revised in Section 10.5.3 to be consistent with what is written in Section 10.5.2.<br>B. Information from the Phase I, Phase II, and Phase III PDI surveys is being used as baseline conditions in the habitat evaluation as detailed in the forthcoming BA. This has been added to Section 10.5.3.<br>C. Per the ROD, RAAs that include dredging will be backfilled to restore pre-construction grades above elevation -10 feet MLLW. Habitat monitoring is not required for these remediated areas. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 158. | 10.5.3 | 10.5.3 Habitat Evaluation | Include additional discussion on the habitat evaluation process and timing in this section. EPA has concerns about waiting for the lower reach remedial design to plan habitat mitigation, if necessary, to address impacts across all three reaches. Mitigation should occur near impact if at all possible. Given the extended construction schedule for the middle reach, there may be time to implement mitigation, if required, concurrent with construction, reducing the temporal impacts.<br>Consider the timelines for completion of key pre-design investigations in the lower reach, relative to the middle reach design process. If the middle reach design indicates a need for habitat mitigation for middle reach impacts, mitigation plans should go forward. Minor mitigation benefits from the upper reach can be applied to the middle reach, and as information about lower reach remediation areas develops, the mitigation plan can be adjusted. | Attachment 6 of the forthcoming BA includes a habitat evaluation that will assess the need for mitigation due to the designed remedial action. If there is a need for mitigation identified, LDWG will evaluate conservative assumptions and additional beneficial design elements to the extent possible that could be implemented to further minimize impacts or improve habitat as part of the remediation to offset impacts between the Intermediate (60%) and Pre-Final (90%) RD. If compensatory mitigation is still needed at the Pre-Final (90%) RD phase, additional discussions with EPA will occur to determine if habitat improvements in the upper reach and/or lower reach will be expected to offset any unavoidable impacts in the middle reach. In lieu of expanding Section 10.5.3, the reader is directed to the forthcoming BA for a more in-depth discussion of the habitat evaluation process. |
| 159. | 10.5.3.1 | 160 | NHVM defines habitat values in terms of physical and biological functions of salmonid critical habitats. Evaluations using on NHVM definitions and values may not capture all relevant habitat functions or potential impacts. Add discussion on how other habitat functions and potential impacts will be accounted for. | There are two parts to the mitigation evaluation: a quantitative (Puget Sound Nearshore Calculator that uses the Nearshore Habitat Values Model) and a semi-quantitative evaluation that is based on habitat type conversions, substrate condition, and degraded conditions (e.g., debris or pilings); Additionally, a CWA Sections 404/401 and Rivers and Harbors Act Section 10 substantive compliance evaluation will be prepared as part of the Pre-Final (90%) RD. This information was added to the Section 10.5 introduction. |
| 160. | 10.6 Buried Contamination Protectiveness Evaluation | 162 | In determining the potential for dissolved phase transport of COCs buried under current sediment depths, the maximum scour potential needs to be assessed in the areas considered in the long-term transport potential relative to the current bathymetry and the types of vessels that use the navigation channel where the authorized depth is at -20 ft or 15 ft. The engineered cap does not extend over these sample areas, which may be susceptible to erosion. State a range of considered maximum potential scour depths and revise Appendix L to demonstrate that the bury depths assumed in the dissolved phase transport in Appendix L under the range of maximum scour depths still provide containment. | The LDW FS (AECOM 2012) included an evaluation of scour potential related to river flow and vessel operations (refer to FS Appendix C). The evaluation concluded that scour related to maneuvering vessels was about 25 cm. The Intermediate (60%) RD evaluations performed to support engineered cap armor layer design (BODR Appendix I) are consistent with these conclusions. Appendix M (formerly L) includes reference to this scour depth. |
| 161. | 10.6 Buried Contamination Protectiveness Evaluation | 162 | Include information on how long the buried contamination is likely to be contained and considerations for transport in the event of vessel accidents, flooding and other events. | See response to Comment No. 160. The buried contamination modeling performed on 13 cores indicates that contamination at levels below the 0- to 10-cm surface RALs will be contained below a minimum of 50 cm clean sediment for a period of 100 years or more. This evaluation excludes the beneficial impacts of future sedimentation and deposition. Appendix M includes figures that illustrate the predicted COC concentrations as a function of depth for the Year 0 and Year 100 model timesteps. It is important to note that propwash forces during vessel maneuvering are likely to cause the greatest potential for scour. This scour occurs as temporary furrows that recover as a result of other hydrodynamic forces that even out the bathymetry. This is evident in the hill-shaded bathymetry for the six buried contamination cores evaluated in RC 1 areas. |
| 162. | 11.1 Property access considerations, Table 11-1 | 163 | A. All rows have yes in the third column – need access agreement. The title alone may be enough, and this column deleted. Revise text to explain why upland access is/is not/may be considered necessary (fourth column).<br>B. Is access to LDW-owned or all publicly owned land assumed to not require access agreement? Agreement should not be needed from Seattle Parks, if that is the case. Add statement regarding access to waterway and slip areas, if not privately owned. (Are any areas on Port or DNR property that requires access agreement, permit, or notification?). Note in text whether Seattle City Light or SPU or Seattle DOT or King County rights of way or other easements require access agreements.<br>*Note: List formatting added to this comment to match the LDWG response.* | A. Previous "Access Agreement Needed?" column has been deleted as suggested. Text has been added to help explain the reasoning behind the "Upland Site Access Anticipated?" column.<br>B. Port of Seattle has indicated that access agreements are not needed for waterway district land. Access to King County and most properties owned by the City of Seattle do not require access agreements. Permits are required for access to Seattle Parks-owned property.<br>Port of Seattle properties with active tenants require access agreements.<br>There are no state -owned aquatic lands within the middle reach.<br>Slip 2, Slip 3, the Inlet at RM 2.2W, Myrtle Bay, Slip 4 and various slivers of aquatic lands are privately owned within the middle reach. These all require access agreements even though they are contiguous with the waterway. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 163. | 12.1 Construction Sequencing | 165 | "Cleanup construction activities will be sequenced to accommodate logistics and reduce the risk of contaminant release, generally beginning with contaminated debris removal (e.g., demolition and removal of creosote-treated materials) followed by intertidal excavation and subtidal dredging."<br>Revise text to discuss sequencing construction in coordination with Ecology upland cleanup at, for example, DMC and ICS. This may also be a consideration at Gateway Park North if upland cleanup is required. Consider other factors such as proximity of RAA's to each other, potential vessel propwash from contractor operations, remedial technologies being used. | As stated in Section 2.2.1, remedial construction of the middle reach is being coordinated with upland source control sufficiency evaluations led by Ecology. If source control is determined by EPA not to be sufficient for an upland area adjacent to an RAA, the remedial action in these sediment areas will not occur until source control sufficiency is achieved. For example, in areas such as Inlet at RM 2.2W and Duwamish Marine Center, RD cannot be completed until the respective upland site cleanup actions are further along in design. LDWG continues to discuss sequencing of the middle reach cleanup with EPA. |
| 164. | 12.1 Construction Sequencing | 165 | "Certain sequencing requirements will be specified.." specify the sequencing requirements for EPA review and comment. It is not clear if the examples given are the only considerations. There should be additional considerations such as working upstream to downstream when possible. | Examples of overall project sequencing requirements have been added to Section 2.1. |
| 165. | 12.2 Construction Schedule | 167 | "LDWG is currently exploring the feasibility that a new transload facility may be developed and available by the time the LDW middle reach remedial action starts. LDWG will continue to assess the feasibility that private parties or ports may develop a new facility or that LDWG may partner with third parties to secure additional transloading capacity." EPA will seek continued updates between design submittals. Consider whether construction may be able to start with one available facility as another is being developed. | See response to Comment No. 117. |
| 166. | 12.2 Construction Schedule | 166 | Due to the location of the Middle Reach and the quantity of dredging and placement planned, depending on timing, duration and specifics of the construction, the impacts to the Muckleshoot fishery could be substantial. Early coordination on sequencing will be essential to help reduce impacts to both fishing and remedial construction. | As stated in Section 12.2, construction activities (and potentially sequencing) will be coordinated with the Muckleshoot Indian Tribe and Suquamish Tribe to reduce impacts on Tribal fishers. |
| 167. | 12.2 Construction Schedule | 166 | First paragraph of section: Remove phrase starting "or an approved extension" Extensions to the in-water construction window will only be granted under extraordinary circumstances and should not be assumed as part of the design or when developing remedial action work plans. It should be possible to complete this work without unavoidable impacts to natural resources. Recommend reinforcing this constraint by incentivizing timely completion or to include penalties if work is not completed by February 15. | Deleted "or an approved extension" as requested. |
| 168. | 12.2 Construction schedule | 167 | The conservative estimate of 10 construction seasons for the Middle Reach is considerably longer than originally anticipated. EPA encourages LDWG to consider all options for reducing the number of seasons and to present these for discussion with EPA and others as the design progresses to 60%. | As stated in Section 9.1.3, additional options are being explored to reduce the estimated number of seasons. However, the constraint of transloading at the transload facility and rail shipment to a commercial landfill is anticipated to govern the maximum amount of sediment material that can be dredged per day.<br>As requested, LDWG discussed this topic with EPA on March 26, 2026. |
