REDACTED

From: Young, Hunter <Young.Hunter@epa.gov>
Sent: Monday, December 5, 2022 4:06 PM
To: Wyatt, Robert <Robert.Wyatt@nwnatural.com>
Cc: Peterson, Lance <petersonle@cdmsmith.com>; Ryan Barth <rbarth@anchorqea.com>; Jen Mott <jmott@anchorqea.com>
Subject: RE: PAR and Laboratory Pilot Study Work Plan

CAUTION: This email originated from outside of Anchor QEA. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Bob,

The Preferred Alternative Report (PAR) dated October 2022 provides a concept for moving forward with a sediment remedy for the Gasco Project Area that incorporates in situ stabilization and solidification (ISS) into the design. NW Natural's "preferred Full Dredge and ISS Design" presented in the PAR combines full dredging to the depth of contamination based on Record of Decision Table 21 remedial action level exceedances and the presence of Principal Threat Waste (PTW) in the Navigation Channel Region, combined with ISS treatment throughout the Intermediate, Shallow, and

Riverbank Regions of the Project Area, and an integrated deep ISS treatment barrier wall at the top of riverbank. EPA recognizes the primary purpose of the PAR as a planning document to articulate future evaluations needed to demonstrate applicability of the ISS technology.

The conditions under which ISS was retained in the Feasibility Study (FS) and included in the selected remedy are for areas where access, structures, and slope stability issues exist, where groundwater is affecting porewater, and for PTW, which EPA recognizes are situations present at the Gasco Project Area. EPA generally supports the ISS concept and supports NWN moving forward with treatability and pilot studies to validate whether ISS is a viable sediment remedial technology at the Gasco Project Area. EPA also supports incorporating this technology into the revised design for the project area.

EPA understands that NWN has proposed an integrated deep ISS treatment barrier wall to DEQ as an alternative source control measure and that DEQ is reviewing NWN's proposal with an understanding that the design and construction of the alternative source control remedy will be completed in parallel with the in-water remedy.

This email provides EPA's comments on the PAR which are to be addressed in future design deliverable.

Thank you,

Hunter Young
U.S. Environmental Protection Agency
Region 10 - Oregon Operations Office
Young.Hunter@epa.gov
(503)-326-5020

From: Wyatt, Robert <Robert.Wyatt@nwnatural.com>
Sent: Monday, October 31, 2022 2:51 PM
To: Young, Hunter <Young.Hunter@epa.gov>
Cc: Peterson, Lance <petersonle@cdmsmith.com>; rbarth@anchorqea.com; jmott@anchorqea.com
Subject: PAR and Laboratory Pilot Study Work Plan

Hi Hunter,

We've completed the Preferred Alternatives Report (PAR) you requested for the Gasco Sediments Site. To maintain an expedited schedule, we have also prepared a Laboratory Pilot Study Work Plan that describes our recommended testing program for in situ stabilization and solidification (ISS). Both documents are available for download using the following options:

Instructions to access the FTP:

To access the FTP site automatically using Windows Explorer please follow the steps below for your version of Windows:

Windows 7: Click Start -> and click in the search box; **Windows 8.1/10**: Right-Click Start -> Run

- Copy/Paste the following line into the "Open" box for XP/8.1/10 or the "Search" box for Windows 7 and hit "enter"

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- You should now be logged into the site using Windows Explorer. You can use copy/paste to move files to or from the site

To access the FTP site manually using a FTP browser like CoreFTP or Windows Explorer please use the info below.

- Site URL:
- Username:
- Password:

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To access the FTP site via web browser please follow the steps below.

- Click on the following link: **REDACTED**
- Input the username and password that are listed in the above section
- Use the tools available directly to the site to download or upload

As we have discussed, to be able to implement a field pilot test of ISS this summer we will need a final decision on EPA's selected design option by the end of 2022. This timeline is critical for us because of the complex equipment, materials, and staffing logistics involved in performing work in summer 2023. We will also need approval of the work plan by the end of January 2023 so the initial laboratory treatability testing results can be used to support the field pilot study.

We appreciate your support in maintaining strong forward progress on this project and are excited to move into the next phase of design. If you have any questions during your review, please call.