| 169. | 12.2. Construction Schedule | 167 | Clarify if the conservative estimate of 10 construction seasons assumes the maximum operational throughput capacity at the Duwamish Reload Facility. EPA is aware of other projects planned during Middle Reach Construction Season that may also require transloading at the Duwamish Reload Facility. If LDWG has already secured this capacity include a statement in the design. Otherwise add transloading capacity at the DRF as a Data Gap. | The construction schedule assumed a site-wide weighted average dredging production rate of 890 cy per day, which is 89% of the maximum operational throughput capacity (1,500 tons per day, equivalent to approximately 1,035 cy per day) at the Duwamish Reload Facility.<br>LDWG will continue to assess transload status at the Duwamish Reload Facility and other possible facilities as the design is finalized. The construction contractor will be responsible for business arrangements with transload operator(s), with capacity and other details described in its RAWP. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 170. | 13.1 Quantity Calculations | 169 | Design assumes 15% re-dredge requirement. Discuss how this compares to the first two seasons of the upper reach and if that is comparable. | For costing purposes only, the RD assumes the following:<br>• 15% of the total required dredge area (excluding any PD&C footprints and side slopes) will be re-dredged by 1 foot (which includes 6 inches of overdredge allowance) to address generated residuals.<br>• 20% of the total required dredge area (excluding any PD&C footprints) will be re-dredged by 2.5 feet (which includes 6 inches of overdredge allowance) to remove missed inventory.<br>Actual contingency re-dredging decisions will be based on confirmation sediment sampling per the CQAP. Contingency re-dredging passes are not a requirement.<br>Review of the actual contingency re-dredging areas and volumes for upper reach Seasons 1 and 2 indicated that contingency re-dredging only occurred in limited upper reach SMAs and was generally tracking to be low (less than 8% and 12% of the SMA areas were dredged for residuals and missed inventory, respectively).<br>Therefore, the middle reach Intermediate (60%) RD assumptions of 15% and 20% of dredge areas (residuals and missed inventory, respectively) still hold based on professional judgment and are considered conservative, reasonable, and appropriate because the middle reach site has generally higher levels of sediment contamination (when compared to the upper reach conditions). |
| 171. | 15.3.3 | 178 | EPA anticipates tribal review of the CQAP. Discuss with EPA and the fisheries representatives for the Muckleshoot and Suquamish Tribes how best to ensure adequate time for CQAP review. Discussion with the Tribes of the upper reach CQAP and orientation to the middle reach CQAP when drafted may be helpful. | Comment noted. LDWG will discuss review schedules with EPA prior to submitting the Pre-Final (90%) RD, which includes the first draft of the CQAP. |
| 172. | 16 Work by others | 179 | Include in this section any potential habitat restoration activities that may be considered or conducted by others during the Middle Reach remediation. If none are planned, indicate that this was covered in the topic of Work By Others. | The text in Section 16 has been revised to include habitat enhancement projects as a type of project that the design team is tracking as "work by others." Outreach to property owners is summarized in Table A1-2 and Attachment A.1 in Appendix A. |
| 173. | 17 Phase III PDI Preliminary Data gap categories | 180 | Include category specifically on TSCA and hazardous waste data collection | This comment has been addressed as part of QAPP Addendum No. 3 for the Phase III PDI, which describes data gaps associated with waste profiling. |
| 174. | Table 17-1 | 168 | Add in a data gap investigation to determine if potential sheen producing material is potentially present in any of the RAAs, particularly those with elevated contaminant concentrations. | This comment has been addressed as part of QAPP Addendum No. 3 for the Phase III PDI, which includes conducting sheen testing. See also response to Comment No. 145. Table 17-1 has been removed from the BODR. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 175. | Table 17-1 | 168 | EPA received the following questions regarding data gaps from the Muckleshoot Tribe. Please be prepared to address these during Phase III Preliminary Design Investigation.<br>• Is there sufficient information on the horizontal extent of deep contamination to determine the appropriate boundary of the cap between RAA 1A and 1B?<br>• Is additional vertical extent information needed in northern portion on 9I? Cores 1522 and 1519 met refusal, so depending on 1522C interval concentrations, additional vertical delineation may be needed.<br>• RAA 16 is adjacent to a dock with no samples underneath the structure to bound contamination. Are there ROV options for collecting samples where it's unsafe to send divers under structures? Alternatively, SIM has indicated they think the cleanup will require demolition of their south dock, which doesn't appear to be the case, but if the dock was going to be removed, could sampling happen after that?<br>~~•RAA 21A, looks like dioxins were not corroborated in the Phase II sampling. At one point recently Boyer wanted to do a maintenance dredge, is that still on the table? Maybe it was to the south of RAA 21?~~<br>~~RAA 29, if bioassay testing is conducted and passes, will this RAA drop out? If bioassays fail or aren't conducted, will only the top 0.5 ft be dredged, so the PCBs at depth will remain regardless?~~ | These specific questions regarding potential data gaps were considered as part of the development of QAPP Addendum No. 3 for the Phase III PDI:<br>• RAA1A/1B: Three Phase III samples are proposed in this area (two 0- to 60-cm samples to define horizontal extent and one vertical extent core between RAA 1A/1B to confirm boundary between these two areas).<br>• RAA 9I: No Phase III samples are proposed in this area. Vertical extent of contamination is vertically bounded.<br>• RAA 16: No Phase III samples are proposed in this area. Sampling was conducted immediately adjacent to this small structure; the composition of substrate below the structure precludes use of remote sample collection equipment.<br>Table 17-1 has been removed from the BODR.<br>Note: The last two bullets were removed as indicated by EPA via email on January 5, 2026. |
| 177. | Figures/Maps | General | Why are some called figures and others called maps? The numbering is sequential, so they're not separated. | All have been switched to "Figures" throughout the document. |
| 178. | Figures/Maps | General | For the 60% design create a separate legend page including all of the line types and hatching to use as a reference when reviewing figures. Similar to the one in Appendix D. | Different figures use different line types. In addition, each figure (other than some figures in Appendix D) includes a full legend depicting the lines and hatching appearing in that figure. |
| 179. | Figures/Maps | General | Sometimes RAA boundary on maps includes the area inside the cutlines (7-1 series), while other times the side slope isn't included (e.g. 5-2 series, 9-1 series). Check maps and revise to specify what is meant by "RAA boundary." Some maps include the side slope marking, which helps understand that these areas range in dredged thickness. | Figure legends have been revised for clarity. |
| 180. | Figures/Maps - | General | Berths do not appear to be shown on a map, but the remedial approach needs to consider maintenance dredging and erosion, and berths may affect habitat considerations. Add a map showing berths overlapping technology assignments (or add berths to 5-2a/b) | Permitted berths have been added to the Figure 7-1 series (rather than 5-2) because the locations of these areas are also important input to the geotechnical evaluations. |
| 181. | Figures 2-3a and 2-3b | | Confirm the labels on CSOs, storm drains, and outfalls. Some are labeled with numbers, and others are labeled with site names. Add a legend entry to define what the numbers refer to. | Outfall labels in Figures 2-3a and 2-3b are from Ecology's outfall inventory and have not been modified for this project. See footnote c. |
| 182. | Figures 2-3a and 2-3b | | Confirm that the upland cleanup site labels are clearly and correctly applied to each site. Some of the labels are currently unclear as to what site they are referencing. For example, in Figure 2-3a, it is not clear what the Seattle DOT S River St site encompasses. There are other smaller labels for "Seattle DOT" properties, one of which is in the river, but is not evident if these are part of the Seattle DOT S River St site. The Duwamish Marine Center label points to five properties, one of which appears to be labeled both "personal property" and "Samson Tug," which is confusing. | The Figure 2-3 series contained operations labels as well as labels for cleanup sites and property ownership. The figure series has been revised to remove operations labels for clarity. |
| 183. | Figures 2-3a and 2-3b | | Add a label for RAL Exceedance Area 24a. | The figure has been revised to address this comment. |
| 184. | Figure 5-1a | | RAA 34 – The dredge prism looks like it barely encompasses SC1312 (PCB EF 33) and does not encompass the full extent of the RAL exceedance area. Assuming that the extent of horizontal dredging is limited by the presence of the adjacent pier, include amended ENR as an AST to the northern portion of RAA 34. | Additional sediment chemistry coring and geotechnical investigations are being conducted in this area as part of the Phase III PDI. Amended ENR will be considered as a remedial technology based on the Phase III results and potential limitations posed by the adjacent T-dock. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 185. | Figure 5-1b | | RAA 29 – The dredge prism does not encompass the full extent of the RAL exceedance area. Assuming that the extent of horizontal dredging is limited by the presence of the adjacent boat ramp, include amended ENR as an AST to the western portion of RAA 29. | The dredge prism at RAA 29 excludes the concrete boat ramp. The Thiessen polygon does not take this physical limitation into account. The western portion of RAA 29 is being addressed through dredging. Amended ENR placement over the eastern portion (i.e., the concrete boat ramp) is not appropriate. |
| 186. | Figure 5-1b | | RAA 30 - Merge dredge prisms 30A and 30B. | RAA 30A is a cap-only area. Figure 5-1b has been revised to clarify the selected technology at RAA 30A. |
| 187. | Figure 5-1c | | RAA 24 - Extend the northern boundary of RAA24H to eliminate the notch in the prism and create a straight boundary line. | RAA 24A is an ENR area. RMC applied after dredging RAA 24I will connect these two areas. Refer to Drawing C-304 (Volume III). |
| 188. | Figure 5-1c | | RAA 20 – The southern portion of RAA 20 needs to be addressed by a remedy. | RAA 20 has been revised. Additional data are also being collected as part of the Phase III PDI. |
| 189. | Figure 5-1e | | RAA 9 – include the area of no action as a dredging remedy between RAAs 9I and 9F. Note that the area behind/around the wingwalls warrants further discussion, given public use of the area. Recommend extending the dredging in this area, where possible, though RALs are not exceeded in the 2 45 cm samples and one 10 cm samples. This area is near an old outfall, may be disturbed over time as the park is developed. Remediating here would likely result in meeting the Beach Play Area cleanup levels in BPA 6. | Additional samples will be collected in this area during the Phase III PDI. The area between RAAs 9I and 9F will be re-evaluated during Pre-Final (90%) RD based on these results. |
| 190. | Figure 5-1e | | RAA 8 – include notch shoreward of 8H in ENR footprint. A surface sample below RALs is the reason it was omitted, but this is part of a beach play area and is adjacent an old outfall and public land. RAA 8G is in an offset area slated for an amended cover (AST-B). Exceedance factors are upwards of 11 in this area. Ensure the designed AC percentage will sufficiently sequester PAHs at this concentration. | Comment noted. |