Thank you,

Bob

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EPA Comments on Preferred Alternative Report, Gasco Sediments Site Dated October 31, 2022

Comments dated December 5, 2022

The following are the U.S. Environmental Protection Agency's (EPA's) comments on the Preferred Alternative Report (PAR), prepared by Anchor QEA, LLC (Anchor) on behalf of NW Natural and dated October 31, 2022. NW Natural should consider these comments as it moves forward with treatability studies, field pilots, and the design for the Gasco Project Area.

General Comments on PAR:

1. **Conceptual Design:** The PAR bases its conclusions on mostly conceptual approaches that will need to be verified during the pilot studies and/or future stages of design. EPA recommends future design deliverables clearly distinguish conceptual design concepts from design evaluations already conducted. Supporting evaluations are expected in the forthcoming revised Basis of Design Report (BODR). EPA agrees with the general approach of ISS treatment at the Gasco Project Area with the caveat that site-specific details of the approach will need to be further developed in collaboration with EPA during design of the ISS remedy.

2. **ISS as a ROD technology:** While EPA agrees that ISS is a remedial technology that is included in the ROD's selected remedy, future design deliverables should clearly discuss the conditions under which ISS was retained in the Feasibility Study (FS) and included in the selected remedy (e.g., for areas where access and slope stability issues exist, and for principal threat waste (PTW) underneath and around pilings, docks, berthing or mooring dolphins, and other structures servicing active wharfs or shore-based facilities that remain intact). ISS was specifically retained as a technology for use in areas with PTW and where groundwater is affecting porewater, which EPA recognizes are significant issues at the Gasco Project Area.

3. **Shallow Region Elevations:** Future design deliverables should consider including figures depicting the elevation changes as they relate to Endangered Species Act (ESA) species down to -15 feet Columbia River Datum (CRD) for dredging and capping and also discuss whether an ISS approach could create additional shallow water habitat compared to the dredge and cap design.

4. **Other Site Examples:** Future design deliverables should describe whether ISS has been successfully used for other manufactured gas plant (MGP) sites in freshwater or marine environments along with any lessons learned and design and construction best management practices (BMP) elements that were particular to those specific applications.

5. **Remedy Monitoring:** The PAR suggests that the "Full Dredge and ISS Design" alternative would not require capping and would have reduced monitoring requirements compared to capping. The laboratory pilot study treatability testing results should be used to inform the need for capping subsequent to ISS implementation. Monitoring of the in-river remedy will still be required for the ISS remedy and these capping and monitoring requirements should be evaluated during future design stages.

6. **Habitat Quality:** Future design deliverables should describe in detail the anticipated habitat conditions (soil type, depth, vegetative conditions) if ISS were to be applied to the Siltronic riverbank. The PAR states that existing thick armoring would be removed to complete ISS across

the riverbank but does not specify whether armoring would be replaced to support slope stability, whether the riverbank would be laid back to accommodate natural habitat configurations, and/or whether a soil layer would be added following implementation of ISS.

7. **Dredging Equipment:** The PAR states that the Revised Dredge and Cap alternative would require special equipment for dredging around the Gasco dock. Future design deliverables should address the need for follow-up dredging for the swell around the pier.

Specific Comments on PAR:

1. **Section 1. Introduction, page 2:** Whether ISS reduces or eliminates contaminant transport depends on the application. Until the pilot studies are completed it is premature to state that contaminant transport will be fully eliminated via any transport mechanism. Future design deliverables should note that ISS has the potential to eliminate contaminant transport via ebullition and advective flux, and this is contingent on the final design.

2. **Section 2 Summary of Remedial Technology Assignments Developed for the PAR, Revised Dredge and Cap Design, page 4:** The revised remedial technology assignments include capping on grade for a large portion of the project area adjacent to the riverbank. Future design deliverables should provide the rationale for proposing the cap on grade approach.

3. **Section 2 Summary of Remedial Technology Assignments Developed for the PAR, Full Dredge and ISS Design, page 5:** Future design deliverables should include a reference to an existing study to support the statement that ebullition does not occur in sediment that are directly treated with ISS.

4. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Revised dredge and Cap Design, page 6:** EPA has the following comments on this item:
    a. This section indicates that a maximum amount of PTW-NAPL and PTW-NRC could be removed is approximately 70% and 50%, respectively. EPA recommends that future design deliverables include any analysis that support these quantities and illustrate where removal of these materials is considered feasible/infeasible.

    b. EPA does not agree with the following text in the last sentence in the first paragraph since it is unsubstantiated and subjective; any future design deliverables should restructure or exclude such text, as needed, for clarity: “and even that would require extraordinary effort.”

5. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Revised dredge and Cap Design, Maintain long-term slope stability for post-dredge cap and habitat material placement, page 7:** Future design deliverables should clarify if the same software and methodologies described in the Combined BOD-PDR were used for the additional slope stability evaluations.

6. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Revised dredge and Cap Design, Minimize Potential Impacts to the Gasco Dock, page 7:** EPA has the following comments on this item:
    a. Future design deliverables should provide the required offset from the dock structure for the maximum 10-foot partial dredging depth.

    b. Future design deliverables should provide additional clarification regarding the mudline elevation increases discussed in this section and why the slope cannot be laid back to achieve the 3H:1V slope configuration and discuss if this would require greater than 10-foot

excavation, result in removal of substantial material with concentrations below remedial action levels (RALs), or both.

7. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Revised dredge and Cap Design, Minimize Water Quality Impacts During Dredging, page 9:** Future design deliverables should refrain from using water quality "permit" and replace it with substantive applicable or relevant and appropriate requirement (ARAR) water quality requirements, or similar.

8. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Revised dredge and Cap Design, Control the Ebullition-Facilitated Transport of DNAPL, page 10:** EPA would prefer that the last sentence read as follows: "The Revised Dredge and Cap Design must be designed to fully address this documented DNAPL transport pathway and any potential DNAPL migration via advection."

9. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Full Dredge and ISS Design, Maintain Long-Term Slope Stability for Post-Dredge Cap and Habitat Material Placement, page 10:** EPA has the following comments on this item:
    a. Performance standards for strength will be established in future design deliverables and will require EPA approval.

    b. Future design deliverables should expand the discussion of greater seismic stability factors of safety due to integration of ISS treatment layer with the ISS treatment barrier wall and provide the factors of safety for the ISS treatment layer with and without the ISS barrier wall.

10. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Full Dredge and ISS Design, Minimize Potential Impacts to the Gasco Dock, page 11:** The feasibility of ISS to treat to the full depth of PTW or RAL exceedances will also need to be evaluated in future design deliverables. A revised BODR should clarify if ISS in a river setting has a depth limitation and determine whether there is a potential for leaving untreated PTW or RAL exceedances below the feasible depth limit of ISS.

11. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Full Dredge and ISS Design, Minimize Water Quality Impacts During Dredging, page 11:** EPA expects that the efficacy of the moonpool as a BMP for ISS mixing will be evaluated during the field pilot study.

12. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Full Dredge and ISS Design, Control Advective Flux, page 12:**

    a. Future design deliverables should clarify whether a permeability of 10E-6 cm/s is the intended performance standard for the proposed ISS treatment. As noted in the BOD-PDR, typical performance standards for ISS are on the order of 10E-7 cm/s permeability. EPA expects the performance standards for permeability will be established in future design deliverables and will require EPA approval.

    b. The Deep Lower Alluvium would potentially interact with sediments exhibiting concentrations above Table 17 clean up levels, and then discharge at higher rates around the perimeter of the ISS monolith. EPA recommends that NW Natural better evaluate groundwater fate and transport under this scenario to predict the range of groundwater concentrations and flow rates into the Willamette River as part of a revised BODR. EPA

observes that the groundwater advective flux from the uplands may increase (not decrease or be eliminated) compared to the current condition as a result of constructing the upland measures. The current groundwater flow condition is conceptually illustrated in Figure 3-10. The increase in groundwater flow is conceptually illustrated in Figure 3-14. This increased groundwater flow from the Deep Lower Alluvium may introduce higher groundwater flux with low level contamination. As stated in Section 3.1, Deep Lower Alluvium groundwater "can become contaminated as it flows through contaminated sediments."