| 191. | Figure 5-2A | | The outline of the concrete boat ramp in RAA 29 as shown on drawing sheet C-106 does not extend fully into RAL exceedance area 29. The dredging offset as currently shown appears to be approximately 20 feet and only extends in a single direction from the boat launch. Revise drawings or text in the 60% design to clarify how the offset from this structure was determined. | Probing data will be collected during the Phase III PDI. The RAA 29 footprint will be revised accordingly during Pre-Final (90%) RD. |
| 192. | Figure 5-2 a, b | | These figures don't show side slopes (given the focus on assigning technology). They show many small "between" areas not requiring action. It would be helpful to see where intertidal beach plan and clamming areas, berths, and habitat restoration sites are relative to the technologies (at one time), and to add UR SMA 18. Add sideslopes to show where areas overlap. The figure assumes no action will be required for interpolation-only areas. Show the areas, with a note explaining this assumption pending Phase III data. | Side slopes are shown on the Figure 5-1 series, which includes the RAL exceedance boundaries and helps to illustrate why "between" areas exist. This detail would be difficult to effectively show on the scale of Figures 5-2a and 5-2b.<br>Upper reach SMA 18 has been added to Figure 5-2b. A footnote has been added to Figure 5-2b explaining that RAAs 10 and 13 are interpolation-only areas and are pending Phase III data. |
| 193. | Figure 7-1 series | | These figures show engineered cap (per legend): please distinguish caps which do and do not require partial dredging (if all require PD&C, revise legend). Also, dredge prism footprint is unshaded: please provide a color for dredging, for clarity. | LDWG believes that this comment should refer to the Figure 5-1 series. The requested revisions have been made. |
| 194. | Figure 9-2 | | This figure shows RAL exceedances at LDW24-SS1496, which should be next to RAA 13, but RAA 13 isn't shown, as it is "interpolation only." The PCB concentrations in the samples shown on DER Map A-1, and BBP RAL exceedances indicate a problem in this area, which is adjacent to a road end and two inactive outfalls. Samples above MHHW may be a source issue that would best be addressed by remediation. | Location 1496 is a Phase II bioassay sample (which passed toxicity tests) and is not within RAA 13. Sampling is planned in RAA 13 during the Phase III PDI. |
| 195. | Figure 10-1a | | RAA boundary legend needs to be improved. Legend doesn't match the drawing (hatching is different line weight) and RAA hatching is invisible over light green (lower intertidal) habitat. Stippling is generally used for recovery category 1 but is used here for habitat area. The figure provides useful information: please make it clear. Distinguish between technologies, also. | Revisions were made to improve the clarity of the figure. For clarity, the RAAs were not modified to denote the different technologies. The reader is referred to Figures 5-2a and 5-2b. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 196. | Figure 10-1b | | Add a notation for individual trees, as the community has an interest in minimizing impacts to existing trees and enhancing tree cover. Note that the potential clamming areas shown warrant discussion with tribes and natural resource agencies to consider clean material types to use and how to minimize potential habitat impacts. | A tree survey of potentially impacted areas is being conducted as part of the Phase III PDI. These results will be included in figures as part of the Pre-Final (90%) RD.<br>The comment regarding potential clamming areas is noted. |
| 197. | Drawings | General | Current label symbology obscures outfall symbols making it difficult to differentiate from sample locations. Adjust sizing or label marker location for clarity. Ensure all features within RAAs are clearly labeled. | The Drawings have been revised. |
| 198. | Drawings | General | Check text labels for typos and clarity across the drawings package. | The Drawings have been revised. |
| 199. | Drawings | General | What is the difference between "REA" and "RAA" denoted in the drawings? | "REA" has been removed from the drawings. |
| 200. | -blank- | -- | -- | -- |
| 201. | Drawings | General | Provide information about how the future contractor will access RAA 24A, 24B, 24C, and 24D and identify areas that can be used for water treatment, sediment processing, packaging TSCA waste into containers, and loading waste into vehicles for offsite disposal. Also, depict surface water diversion or bypass practices that may be required to perform the remediation in the dry. | These evaluations will be performed during Pre-Final (90%) RD. Conceptual-level locations for some of these project features are included on the Intermediate (60%) Drawings. |
| 202. | -blank- | -- | -- | -- |
| 203. | Drawings | General | The drawings need to more clearly identify RAAs that contain TSCA waste. Once a waste determination is made for the "Potential RCRA Hazardous Waste" RAAs, the confirmed RCRA Hazardous Waste RAAs should also be clearly identified throughout the drawings. | TSCA, hazardous, and Washington state-only waste designations will be finalized after receipt of Phase III PDI results and as part of the Pre-Final (90%) RD. Areas requiring special handling and management will be noted on the Pre-Final (90%) Drawings. Figures 9-1a and 9-1b show areas that may designate as TSCA, hazardous, or Washington state-only waste in Pre-Final (90%) RD. |
| 204. | Dredge Plans | General | There are several RAAs where existing grade may be too steep to recreate topography with the placement of material (e.g., RAA 9, RAA 24, RAA 26). For the 60% design submittal, provide additional geotechnical data and analysis demonstrating that riverbank can be constructed to the existing grades. Where the existing slopes can't be reestablished, clearly identify areas that will be backfilled above existing grade. | Additional data are being collected as part of the Phase III PDI. These data are necessary for completing the design within the referenced RAAs. As such, geotechnical slope stability analyses will be performed for these areas during the Pre-Final (90%) RD. |
| 205. | Dwg V-105 | V-105 | The inlet shows blue lines that look like hatching but are probably signifying the wooden structures. Clarify with label or legend. | The Drawing V-105 legend has been revised and an arrow added. |
| 206. | Dredge Plans | C-102 | Dredge cuts should be designed to the next confirmed clean interval. The dredge cut for RAA 8F is 5.5 feet as delineated using vertical location 1527. As shown on Map 3-1h of the DER, the sample collected from the 4.5 to 5.5-foot interval was contaminated and the next analyzed clean sample is at 6.5 feet. The dredge prism depth should be increased to 6.5 feet to ensure a clean dredge surface. | Tier 2B results, which were not available during Preliminary (30%) RD, confirm a dredging thickness of 5.5 feet. Appendix D has been updated accordingly. |
| 207. | Drawing | C-102 | The no-action area between RAA9E and the shore includes core 1546. The surface was a near RAL exceedance (EF = 0.98) with all analyzed deeper intervals exceeding the RAL. An area specific technology is recommended | As shown on Drawing C-302, this area will be covered by RMC. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 208. | Dredge Plans | C-103 | Confirm if the dredge side slope of RAA 14 that extends into RAL exceedance area 17 removes all of the identified contamination within the area. If not, describe if the dredge prism of RAA 17 will be expanded to overlap with RAA 14. | The dredge side slope of RAA 14 that extends into RAL exceedance area 17 will remove at least 1 foot of sediment, which removes all material above RALs within the area. |
| 209. | Dredge Plans | C-104 | Identify if there is a technical limitation preventing the inclusion of intertidal portions of RAA 23A and portions of RAA 22 outside of the FNC in the dredge prism. | The RAA 22 dredge footprint has been modified to ensure that the primary dredge cut and side slope will remove the material above RALs in this area. Expansion of the RAA 23A footprint to include RAA 23B would cause an instability of the riprap that is protecting the adjacent shoreline. RAA 23B meets ROD requirements for ENR placement. |
| 210. | Drawing | C-151 | RAA 9B includes vertical core 1555 with unbounded contamination (refusal) at a sediment depth of about 4 feet. 9B is slated for dredging of 3 feet plus backfill of 3 feet. Since unbounded contamination will be left in-place, partial dredge & cap seems to be a more appropriate technology. Only finding intertidal sampling. Not in appendix maps Note Is 1555 TSCA waste. | Phase III data are being collected to determine depth of contamination, pending utility clearance activities. If a cap is determined to be needed, it will be included in Pre-Final (90%) RD updates.<br>The material in vertical core 1555 is not TSCA waste. PCB concentrations in vertical core 1555 are as follows:<br>• 1555A (0 to 1.5 feet): 2,110 µg/kg dw<br>• 1555B (1.5 to 2.9 feet): 513 µg/kg dw |
| 211. | Drawings | C-150 through C-156 | Note 3 should also include a reference to Drawing C-201 for the cross-section legend. | The Drawings have been revised. |
| 212. | Drawings | C-151 | It is assumed that RAAs 9D and 9L are modified caps because of the historic pilings in this area? If they are deemed historic, is it still absolutely necessary to have them remain in place? Consider removing pilings and dredging this area to eliminate the need for a cap. | The structure at RAAs 9D and 9L is historic (refer to BODR Section 3.9). The amended ENR in RAA 9L supports protection of the structure. Partial dredge and modified cap was selected in RAA 9D to address deeper RAL exceedances and meet ROD expectations regarding restoring habitat elevations above -10 feet MLLW. Pile removal would not change the technology selection in RAA 9D. |
| 213. | Drawings | C-151 & C-152 | Confirm whether RAOs can be met without taking out historic structures. If this is an uncertainty, the project should move forward with the 106 process for their removal (e.g. photo mitigation and associated coordination). If determined they do not need to be preserved, they should be removed and the remedy in RAAs 9L and 9M modified to dredge or PD&C, as appropriate. | See response to Comment No. 212. |
| 214. | Drawing | C-202 | Vertical core 1531 has buried contamination and is going to be within the side slope to RAA 9J. Based on the side slopes, will this remain buried, be exposed, or be removed? | Based on the side slopes, the buried contamination at vertical core 1531 is expected to be removed by dredging. |
| 215. | Drawing | C-202 | RAA 9G is dredged to -24ft MLLW based on a surface (0-10 cm) exceedance. Based on the cross section, this appears to be several feet of dredging.<br>Confirm if this is needed, or if a shallower dredge cut could be sufficient. | Sampling is planned in RAA 9G during the Phase III PDI, and depending on those results, the dredging depth will be revised. |
| 216. | Drawing | C-203 | Vertical core 1509-198 has buried contamination and is going to be within the side slope to RAA 11. Based on the side slopes, will this remain buried, be exposed, or be removed? | Based on the side slopes and tier 2C data, the contamination at vertical core 1509 will remain buried with at least 2 feet of RMC cover. |
| 217. | Drawings | C-210 | Section 131+50: What slope angle are we looking at on the right side cap material? Seems to be somewhat milder than 3H:1V to begin with but somewhat steeper midway through? Are we confident in stability here? | As noted on the drawings, RAA 31B includes a 3H:1V slide slope, and RAA 31D includes a thickness cut of 3 feet. |