13. **Section 3.2 Revise Design to Eliminate or Minimize Cap on Grade and Maintain Current Elevations to Minimize Habitat Impacts, Revised Dredge and Cap Design, pages 12-13:** EPA has the following comments on this section:
    a. Future design deliverables should describe the acreage, or range of acreage where shallow water habitat is lost or altered under this option.

    b. Text on page 13 states that: "Preliminary flood rise evaluations for the Revised Dredge and Cap Design, including these isolated elevation increases, indicate minimal potential for flood rise impacts; however, additional Project Area-specific modeling would be required to confirm the no net rise threshold can be met with sheetpile wall structures in place and incorporation of additional remedial design details." EPA would have preferred the qualitative term "minimal" be replaced with the range of increase in water surface elevations based on the results of the preliminary flood rise evaluations at the cross-sections evaluated.

    c. Additional Project Area-specific modeling would be required to confirm the no net rise threshold can be met using the HEC-RAS model provided by EPA on November 9, 2022.

14. **Section 3.3 Revise Design to Better Integrate Upland Source Control Measures into the Sediment Remedy, pages 14-18:** EPA has the following comments on this section:
    a. The PAR would have benefited from an explanation how the schematic illustrations in Figures 3-9, 3-10, 3-12 and 3-14 were developed. While these conceptual evaluations of groundwater flow are acceptable for the PAR, groundwater flow and pathways need to be evaluated in greater detail during future design deliverables.

    b. Text on page 14 states that "the underlying Deep Lower Alluvium WBZ groundwater that does not pose a current of future risk of sediment recontamination upon entering the riverbank flows through the contaminated sediments, becomes contaminated at levels that exceed ROD Table 17 cleanup levels, and transports this contamination to the surface sediments and surface water." Future design deliverables should provide contaminant fate and transport evaluations for the Deep Lower Alluvium water-bearing zone (WBZ) groundwater pathway and its potential for recontamination as it flows through contaminated sediments.

    c. The text in the first bullet point on page 15 ideally would have touched on EPA comments regarding evaluation of cap modeling with and without the HC&C system in operation. Without this additional context, the text appears to inaccurately imply that EPA agreed that cap design will only consider post-HC&C seepage meter data.

    d. The text would have benefited from a reference to an upland source control document that presents results of groundwater modeling mentioned in the second full sentence page 16.

e. Detailed groundwater evaluations will need to be conducted in future stages of design to substantiate the discussion in the Full Dredge and ISS Design text. It is premature to state that all groundwater pathways will be eliminated and "groundwater will not migrate" through ISS'd sediments and soils before the ISS mix designs are finalized. The objective of the ISS treatment will be to eliminate upland contaminated groundwater and ebullition pathways.

f. Text in the 3rd bullet on page 15 ideally would have qualified that the recontamination potential of the Deep Lower Alluvium will be addressed through DEQ's review of the November 10, 2022 Source Control Addendum Report that NW Natural submitted to DEQ as part of the upland Voluntary Agreement (DEQ No. WMCVM-NWR-94-13).

g. The Full Dredge and ISS Design text does not clarify how the average seepage rate of 0 cm/day shown on Figure 3-14 was determined. This concept of zero seepage should be verified during future stages of ISS design. EPA notes the advantage of the negligible seepage in limiting dissolved contaminant transport compared to the dredge and cap alternative which relies on the HC&C system to be fully operational in perpetuity.

15. **Section 3.4 Revise Design to Evaluate/Perform Active Remediation at Siltronic Riverbank, page 18-20:** The Revised Dredge and Cap Design text ideally would have described the potential of dissolved contamination migrating through the Siltronic riverbank, and means for sampling behind the armor (e.g., angled riverbank borings), rather than through it.

16. **Section 3.5 Additional Design Performance Considerations, Seismic Stability, page 20:** ISS treatment of the sediment in the intermediate and shallow underwater regions is expected to increase the unit weight of sediments. Therefore, stability of these slopes must be evaluated under both static and seismic loading conditions to assess the effect of increased unit weight on local and global slope stability failure modes. Detailed slope stability calculations must be submitted to EPA for review in the revised BODR (see also General Comment No. 1).

17. **Section 3.5 Additional Design Performance Considerations, Potential for Water Quality Impacts During Construction, page 20-21 and Appendix B, ARARs, page 4:** The text would have benefited from a discussion of the testing that will take place before any field pilot study, e.g. SPLP, DRET that could be conducted to demonstrate both water quality impacts of introduced grout, but also nominal levels of site contaminants of concern emanating from disturbed treated material during dredging to remove swell/obtain a particular elevation for slope stability and/or habitat. Consideration should be given to possible pH, turbidity, dissolved oxygen, and temperature impacts to the water column from ISS itself, or the dredging to target elevation of ISS treated materials as well as the types of grout that might be used including their active ingredients and possible water quality impacts.

18. **Section 3.5 Additional Design Performance Considerations, Post-Dredge Residuals Management, page 22:** EPA has the following comments on this item:
    a. EPA recognizes the following statement revision (second to last sentence of the first full paragraph): "This simplifies the design and, unlike the Revised Dredge and Cap Design, ***reduces*** dredge residuals potentially containing PTW-NAPL and the associated risk for off-site migration."

    b. EPA recognizes the following statement revision (first part of the last sentence of this section): "The Full Dredge and ISS Design would, therefore, significantly reduce the ***short-term*** risks ***during remedial action***,..."

19. **Section 3.5 Additional Design Performance Considerations, Green Remediation, page 23:** EPA has the following comments on this item:
    a. The type of remedy that best meets remedial action objectives and ARARs is meant to be selected without an overriding carbon or energy footprint deciding factor, i.e. Green Remediation is not a 10th criteria for remedy selection (EPA 2016). The text ideally would have indicated whether or how green remediation concepts may be applied to ISS, rather than implying that ISS should be chosen over conventional dredging and capping due to its lower carbon footprint.

    b. The text would have benefited from a reference to green remediation plan(s) that exist and that will be developed in the future that do or will go into more detail on this topic.

20. **Section 4 Summary of Preferred Design, page 25:** EPA would have preferred bullet points 2 and 3 to start with the phrase "Eliminates or minimizes", or have includes footnotes to clarify that the assumption that these pathways will be eliminated will be verified in future stages of design.

21. **Table 4-1**: EPA has the following comments on Table 4-1:
    a. Table 4-1 ideally would have included a row for "Estimated volume of PTW-NAPL/NRC treated with capping" or something similar.

    b. A footnote ideally would have been added to the table clarifying all the considerations (e.g., removal of armor stone) for determining possibility of active remediation of the Siltronic riverbank. EPA notes that if existing armor can be removed to implement ISS, then the armor could also be removed to construct a cap, and so both alternatives should indicate "yes" if this were the only consideration for active remediation of the Siltronic riverbank. However, based on Section 3.4, it appears that the armor layer is not the only limitation.

Editorial Comments on the PAR (for consideration to the extent these comments may inform future design deliverables):

1. **Section 2 Summary of Remedial Technology Assignments Developed for the PAR, page 4:** EPA has the following comments on Table 4-1:
    a. Although other alternatives considered are discussed in Appendix A, it would be helpful to have at least a bulleted list of those in Section 2.

    b. Section 2 currently presents arguments for the Full Dredge and ISS Design alternative, which should instead be presented and compared in later Sections of the report. Ideally Section 2 should be a straight-forward description of each alternative.

2. **Section 3.3 Revise Design to Better Integrate Upland Source Control Measures into the Sediment Remedy, pages 17-18:** Clarify in the text, and consider adding a figure, to explain what is meant by "…two side-by-side rows of ISS columns that will overlap/integrate with the riverbank columns."

3. **Figure 2-1:** This figure could be improved by showing the location of the sheetpile walls, groundwater trench, and any other new elements on Figure 2-1. A legend would be helpful for the cross-hatched area, dashed blue line and circles, and other features. Showing in-water structures should also be considered.

4. **Figure 2-2:** Ideally Figure 2-2 should be similar to Figure 2-1 in content, simply showing the locations of design elements and a legend (without the bullet points). It should visually identify any areas where shoreline configurations or upland treatment elements are changing, if any. Any existing treatment elements that are not included in this alternative should be removed from the figure, and new ones identified in the legend (e.g., is the dashed green line the new groundwater extraction trench?).