| 218. | Drawings | G-002 | Typos in titles of sheets 52 and 59. | The Drawings have been revised. |
| 219. | Drawings | G-002 | Suggest adding tidal datum table to sheet, NOAA station 9447130. | The Drawing sheet has been revised. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 220. | Drawing S-175 Inlet at RM 2.2W Partial Plan | S-175 | Photo 2 shows a Timber Structure and has a note stating: "TIMBER STRUCTURE TO REMAIN." The timber structure shown in the photo has significant plant growth on top of the structure, and holes in the deck of the structure are visible. Would it be better to demolish this timber structure? Or, if the structure is needed by the Owner, should it be repaired so that no damage occurs during dredging of the inlet? This structure is in next to land where MTCA cleanup is likely to require structure demolition. Coordination is needed with Ecology. | LDWG agrees that coordination with the landowner, tenant, and Ecology is required. Additional information regarding the plan for the upland cleanup is required before finalizing the design for this area, including the need to demolish the timber structure on the south side of the inlet at RM 2.2W. |
| 221. | Appendix A, Table A1-1 | Appendix A pdf page 3 | Review and ensure consistency between Table A1-1, Table 2-1, and Figures 2-3a and 2-3b. Specifically, there are three sites listed in Table A1-1 as being adjacent to RAL exceedance areas that are not included in Table 2-1 or shown on Figure 2-3a and/or 2-3b. The three sites are Franks Used Cars, Vic Markov Tire, and Evergreen Marine Leasing. Confirm their locations relative to the site and either revise the last column in Table A1-1 to reflect that they are not adjacent to the LDW site or add these sites to Table 2-1 and Figure 2-3a and/or 2-3b if they are adjacent to the LDW site. Verify that upland sites separated from RAAs by armored banks (such as Dawn Foods) or overwater structures are considered adjacent. | Franks Used Cars, Vic Markov Tire, and Evergreen Marine Leasing are not adjacent to RAL exceedance areas. Table A1-1 has been revised.<br>Upland cleanup sites separated from RAAs by armored banks and overwater structures were considered adjacent for the analysis. |
| 222. | Appendix A, Table A1-1 | Appendix A pdf page 10 | The row containing Boyer Towing should be unshaded to show that it is adjacent to the LDW Middle Reach, and the last column should be revised to indicate that it is adjacent to RAL Exceedance Area 21 (consistent with Table 2-1 and Figure 2-3b). | The table has been revised as requested. |
| 223. | Appendix A, Table A1-1 | Appendix A pdf page 11 | The row containing Puget Sound Truck Seattle should be unshaded to show that it is adjacent to the LDW Middle Reach, and the last column should be revised to indicate that it is adjacent to RAL Exceedance Area 9 (consistent with Table 2-1 and Figure 2-3b). | The table has been revised as requested. |
| 224. | Appendix B | | Drawings for SMA 10 incorrectly cross reference BODR Section 10.3.2 (assuming this is from the Upper Reach BODR). Update the drawings to include the appropriate cross reference to the Middle Reach BODR. Within the main body of the BODR for SMA 10, explicitly address stability of ENR placed on the intertidal shoreline as well as cap stability along the shoreline. | The SMA 10 Drawings included in Appendix B were extracted from the upper reach Preliminary (30%) RD and directly included without any edits. SMA 10 design has progressed in Intermediate (60%) RD, and those Drawings are now included as Volume III Part IB.<br>The stability of amended ENR in the offset area will be further reviewed as part of Pre-Final (90%) RD. See also responses to Comment Nos. 11 and 13.<br>*Note: Appendix B has been repurposed and now contains SMA 10 maps from upper reach documents.* |
| 225. | Appendix C | Appendix C pdf page 2 | Global comment: Consider editing regulatory citation formatting to match exactly how it is written in the ROD. For example, USC 6901-6992K is written as U.S.C. §§ 6901- 6992K in the ROD. | Comment noted. |
| 226. | Appendix C | Appendix C pdf page 3 | Correct "WAC 220-660" in regulatory citation Hydraulic Code Rules (RCW 77.65; WAC 220–660) DMMP to "WAC 220-110". | The Appendix C text has been revised as requested. |
| 227. | Appendix C | Appendix C pdf page 4 | The regulatory citation in row "Shoreline Management" should be revised to match what is written in the ROD. Text provided: "Shoreline Management Act RCW 90.58.<br>WAC 173-26; City of Seattle Master Plan SMC 23.60; King County Master Plan K.C.C. 21A.25)" | Text has been updated to remove the RCW reference and add a King County Master Plan reference. Note that the City of Seattle Shoreline Master Plan reference in the ROD is dated and should be SMC 23.60A, not SMC 23.60, which is no longer available. |
| 228. | Appendix D | General | The presentation of depth of contamination (DOC) to support the dredge prism assumptions in the Appendix is not easy to follow. The figures presenting DOC are very busy, making it difficult to visualize how DOC changes across sub-RAAs, and how dredge depths relate to the DOC across the Site. Include a figure or set of figures showing the DOC overlain with the sub-RAA boundaries. | The original table in this appendix has been divided into two tables: one focused on dredging RAAs and one focused on PD&C RAAs. LDWG believes that this revision and the inclusion of supplementation information will support use of the existing figures without edit. |
| 229. | Appendix D | General | Appendix D should provide a table similar to Table D-1, which lists the information driving the remedial design in non-dredge RAAs, so the rationale for all RAAs and technology assignments are clearly stated and supported by the relevant information driving the decision-making process. | This information was provided in Appendix K of the DER (Anchor QEA and Windward 2025), and reference has been added to the text. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 230. | Appendix D | General | There are numerous RAAs that are unbounded but are not identified as data gaps because the selected technology is partial dredge and cap. Unless it is engineeringly infeasible to dredge deeper, assess if one additional foot of dredging would remove contamination to below RALs, per the ROD, and clearly document this or identify a data need. Otherwise, the justification needs to include engineering feasibility to sample and dredge deeper if one foot of contamination remains. | Table D-2 has been added to Appendix D. This table focuses on dredge and cap RAAs and includes a clear assessment, "if one additional foot of dredging would remove contamination to below RALs, per the ROD." |
| 231. | Appendix D | General | It's difficult to understand the depths of dredging relative to DOC using the plan view maps and stick graphs.<br>EPA would like to discuss how to make the Figure D-1-1 series more intuitively understandable. For example, revise the Figure D-1-1 series to include call-out boxes showing the vertical contaminant profiles for all cores listed in Table D1-1 and those that are driving the RAA footprints (e.g., locations 1555 and 1556). Appendix A of Data Evaluation Report shows this similar but does not highlight which cores are driving the design depth. | Refer to the response to Comment No. 228.<br>The DER Appendix A core profiles include concentrations of COCs (Anchor QEA and Windward 2025). It is not feasible to develop a figure that includes both the detailed profiles and the location maps on a single page. The BODR Appendix D figures are clones of the DER Map 3-1 series with the addition of the RAA boundaries.<br>Per our response to QAPP Addendum No. 3 Comment No. 7, the design team evaluated options for developing alternative figures and believes that the existing figures along with the revised tables should enable EPA to evaluate the required dredge depth in each RAA. As such, no revisions to Figure D-1 were made. |
| 232. | Appendix D | General | Include line for remedial dredge depth in Stick charts. | Refer to the responses to Comment Nos. 228 and 231. Where feasible, an approximate dredge elevation line has been added to the stick charts on the Figure D-1 series. Dredge lines were not added for RAAs that include thickness-based cuts. |
| 233. | Appendix D | Figure D1-1g | Northeast of RAA 13 there are significant RAL exceedances along the shoreline that are not included in the cleanup design. These are above MLLW, but they may be a source of contamination. Revise the BODR to discuss explain why these are omitted from the BODR and how/whether they will be addressed. | Per the methods established in the PDI WP (Windward and Anchor QEA 2023), sample locations that are located above the MHHW mark (such as those from the 2011 study at Seattle Iron and Metals) are not used to establish the horizontal extent of remedial action required as part of the middle reach design.<br>If there is an upland source control issue, as these samples suggest, LDWG expects that Ecology will evaluate the site and provide an opinion if the cleanup in this area can proceed (i.e., that sources are sufficiently controlled). |
| 234. | Appendix D<br>Figures D1-2a and D1-2b | Figure D1-2a | Label the RAA subareas on Figures D1-2a and b (e.g., 1A, 1B, 8A, 8B, 8C, etc.). | Figures D-2a and D-2b have been revised.<br>*Note: Figure numbers have changed slightly in this appendix.* |
| 235. | Appendix D<br>Table D1-1 | Appendix D pdf page 3 | A. Revise Table D-1 so that all sample locations driving the RAA boundaries and technology assignments are included. For example, per Figure D1-1h, the RAA boundary at 8D is apparently driven by the extent of the Thessian Polygon associated with location 1828, but no information is provided to support this assumption.<br>B. Additionally, revise the Figure D-1-1 series to include call-out boxes showing the vertical contaminant profiles for all cores listed in Table D1-1 and those that are driving the RAA footprints (e.g., locations 1555 and 1556).<br>*Note: List formatting added to this comment to match the LDWG response.* | A. The purpose of Table D-1 is to document the design basis for vertical extent of dredging and does not include information related to horizontal delineation. Horizontal delineation of RAL exceedance areas is described in detail in Appendix J of the DER. Therefore, no revisions were made to the table.<br>B. See responses to Comment Nos. 228, 231, and 232. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 236. | Appendix D Table D1-1 | Appendix D pdf page 3 | A. The RAA boundary of RAA 8E, driven by the Theissen Polygon at 1212/1528, is inappropriately clipped at the Recovery Category 1 boundary. The exceedance at 1212/1528 is not bounded by clean bank-ward samples. This sub-RAA is on the intertidal boundary directly adjacent to RAA 8F. RAA 8F will be dredged 6.5', whereas RAA 8E will be dredged to 3.5'. Based on the current DOC and mudline between these two RAA's the dredge cut at 8F will likely encroach into the dredge cut at 8E and potentially disturb contaminated sediments at the DOC associated with interval G of location 1528. Due to the proximity of these dredge prisms, the presence of contaminated sediment in RAA 8E just below the dredge cut in RAA 8F, and the likelihood of a continuous RAA between 8E and 8F the dredge prism design at the boundary of 8E and 8F should be further evaluated and refined, with justification provided in Table D1-1 supporting the current design.<br>B. Similar information should be provided to clearly state the rationale supporting the various technology assignments and dredge prism designs when RAAs are located directly adjacent to one another. For example, RAA 9 has multiple sub-areas each with a different dredge prism design, and some subject to a non-dredge technology. The current information presented in Appendix D does not clearly state the rationale for the RAA design or technology assignment within RAA 9.<br>*Note: List formatting added to this comment to match the LDWG response.* | A. RAA 8E has been revised based on Tier 2b data. Additionally, RAAs 8F and 8E are being dredged to similar elevations; the thickness varies due to sloping of the existing mudline.<br>B. The purpose of Appendix D is to support the vertical basis of design for areas that include dredging or PD&C. BODR remedial technologies are assigned to each RAA using the same procedure documented in Figure 19 and Revised Figure 20 of the ROD (EPA 2014). Remedial technology selection was documented in Appendix K of the DER. |
| 237. | Appendix F Section 2.1 Subsurface Stratigraphy | General | See comments on Section 7.2 of the design document. As applicable revise Appendix F to reflect comments in section 7.2 of the BODR Narrative | Corollary edits have been incorporated into Appendix F. |
| 238. | Appendix F Section 2.2 Groundwater and Surface Water Elevations | Appendix F pdf page 10 | Clarify the groundwater elevation(s) used in the slope stability and settlement analyses. | Groundwater and surface water elevation assumptions were added to the discussion in Section 3.1. |
| 239. | Appendix F Section 2.3.1 Sediment Undrained Shear Strength | Appendix F pdf page 14 | Clarify whether Su = 75 + 32.5·Z (≤400) represents the mean, minimum, median, or a specified percentile of the measured Su data. Demonstrate that this assumed relationship captures the lower bound of measured shear strengths; if it does not, justify why the approach is conservative or revise the assumption accordingly. | The selected strength profile represents professional judgment based on review of the data and the typical properties derived from test results. A more conservative lower-bound model (similarly developed based on professional judgment) was also evaluated for the Intermediate (60%) RD. |
| 240. | Appendix F Section 2.3.1 Sediment Undrained Shear Strength | Appendix F pdf page 14 | Clarify if this is 'compression ratio ($C_R$) or compression index (Cc)in table F2-2. Provide the formula to eliminate the confusion. Additionally, specify why this parameter is defined in slope stability material properties and how it was incorporated into the slope stability analyses. | The table heading has been updated to clarify the definition of the compression ratio by including the formula. The title of the table has been revised to avoid the misleading implication that the compression ratio is used in slope stability modeling; it is not used for that evaluation. |
| 241. | Appendix F Section 2.3.1 Sediment Undrained Shear Strength | Appendix F pdf page 14 | Clarify the basis for selecting direct shear testing instead of triaxial compression testing. Considering that direct shear imposes a predetermined failure plane, clarify how the results were determined to be representative of in-situ shear behavior. | LDWG assumes that this comment is in reference to Section 2.3.2, where the direct shear test is mentioned. In fact, in addition to direct shear tests, consolidated undrained triaxial testing was conducted to measure shear strength. Reference to this test was added to the text in this section. |
| 242. | Appendix F Section 2.3.3 Compressibility | Appendix F pdf page 15 | Describe the mechanism that is expected to induce consolidation. | The first paragraph of Section 2.3.3 provides a description of the mechanism. An additional sentence was added to further describe how consolidation occurs. |
| 243. | Appendix F Section 2.3.3 Compressibility | Appendix F pdf page 15 | Report the preconsolidation pressures from the oedometer tests and identify the value used in the design. | Preconsolidation pressures are not used. Text added to clarify that the sediments are assumed to be consolidating in virgin compression only. |
| 244. | Appendix F Section 2.3.3 Compressibility | Appendix F pdf page 15 | According to the text, five consolidation tests were performed. In addition to the selected coefficient of consolidation selected for the design (0.08 square foot per day), provide the range of coefficients of consolidation obtained from these tests. Additionally, it is unclear why this parameter is reported as "assumed" rather than based directly on the laboratory results. Provide clarification on this. | Laboratory results did not publish the coefficient of consolidation. There is no range of reported results to include in the text. No edit has been made. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 245. | Appendix F Section 3.1 General Dredge Prism Side Slope Stability | Appendix F pdf page 17 | Ensure that the pseudo-static analyses is part of the 60% design. | These analyses are reported in the Intermediate (60%) RD appendix. |
| 246. | Appendix F Section 3.1 General Dredge Prism Side Slope Stability | Appendix F pdf page 17 | Specify the phreatic surface elevation (tidal elevation used in modeling) used in the slope stability analyses and indicate whether it represents a conservative condition. Identify whether sensitivity analyses were performed to evaluate the effect of phreatic surface selection on the computed factors of safety. | See response to Comment No. 238. |
| 247. | Appendix F Section 3.3.2 Subgrade Consolidation Settlement | Appendix F pdf page 21 | Refine the settlement analyses for the next design phase. Model more representative/site-specific subsurface conditions and non-uniform pressure distribution and perform time-rate and total settlement using appropriate consolidation software (e.g., SETTLE3, SIGMA/W, or similar). | The engineer of record is comfortable that the tools used to calculate settlement are appropriate and the assumptions are representative. The additional requested analyses would not provide additional value to the design team and as such are not being conducted in future design phases. No edit has been made. |
| 248. | Appendix F Section 3.3.2 Subgrade Consolidation Settlement | Appendix F pdf page 21 | Include a table of all parameters used in consolidation analyses: compression index (Cc), recompression/compression ratio (CR or Cr), preconsolidation stress (σ'p), coefficient of consolidation (Cv), unit weight, void ratio, etc. | See response to Comment No. 243. Recompression and pre-consolidation stress are not used in the calculation because virgin compression is assumed. Because compression ratio (Table F2-2) includes the void ratio, it is also not used directly in the calculation. Section 2.3.3 reports the assumption for coefficient of consolidation, and total unit weight assumptions are presented in Table F2-2. No edits have been made to the text. |
| 249. | Appendix F Section 5.2 Strong Motion Design Input Parameters | Appendix F pdf page 35 | The selection of design earthquakes must be consistent with the Washington DOT Geotechnical Manual and the applicable USACE Engineering Manuals and Engineer Regulations. Ensure this requirement is captured and applied in all future design work. | See response to Comment No. 250. |
| 250. | Appendix F Section 5.2 Strong Motion Design Input Parameters | Appendix F pdf page 35 | The current text presents PGA and mean magnitude values derived from the USGS probabilistic seismic hazard analysis; however, this alone is not sufficient. In accordance with USACE and WSDOT guidance, the potential effects of the Cascadia Subduction Zone must also be explicitly considered. The analysis should evaluate a range of magnitude–rupture distance (M-R) pairs to determine which scenario produces the controlling seismic demand for the project. This step is especially important for liquefaction potential assessment. | The engineer of record considers that the assessment completed is sufficient. In accordance with WSDOT, the evaluation uses the General Procedure, which is appropriate for this project. The requested analyses are documented in WSDOT for a Site-Specific Ground Motion Response analysis, which is not warranted.<br>As stated in the appendix, liquefaction was predicted for all CPT locations. The engineer of record presumes that a Site-Specific Ground Motion Response analysis would result in the same conclusions. |
| 251. | Appendix F Section 5.2 Strong Motion Design Input Parameters | Appendix F pdf page 35 | It is unclear if the PGAs in table F5-1 were adjusted for the site-specific Site Class. If not, the values may not be representative of Site Class E, because the USGS probabilistic hazard results use a default Site Class B (VS30 ≈ 760 m/s). Confirm whether site-class adjustments were performed. | The values presented in Table F5-1 were adjusted by the USGS tool to site class D/E boundary. See table notes. No edit has been made. |
| 252. | Appendix F Section 5.4 Seismic Performance of Capped Slopes | Appendix F pdf page 36 | If pseudo-static slope stability analyses were performed, clearly present the results in the report. Tabulated results should summarize static short-term, static long-term, and pseudo-static factors of safety for direct comparison. | See response to Comment No. 245. |
| 253. | Appendix F Section 5.4 Seismic Performance of Capped Slopes | Appendix F pdf page 36 | Pseudo-static slope stability analyses must be performed using seismic coefficients derived from the PGA selected in accordance with USACE Engineer Manuals/Regulations and the Washington State DOT Geotechnical Design Manual. Ensure this is addressed in the design. | The WSDOT *Geotechnical Design Manual* (WSDOT 2022) provides mapping for return interval earthquakes that differ from the design earthquake scenarios used for this project. Thus, this reference cannot be used directly. The general approach of using site-adjusted mapped bedrock acceleration coefficients for analysis (akin to the WSDOT approach) has already been performed. No changes were made for Intermediate (60%) RD. |
| 254. | Appendix F Section 5.4 Seismic Performance of Capped Slopes | Appendix F pdf page 36 | The NCHRP 2008 might underestimate displacements if multiple magnitude-distance combinations are not considered due to the presence of Cascadia Subduction Zone. Ensure this is addressed in the 60% design. | The salient conclusion of this discussion is that deformation is predicted during an earthquake. Precise prediction of the amount of deformation is not necessary, and using alternative methods to evaluate deformation would not change the design conclusion that post-earthquake monitoring (and potential maintenance) will be addressed by the LTMMP. Additional text has been added to acknowledge that different methods could predict different calculated deformations. |
| 255. | Appendix G | Appendix G pdf page 4 | Parts of the Middle Reach of the Duwamish Waterway extends outside of the city of Seattle. Clarify whether Washington State Building Code should be the governing code. | No middle reach structures are located outside of the City of Seattle. Additionally, no structural work is expected related to upper reach SMA 10. No change to Appendix G is required. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 256. | Appendix H | General | Revise the text and evaluations in Appendix H for consistency with comments on main body text section 9.3. | A consistency review between Section 9.3 and Appendix H was performed. |