5. **Table 4-1**: NW Natural should consider the following regarding Table 4-1:
    a. A key to explain shading and hatching on several figures is not included, and it is unclear what some of the shading and hatching is intending to communicate. For example, the intent of the blue shading/hatching on Figure 3-3 ideally would be provided.

    b. The "existing top of riverbank" label on Figure 3-7 does not accurately reflect the top of riverbank and implies that the ISS barrier wall is riverward of the top of riverbank. Figure 3-3 shows the same cross section but shows the "existing top of riverbank" at a different location.

To Be Considered Comments on the PAR:

1. **Upland Measures:** The PAR implies that the currently uncontrolled Fill WBZ groundwater will pose a risk to the in-water remedy. EPA notes that DEQ has already approved a Fill WBZ groundwater source control measure consisting of groundwater recovery trenches and/or horizontal wells extending the entire length of the Gasco OU shoreline and along the Gasco/US Moorings property boundary. At NW Natural's request and EPA's concurrence, DEQ postponed the implementation of the Fill WBZ source control measure because excavation of the riverbank during construction of the in-water remedy would potentially interfere with, damage, or destroy the Fill WBZ source control measure. It is important to recognize that key documents related to upland and in-water remedy have stated that NW Natural is committed to constructing the Fill WBZ source control measure prior to or concurrently with the riverbank and sediment remedy. The Final Gasco Sediments Site Sufficiency Assessment (SAR)[1] identifies the Fill WBZ as conditionally controlled based on NW Natural's commitment. EPA understands that DEQ is prepared to direct NW Natural to implement the Fill WBZ source control measure without further delay if it is decided that riverbank remediation will not result in an impact to the source control measure. Otherwise, NW Natural will implement the Fill WBZ source control measure under DEQ oversight concurrent with the in-water remedy. EPA acknowledges that the long-term effectiveness of any in-water design alternative relies on effective source control, and that DEQ will approve and oversee implementation of source control measures.

2. **Dredging Limits:** Except for dredging near the Gasco dock, the PAR does not clearly demonstrate the point at which removal of PTW-NAPL and PTW-NRC becomes impracticable based on feasible depth limit of dredging. It would have been helpful to include a conceptual dredge prism that illustrates the feasible limit of dredging be included in the revised BODR to provide support to the PTW-NAPL and PTW-NRC removal volumes reported in the PAR, with call outs to identify specific limitations to complete removal of PTW. In addition, the PAR does not assess the reduction in the footprint of PTW-NAPL and PTW-NRC in its assessment of long-

[1] Anchor QEA, LLC. 2021. Final Gasco Sediments Site Sufficiency Assessment, Gasco Sediments Cleanup Acton, Prepared on behalf of NW Natural. March 1.

term cap performance and a figure showing the existing footprint of PTW, and the estimated footprint of PTW after dredging to the extent feasible ideally would have been included.

3. **Table 4-1**: NW Natural should consider the following comments regarding Table 4-1:
   a. The percent of PTW-NAPL, PTW-NRC, and PTW-highly toxic material removed from various regions would ideally be listed separately.

   b. The estimated volume of PTW-NAPL/NRC remaining in place would ideally separate the volumes of PTW-NAPL and PTW-NRC left in place. The methodology for calculating these volumes would ideally also be explained.

4. **Figures:** The following figures would have benefited from having relative horizontal and vertical scales: Figures 3-1 through 3-4b, 3-7 through 3-10, 3-12, and 3-14.

5. **Habitat Enhancement:** There are mentions of how the preferred alternative "provides complete control of final slope configuration to improve habitat" but also "maintains current elevations to minimize habitat impacts." This latter description is still better than the cap on grade included in the dredge and cap alternative, but does not rise to the first statement that could allow for some desirable reconfiguration of the riverbank, nearshore, and shallow environments to improve habitat. EPA understands the Yakama Nation would like to work with NW Natural to incorporate some aquatic and terrestrial habitat into the design for ESA listed and tribally important species, away from operational areas and ideally with minimal impacts on feasibility and cost.

   Some of the questions and comments the Yakama Nation would like to explore in further discussions and design documents include:

   - Will the ISS method, including the treatment barrier wall, impede future habitat restoration efforts in nearshore and upland areas – for example, once in place does the ISS barrier result in a no work or no modification zone?