| 257. | Appendix H | General | Chemical isolation material is described as sand in Table H4-1, gravel in Table H4-2, sandy gravel in Table H4-3, and gravelly sand in the main report. Clarify the proposed chemical isolation material and the rationale for selection of the CIL in different areas. | Gravelly sand was proposed as the chemical isolation material in the Intermediate (60%) RD, and the corresponding bulk density and porosity values were used in the standard cap isolation layer modeling. These properties will be updated, along with the additional Phase III PDI data, for the modified cap modeling in the Pre-Final (90%) RD. Sandy gravel was used in the Intermediate (60%) RD model for the RAA 9K utility crossing cover (AST D).<br>The updated porosity and bulk density values may result in minor changes to model-predicted contaminant transport; however, the resulting changes are not expected to be material and are unlikely to affect the thickness of the isolation layer. |
| 258. | Appendix H | General | Include representative breakthrough curves with time for modeled conditions in the 60% design. Breakthrough curves with depth are important for understanding the how variable FOC contents between layers affects model results, as well as the impact of the benthic boundary condition assumption. | Graphics of concentration with depth and time are provided in Attachment H.4. |
| 259. | Appendix H | Table H3-2 | Revise the note in Table H3-2 to reflect the correct congeners for total benzofluoranthenes. | The note for Table H3-2 has been corrected. |
| 260. | Appendix H Section 1 Introduction | Appendix H-1 | Revise Appendix H to include figures of maximum COC concentrations at each capping RAA. EPA agrees that dredged sediments results can be removed from the figures and evaluation. The lack of data collected within a RAA does not warrant the elimination of a COC from the cap design in a given RAA, if no data was collected for a specific COC in an RAA or at the representative depth, a conservative estimate of concentrations should be used. For example, in RAA 5A, PCBs were the only contaminant analyzed in surface and core samples. For RAAs without complete COC data, provide a technical justification for excluding COCs from capping design. | Maps of maximum concentrations below the cap for PCBs and dioxin/furan TEQs were included in Section 1 of Appendix H. For RAAs where COC concentrations have not been fully characterized, the minimum cap isolation layer thickness from a nearby modeled RAA was assumed for the Intermediate (60%) RD. This approach assumes that the sediment chemistry beneath the cap is similar between adjacent RAAs. Additional data are being collected during the Phase III PDI to confirm the COCs present below each cap area and their vertical extent. These results will be incorporated into the final cap isolation layer modeling during the Pre-Final (90%) RD. |
| 261. | Appendix H Section 2.2 Simulation Approach for the Engineered Caps | Appendix H pdf page 12 | The point of compliance should be evaluated below the bioturbation zone for all modeled cap scenarios. The presented cap models are currently being evaluated by comparing the average concentration within a 10 cm or 45 cm surface interval to the RAL. For modified caps, the habitat layer appears to be included in this analysis. This point of compliance is located within the bioturbation zone. "Because of the speed of contaminant transport within the BAZ, this zone quickly adapts to the surface boundary condition." (ITRC 2023). Include additional information and/or sensitivity analysis that show the CIL is effectively attenuating COC concentrations. As currently presented, the modeled sediment concentrations in the top 10 cm may be influenced by the surface water boundary, which has the potential to artificially depress the modeled sediment concentrations. Include information to support if the mass transfer coefficient is applicable to site-specific conditions and to all COCs. | Evaluating the average concentration within the bioturbation zone and comparing that value to the RAL is appropriate because this is the depth over which benthic organisms live and feed. The majority of the benthic organisms will be present at the surface and within the top few centimeters, so including the full thickness of the bioturbation zone with equal weight is conservative.<br>A mass transfer coefficient of 0.3 cm/hr is appropriate and within the range of 0.1 to 0.8 cm/hr estimated using the LDW data from Apell et al (2018). A sensitivity analysis using the lower-end mass transfer coefficient of 0.1 cm/hr was performed to further evaluate its impact to the cap design. |
| 262. | Appendix H Section 2.2 Simulation Approach for the Engineered Caps | Appendix H pdf page 12 | Include model predicted aqueous concentrations compared to initial aqueous concentrations for informational purposes. While solid phase concentrations are necessary for comparing to RALs, aqueous phase concentrations will indicate if transport of COCs are decreasing with time. | Porewater concentrations at Year 100 were provided in Attachment H.3. |
| 263. | Appendix H Section 2.3 Simulation Approach for the Utility Crossing AST | Appendix H pdf page 12 | Revise the text in this section to include the number of feet dredged, in addition to the elevation after dredging. | The average dredge depth was included for the RAA subject to the utility crossing AST in Section 2.2.2. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 264. | Appendix H Figure H2-1 Engineered Cap Layer Configuration and Processes Simulated in the Model | Appendix H pdf page 11 | The modified cap design in the figure shows a 1.5-foot habitat layer, but the note states 1 foot. Modeling files appear to show a 1.5-foot-thick habitat layer but no armor layer. Clarify if the habitat layer and armor layers are the same material and correct thicknesses on drawing accordingly. | The habitat layer was designed to have a minimum thickness of 1.5 feet; however, it is expected that the upper portion of the layer may be dynamically stable. To provide a conservative assessment of long-term cap performance, only the lower 1-foot habitat layer was included in the modeling, as shown in Figure H2-1b.<br>Because the habitat layer (modeled as 1 foot) and the underlying armor (0.5-foot) layer both have the same assumed bulk density and porosity, it was specified as a 1.5-foot layer in the model input. These assumptions will be re-evaluated during Pre-Final (90%) RD as the erosion protection modeling is finalized for modified caps. |
| 265. | Appendix H Figure H2-1 Engineered Cap Layer Configuration and Processes Simulated in the Model | Appendix H pdf page 7 | The standard cap has a filter layer, and the modified cap does not between the armor layer and the chemical isolation layer. If the cap is exposed down to the armor layer due to erosive forces, the sub grade below the armor layer is susceptible to uplifting forces that can degrade the armor layer and subgrade over time or during a sustained large event. Ensure the gradation of either the filter layer or chemical isolation layer is not susceptible to these forces that would undermine the cap layer relative to the selected armor layer D50 and gradation profile. | The Intermediate (60%) RD assumes that the isolation layer material used for the modified cap will be designed for dual purposes (i.e., isolation and filter) and will be specified using the filter material criteria. As discussed in Appendix I, additional erosion protection modeling is required in intertidal areas. This will be completed during the Pre-Final (90%) RD, and the isolation layer design for modified caps will be adjusted accordingly. |
| 266. | Appendix H Section 3 Model Inputs | Appendix H pdf page 12 | During 60% design, perform sensitivity analysis for the default hydrodynamic dispersivity of 10% of layer thickness. | As noted in Section 3.3, a sensitivity analysis on dispersivity was conducted, and the results are presented in Section 5 of Appendix H. |
| 267. | Appendix H Table H3-1 Input Parameter Values for the Chemical Isolation Cap Model | Appendix H pdf page 12 | The assumed porosity and bulk density are the same for the CIL material (sand or gravel) with or without amendment. The porosity and bulk density of the selected amendment could change the porosity and bulk density of the CIL mixture (i.e., sand and amendment), which can change the dissolved phase transport of COCs. Revise the modeling files to include amendment porosity and bulk density. | As noted in Table H3-1, the porosity and bulk density in the chemical isolation layer will be updated with the placement of amendments based on the results of the Phase III PDI during the Pre-Final (90%) RD. |
| 268. | Appendix H Table H3-1 Input Parameter Values for the Chemical Isolation Cap Model | Appendix H pdf page 14 | Revise the table to provide molecular diffusivity values for individual compounds (or homologs), rather than classes and ranges, similar to how partition coefficients are provided for individual compounds (or homologs) in Table H3-1. | The molecular diffusivities are now included in Table H3-3. |
| 269. | Appendix H Section 3.2 Porewater Concentrations | Appendix H pdf page 23 | Revise the text in this section to include the fraction organic carbon (FOC) used in the calculation of equilibrium porewater concentrations. The CapSim models do not include an underlying sediment layer, and therefore, it is unclear how these initial concentrations were calculated. | The text was modified for clarification. |
| 270. | Appendix H Section 4.2 Modified Cap | Appendix H pdf page 30 | Revise the text to include assumed activated carbon percentages in addition to cap TOC percentages. | The requested description was added to the appendix in Table H4-2. |
| 271. | Appendix H Table H.2.1 to H.2.3 | Appendix H pdf page 57 | Revise the tables in Attachment H.2 or include new tables which compare initial sediment concentrations to model predicted sediment concentrations. | Initial sediment concentrations were added to the tables in Attachment H.2. |
| 272. | Appendix H Table H.2.1 to H.2.3 | Appendix H pdf page 57 | Revise the tables in Attachment H.2 to include the SCO for each COC. | Benthic SCOs were included in the tables in Attachment H.2. |
| 273. | Appendix H | | Identify caps in intertidal area that will require a minimum 45 cm clam habitat layer. | The second paragraph of Appendix H identifies the RAAs that require a 45-cm layer of suitable habitat material. These areas include all or a portion of RAAs 5B, 8B, 9A, 9D, 20B, 24I, 26, and 31D. All of these areas are in potential clamming areas (per the ROD) except for RAAs 20B, 26, and 31D. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 274. | Appendix H | H-25 | "At the higher seepage rate and a 15-cm chemical isolation layer amended with 2% TOC, model results show that 100-year concentrations in the top 10 cm and top 45 cm of the cap are 16 and 4.1 times less than the corresponding RALs, respectively (Table H.2.2 of Attachment H.2). At the higher seepage rate and a 30-cm chemical isolation layer amended with 1% TOC, model results show that the 100-year concentrations in the top 10 and top 45 cm are 5.6 and 1.2 times less than the corresponding RALs, respectively"<br>How many of these areas are recovery category 2 areas where the RAL is a higher number (multiple of SCO)? Include a table that shows expected post construction surface concentration in all remediation areas. | RAAs 5B, 9D, 24I, and 26 are RC 2 in intertidal areas. The RALs for these RAAs were set as 2 times the SCOs. Upon construction of a cap, all capped RAAs will have non-detect surface concentrations. A table summarizing this expectation was not provided. |
| 275. | Appendix I Engineering Protection Analysis | General | The design uses a 7-knot speed for calculating wake-related erosion. It has been observed that recreational and commercial fishing vessels on the Lower Duwamish often travel much faster, particularly during peak fishing season from August to October. Recommend adding a contingency factor to account for actual conditions. Chain drag is observed in some areas and should also be addressed here and in appendices related to buried contamination, ENR, etc. The vessel design scenario should also include impacts from more frequent recreational craft in shallow areas with proposed caps | Complete and/or reliable information on frequency and speed of travel for recreational and fishing vessels is not available in the Automatic Identification System data record (e.g., as found at www.marinetraffic.com). It is possible that these vessels occasionally travel at speeds faster than the larger commercial vessels and therefore could produce a larger wake than the design tugs selected for this analysis. However, these events are expected to be infrequent compared to continuous commercial operations in the middle reach used for cap design. Chain drag will be considered as part of Pre-Final (90%) RD, and cap size or cap layer thickness will be adjusted to account for chain drag as needed in areas where this has been identified to be an ongoing activity. However, it is important to note that chain drag is likely to exert lower forces in comparison to propwash. |
| 276. | Appendix J Water Quality Effects Evaluation, Section 3.2 Turbidity and Total Suspended Solids Thresholds | Appendix J pdf page 14 | Revise the last paragraph in Section 3.2 to clearly state that the 5 NTU limit is not a useful protective metric in HMAs and identify specific BMPs that will be implemented (rather than "could be implemented") to account for this. The text should also note that although conservative modeling assumptions (high sediment loss rate, low settling velocity) were applied, these only inflate turbidity and do not eliminate the risk of low-turbidity exceedances. Revise to reflect that water-quality exceedances were modeled in HMAs as low as 0.25 NTU and identify specific additional safeguards to be incorporated for those areas. | Text revised to state that the 5-NTU limit is not a useful metric in the Hazardous Waste Areas, and a reference to BODR Section 10, which is the place where potential BMPs are listed, has been added. Text was also added to refer to the WQMP (to be prepared at Pre-Final [90%] RD), where additional measures will be described. |
| 277. | Appendix J, Section 5 Conclusions and Recommendations | Appendix J pdf page 18 | Commit to Dredge Elutriate Testing and use results to refine design. Appendix J suggests that a DRET may be performed in Phase III PDI for the high-risk areas (particularly HMAs like RAA 21/31). This is critical, and the BODR should unequivocally commit to it. | Section 5.8 of QAPP Addendum No. 3 discusses the elutriate testing proposed for RAA 31. The BODR states that the test will be performed. |
| 278. | Appendix K Green Remediation, 7.2.4 Use of Biodiesel | Appendix K pdf page 34 | While citing "measured reductions in PM (10.1%), HC (21.1%), and CO (11.0%)" this section goes on to conclude that "no overall net emission reductions or environmental benefits are identified" from the use of a 20/80 mix of biodiesel/diesel, respectively. Reducing pm 2.5 emissions in the middle of a community with young children present could have real benefit in reducing childhood asthma according to EPA (See: https://www.epa.gov/dera/learn-about-impacts-diesel-exhaust-and-diesel-emissions-reduction-act ). Revise this conclusion to note that while some benefits were identified in emissions e.g., reductions for PM 2.5, these were outweighed by the logistical challenges of using biodiesel on the project. In other words, a much bigger benefit is realized by putting efforts into fielding tier 4 engines wherever possible, which further reduce emissions and are readily available. | *Note: Appendix K is now Appendix L.*<br>Section 7.2.4 was revised to acknowledge that reductions in air emissions can be achieved through a minimum tier engine requirement for the contractor. |
| 279. | Appendix K Green Remediation, 7.2.2 Marine vessel electrification | Appendix K pdf page 32 | The marine vessel electrification section does not include an evaluation of using electric or hybrid tugboats. Green Remediation should evaluate the use and availability of greener tugboats in the cleanup process. Electric and hybrid tugboats not only emit fewer or no air pollutants, but their design also typically reduces prop wash and can reduce habitat impacts and recontamination risks. | *Note: Appendix K is now Appendix L.*<br>Discussion of examples of hybrid/electric tugboats was added to Section 7.2.2. As the current availability of hybrid/electric tugboats in the United States is very limited (i.e., these marine vessels are generally not commercially available for purchase but rather only on demand for manufacturing), it is anticipated that the Specifications will require prioritization the use of electric equipment or equipment that uses alternative fuels, to the maximum extent practicable. The contractor will be also required to provide justification in its RAWP for when electric equipment or equipment that uses alternative fuels cannot be used. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 280. | Appendix K Green Remediation, 9.2 BMPs for Water Use | Appendix K pdf page 38 | Show how you are meeting water conservation requirements in Section 13.2.5 of the ROD. | *Note: Appendix K is now Appendix L.*<br>This appendix assumes that all water use for the construction activities of the project (e.g., transload, dust control, or decontamination) will be in minimal amounts and non-potable water; therefore, no specific water BMPs apply. However, text was added in Section 9.2 clarifying that water conservation and efficiency approaches will be implemented to the extent applicable or practicable. |
| 281. | Appendix M | General | The project is expected to occur over 10 years; however, the OPC presents costs in 2025 dollars. Inflation over 10 years can be significant. Describe how the OPC factors in inflation over the 10-year schedule. Based on assumed productivities for dredging and backfill, a rough project schedule could be applied to the costs to determine the impact of inflation on the project. Or simpler methods of dividing the costs evenly over 10 years and then applying inflation individually to each year could be used to estimate the impact of inflation. Overall, ensure the impacts of inflation over 10 years are considered. | *Note: Appendix M is now Appendix N.*<br>The unit costs used in Appendix N (Opinion of Probable Cost) for Intermediate (60%) RD have been updated to present-day U.S. dollars (i.e., 2026). Unit costs will be updated for each stage of RD (throughout Final [100%] RD) and will represent the estimate of the costs for the middle reach project(s) as they are prepared for bidding through multiple construction contracts.<br>Once the middle reach is split into multiple contracts, the impacts of inflation will be less significant for shorter duration contracts. |
| 282. | Appendix M Sources of Cost Information and Costing Approach | Appendix M pdf page 5 | A three-point estimating approach was applied using a "lower" cost scenario that applies a 10% decrease in unit cost and an "upper" cost scenario that applies a 20% increase in unit cost. Describe the rationale for applying the 10% decrease and 20% increase in unit cost.<br>In addition, identify why a change in unit cost was chosen for the three-point estimating approach. | The "lower" and "upper" cost scenarios (applying a 10% decrease and a 20% increase in unit cost, respectively) are based on best professional judgment on costing for sediment remediation projects. |
| 283. | Appendix M Sources of Cost Information | Appendix M pdf page 6 | Clarify why the consumer price index historical inflation rates were used to adjust historical sediment remediation costs to 2025. The CPI is based on costs for consumer goods, consumer services, and energy prices.<br>Also clarify why construction-based indices were not considered. For example, Engineer News Record and the U.S. Army Corps of Engineers Construction Civil Works Construction Cost Index System (CWCCIS) provide such information. Revise historical costs based on construction-based indices. | Historical inflation rates from CPI and CWCCIS were used to escalate cost information from the historical remediation projects that were reviewed. See revision to Appendix N, footnote 2. |
| 284. | Appendix M Sources of Cost Information | Appendix M pdf page 6 | The cost assumes that the dredging production rates are limited by the existing transload daily capacity for the single commercial facility. The production rates assume that the project will therefore have full capacity of the transload facility. Clarify if the project will or may compete with other projects for the transload facility capacity. If such competition were to occur, the current schedule assumptions would need to be re-evaluated. Include this risk as part of an overall cost and schedule risk analysis. | See response to Comment No. 169. |
| 285. | Appendix M | M-11 | A 30% contingency was generally applied to the project except for the less defined structural work, which applied a contingency of 50%. Generally, the contingencies are in the range expected for the level of project definition. However, because of the project uncertainties, conduct a cost and schedule risk analysis to determine the contingencies applied to the cost estimate. | Best engineering judgement determines the project and specific contingency percentages for the Intermediate (60%) RD Opinion of Probable Cost. |
| 286. | Appendix M | Attachment M.1.2 | Environmental controls are presented as a lump sum cost, which is intended to include all costs for the expected 10-year project schedule. Review the annual costs between $40,500 and $54,000 per year and verify the costs include deployment, maintenance, and removal of silt curtains and erosion and sediment controls and sheen control. Consider costs for this type of work in upper reach, which may be a lower bound. | Best engineering judgment determines the estimate for the procurement, deployment, maintenance, and removal of a silt curtain/moon pool system for environmental protection, specifically during dredging within RAAs 21A and 31B to 31D. |
| 287. | Appendix N | | Table shows some T-115 info but doesn't include AML's proposed berth dredging. Add this.<br>Table identifies BIA and Silver Bay Logging as tenants of the Muckleshoot property in Slip 3. Figure 4-3 shows multiple in-water parcels in Slip 3. Clarify which parcels are associated with which owner and reference figure. | The table has been revised to include berth dredging and update ownership. Figure 4-3a has been revised to clarify the in-water parcel ownership by SDOT and the Muckleshoot Indian Tribe.<br>Note: The table from Appendix N is now included as Table A1-2 in Appendix A. |

**Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report**
**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | EPA Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 288. | Volume II, Part IV, ICIAP outline, Section 1.2 Middle Reach Specifications Outline | 1 | For government controls, it would be helpful if those being contemplated were named in the outline as sub-bullets, such as regulated navigation areas and call before you dig registration for caps. | Subbullets were added to address this comment. |
| 289. | Volume III, Specifications Outline | | The outline of the specifications is generally acceptable. The 60% RD specifications should be appropriately prescriptive regarding activities that involve hazardous waste (including excavation/dredging, dewatering, transport and disposal, decon of equipment and personnel, and others). | A revised outline of the Specifications is provided at Intermediate (60%) RD. Full Specification sections will be provided as part of the Pre-Final (90%) RD. |

| Comment No. | Section | PDF Page No. | USACE Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 1. | Appendix D | Table D1-1 | Adding USACE stationing for extent of caps (eg 100+00 to 101+50) and providing FNC required depth would be helpful on this chart to show easily where caps will end up in relation to the channel. | Stationing (in plan and cross-sectional view) is included on the draft contract Drawings. The FNC authorized depth has been added to Tables D1-1 and D1-2. |
| 2. | General | | Will upper reach design recommendation be integrated into Middle Reach, especially Appendix D 408 substantive compliance, residual risk analysis and foreseen impacts to FNC? | A Section 408 substantive compliance evaluation for the middle reach will be drafted as part of the Pre-Final (90%) RD. As with other aspects of the design, lessons learned from upper reach will be considered. |
| 3. | General | | Provide 100 foot as-built cross-section drawings with USACE stationing for all caps within FNC extents and areas where side-slope work could impact FNC. Clearly demarcate the footprint area of the RMC or RMCs that exceeds project depth in the FNC on the drawings and cross-sections to quantify its impact. | LDWG will discuss the preferred form of post-construction documentation with EPA and USACE. Cross sections for each 100 feet of FNC stationing are not necessary for the contract Drawings. |
| 4. | General | | Clearly demarcate the footprint area of the RMC or RMCs that exceeds project depth in the FNC on the drawings and cross-sections to quantify its impact. | This information will be included as part of the Section 408 substantive compliance evaluation, which will be drafted during Pre-Final (90%) RD. |
| 5. | General | | Clearly define all dredging-related terms (USACE uses term 'overdepth', so it is important to define terms from the ROD) and specify how these depths will be applied throughout the Middle Reach project, including how dredge profiles are planned to ensure consistency and stability. Assess the potential future maintenance dredging costs that might arise from dredged material remaining above authorized depths. | All dredging-related terms will be defined in the contract Drawings and Specifications, and these contract terms may differ from terminology used by others.<br>Maintenance dredging is not required by the ROD, nor is it an expectation from EPA that LDWG would include maintenance dredging as part of RD. |
| 6. | General | | Include precise locations (USACE channel station numbers) for all engineered caps placed within the FNC, and address how side slope stability requirements will be achieved. The design should provide full support for USACE navigation needs.<br>Ensure all construction areas meet meet FNC maintenance depth + 2 feet advanced maintenance and +2 overdepth to comply with current USACE O&M dredging needs. | The draft contract Drawings include stationing for all cap areas. The limits of the caps have been designed to meet ROD requirements regarding buffers from the authorized depths and limits of the FNC, with two exceptions: 1) the utility crossing at 8th Avenue S (STA 175+20 to 176+20); and 2) the requested operational modification north of the 1st Avenue S Bridge (STA 127+00 to 134+00). These are discussed in Sections 5.1.2 and 9.6.3.<br>Information regarding stability of dredged and capped slopes is provided in Appendix F. |
| 7. | Volume III Drawings | C-210 | REA 30 section 131+50 slope has no overdepth to channel, could affect dredging within channel prism. | See response to USACE Comment No. 6. |
| 8. | Volume III Drawings | | Caps in the channel - 9K, 9J, 1B, 14-sunken barge. 9K will affect dredging operations. Need clear drawings with stationing for areas that will have impacts to O&M dredging. Will sunken barge be completely removed? | Detailed as-built drawings will be provided at the completion of construction. The sunken barge located within the FNC approximately between STA 162+00 and 164+ will be fully removed. |
| 9. | Volume III Drawings | C-151 | Please show federal navigation channel extents for RAO9 C-151 or provide cross sections for 9K and 9J. | Sheet C-151 depicts the shoreline area, and the FNC is off page. See Sheet C-102 for plan views showing FNC in relation to 9K and 9J. A cross section for 9J is on Sheet C-202, and a new cross section has been added at 175+80 for 9K. |

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**Lower Duwamish Waterway Middle Reach**

| Comment No. | Section | PDF Page No. | USACE Comment (January 2, 2026) | LDWG Response (July 31, 2026) |
|---|---|---|---|---|
| 10. | General | | Would a shape file containing federal navigation channel framework in 3d be helpful to this design? We could provide this data if you do not have it. | Yes, LDWG will request this file. |
| 11. | General | | Looking forward to seeing Residual Risk Analysis and associated figures like what was performed for the upper reach Appendix D 408. Request similar analyses and figures. | A Section 408 substantive compliance evaluation for the middle reach will be drafted as part of the Pre-Final (90%) RD. As with other aspects of the design, lessons learned from upper reach will be considered. |
| 12. | 3.4 | 26 | The 30% RD does not include beneficial reuse of sediments but implies there may be potential in the 60% Design. It's unclear what these opportunities might entail and how this may affect the federal navigation project. Provide more context on the type of beneficial use that may be sought and if the material would be placed in proximity to the FNC or other federally maintained navigation features. | No beneficial use opportunities were identified as part of the Intermediate (60%) RD. |
| 13. | Appendix D; Figure 5-1b; Drawings Sheet C-106; Sheet C-209 | Appendix D, D-6 Drawings | RAA subarea 30B (adjacent to Slip3) is in the transition in the FNC from an elevation of 30' MLLW to -20' MLLW at FNC Sta. 134+00. The Engineered Cap is listed to require a top of cap below -24' MLLW. Need to ensure this doesn't leave the north end of the cap above the authorized depth at terminates immediately at this location. It's unclear if there will be an impact to the FNC without demarking the transition of the cap in the Figures presented in Figure 5-1b. Recommend adding lines to demark transitions in FNC authorized depth to help clarify this in Figure 5-1b and an additional cross-section on Sheet C-209 at Sta. 134+00 to detail this transition | See response to USACE Comment No. 6. |
| 14. | Appendix D; Figure 5-1b; Drawings Sheet C-106; Sheet C-209 | | Unclear how the engineered cap will transition to the utility crossing cover near Sta. 134+00. This is also where the FNC changes from -30 to -20' MLLW. Provide more information to ensure this isn't something that could result in a problem for future maintenance of the FNC. | See response to USACE Comment No. 6. |
| 15. | Figure 5-1e Drawings Sheet C-202 | | Utility crossing cover at RM 2.8 is located over the transition in the FNC from -20' to -15' MLLW (i.e. Sta. 176+00). Include a detail and cross-section showing how this transition will be performed to ensure this is compatible with future FNC O&M dredging. | See response to USACE Comment No. 6. |
| 16. | Table D-1 | | It would be helpful to include a column listing authorized FNC depth for each RAA located in the FNC. This would provide a convenient check that all dredging/cap/leave surface elevations are compatible with FNC O&M | See response to USACE Comment No. 1. |
| 17. | Section 9.3.1 & APPENDIX I | | Cap design. The stability of the cap was evaluated for prop wash based on existing vessel traffic using the middle reach from 2019-2024 (Garth Foss and Clayton Arthur). The biggest concern is where the authorized depth decreases to -20' MLLW and larger tugs transit (RM 2 to 2.6). As container ships are getting larger more powerful tugs (i.e 100-ton tugs) are being used. Will the cap be stable for a larger tug class; will this be evaluated in future design? Will institutional controls on vessel traffic be required to ensure the cap is stable? Also, it would be useful to confirm in later design stages with a CFD model that the empirical equations estimating cap stability from prop wash are accurate. | The Garth Foss is a 90-ton tug and already one of the more powerful tugs operating in Puget Sound. 100-ton tugs and larger are typically ocean towing vessels. It is also unlikely that future site uses will change because of restrictions through the 1st Avenue S Bridge.<br>Additionally, the empirical methods used to assess stability generally overpredict in comparison to computational fluid dynamics modeling because of the assumptions used on the method. |
| 18. | BODR Text Section 9.6.3.1 | 108 | This paragraph states, "For Preliminary (30%) RD, the portion of the area within the FNC will be dredged 2 feet deeper (-22 feet MLLW) than the FNC authorized depth in this area to allow for 2 feet of AST D1 cover." This means the cover will be located from -20ft to -22ft MLLW. | Correct. Also, see response to USACE Comment No. 6. |

## Comment and Response Matrix: EPA and USACE Comments on the 30% Remedial Design Basis of Design Report
## Lower Duwamish Waterway Middle Reach

Notes:
µg/kg: microgram per kilogram
AC: activated carbon
AOC5: fifth amendment to the Administrative Order on Consent
AST: area-specific technology
ASTM: ASTM International
BA: Biological Assessment
BBP: butyl benzyl phthalate
BiOp: Biological Opinion
BMP: best management practice
BODR: Basis of Design Report
cm: centimeter
cm/hr: centimeter per hour
COC: contaminant of concern
contractor: Remedial Action Contractor
cPAH: carcinogenic polycyclic aromatic hydrocarbon
CPI: consumer price index
CPT: cone penetration test
CQAP: *Construction Quality Control Plan*
CUL: cleanup level
CWA: Clean Water Act
CWCCIS: Civil Works Construction Cost Index System
cy: cubic yard
$D_{50}$: median particle size
DER: *Pre-Design Investigation Data Evaluation Report for the Lower Duwamish Waterway – Middle Reach*
dw: dry weight
Ecology: Washington State Department of Ecology
ENR: enhanced natural recovery
EPA: U.S. Environmental Protection Agency
ESD: Explanation of Significant Differences
FEMA: Federal Emergency Management Agency
FNC: federal navigation channel
FS: *Final Feasibility Study, Lower Duwamish Waterway*
H:V: horizontal to vertical
ICIAP: Institutional Controls Implementation and Assurance Plan
LDW: Lower Duwamish Waterway
LDWG: Lower Duwamish Waterway Group
LTMMP: Long-Term Monitoring and Maintenance Plan
mg/kg: milligram per kilogram
MHHW: mean higher high water
MLLW: mean lower low water
MTCA: Model Toxics Control Act
NAVD88: North American Vertical Datum of 1988
NRDA: Natural Resource Damage Assessment
NTU: nephelometric turbidity unit
OC: organic carbon
PCB: polychlorinated biphenyl
PD&C: partial dredge and cap
PDI: pre-design investigation
propwash: propeller wash
QAPP Addendum No. 3: *Pre-Design Investigation Quality Assurance Project Plan Addendum No. 3 for the Lower Duwamish Waterway Middle Reach – Phase III Sampling*
RAA: remedial action area
RAL: remedial action level
RAO: remedial action objective
RAWP: Remedial Action Work Plan
RC: recovery category
RCP: Representative Concentration Pathways
RCRA: Resource Conservation and Recovery Act
RCW: Revised Code of Washington
RD: remedial design
RM: river mile
RMC: residuals management cover
ROD: *Record of Decision*
SCO: sediment cleanup objective
SDOT: Seattle Department of Transportation
Services: U.S. Fish and Wildlife Service and National Marine Fisheries Service
SMA: sediment management area
SMC: Seattle Municipal Code
SPT: standard penetration test
TEQ: toxic equivalents
TOC: total organic carbon
TSCA: Toxic Substances Control Act
USACE: U.S. Army Corps of Engineers
USCS: Unified Soil Classification System
USGS: U.S. Geological Survey
WAC: Washington Administrative Code
WQMP: Water Quality Monitoring Plan
WSDOT: Washington Department of Transportation

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