   - How does the ISS method, including the treatment barrier wall, allow for natural physical and biological processes to occur below and above the ordinary high water?

   - What impacts may occur to ESA listed and tribally important aquatic species and terrestrial species and habitats, including the biologically active zone?

   - What additives will be used for the ISS method? Will an evaluation of potential impacts to habitat and species of these additives be conducted?

   - Explore the feasibility for more specific information on how the ISS method allows for optimum design of habitat improvements – including input from habitat restoration experts

and tribes. Also, NW Natural would ideally provide more information on how the ISS method improves habitat on its own without mitigation or restoration.

- What will the treatment barrier wall and other areas incorporating the ISS method look like? There are photos in the 8/23/2022 presentation but they do not show how a wall will look in the environment.

- What is the life expectancy of the ISS treatment barrier wall and other areas (how long is this treatment expected to last)?

- The PAR mentions habitat objectives. When and how will these objectives be developed? Habitat restoration experts and tribes should be involved in this process.

6. **Section 1.1 EPA Comments on the Combined BOD-PDR, pages 2-3:** Please note that EPA General Comment 3 on the Combined BOD-PDR is written as "Integration **with** Upland Source Control Measures" (**emphasis added**). Decisions involving Upland Source Control Measures will require collaboration with DEQ, consistent with the lead regulatory authorities described in the 2009 ASAOC.

7. **Section 3.1 Revise Design to Focus on Removal of PTW-NAPL/NRC to the Extent Feasible, Full Dredge and ISS Design, Maintain Long-Term Slope Stability for Post-Dredge Cap and Habitat Material Placement, page 10 and Section 3.2 Revise Design to Eliminate or Minimize Cap on Grade and Maintain Current Elevations to Minimize Habitat Impacts, pages 12-13:** Due to the greater design strength of the ISS treated sediments, a larger range of slopes can be considered. However, based on the design challenges discussed for the Revised Dredge and Cap alternative, it is not clear if the design team is referring to steeper or slopes similar to current slopes being used to alleviate some of the engineering challenges discussed above. However, steeper slopes or slopes similar to existing slopes may not optimize habitat, which is presented as another benefit of this alternative. EPA understands the Yakama Nation would like to better understand how both objectives can be met using this alternative, and participate in discussions with EPA and the NW Natural design team to ensure the best outcome for habitat at the site. This comment also applies to bullets 3 and 4 on PAR page 11.

8. **Section 3.3 Revise Design to Better Integrate Upland Source Control Measures into the Sediment Remedy, page 15:** Because the 3rd bullet indicates the Deep Lower Alluvium WBZ may not require source control, the PAR would have benefited from a quantification (e.g., as a percent of total) of the extent to which this pathway might "increase[s] pumping volumes, operations and maintenance requirements, treated solids management and disposal, greenhouse gas emissions, and costs…".

Specific Comments on PAR, Appendix A, Summary of Screened Out Revised Remedial Technologies:

1. **Section 2.1 Revised Dredge and Cap Design with Full Removal of PTW-NAPL, pages 2-3:** EPA has the following comments on this section:
    a. The text would have benefitted from a description of what this evaluation entailed (e.g., a comparison of magnitude and extent of PTW-NAPL based on the historical and recent datasets).

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b. The following statement in the 3rd paragraph would ideally be revised to note that EPA did not approve the Combined BOD-PDR: "In addition, Section 6 and Appendix G of the Combine BOD-PDR (Anchor QEA 2021) demonstrate using Project Area-specific data that this additional PTW-NAPL can be protectively isolated in situ with an active cap, so dredging does not provide additional risk reduction." Considering the concerns with DNAPL migration described in the PAR and EPA's comment on the Combined BOD-PDR, EPA does not agree that isolation of PTW-NAPL using caps has been effectively demonstrated and that dredging will not provide additional risk reduction.

2. **Section 2.2 Hybrid Dredge and ISS Design, page 3-4:** EPA has the following comments on this section:
    a. The rationale for screening out the hybrid options in this section would ideally provide additional details and supporting information. The calculations or modeling to substantiate the conclusions regarding advective flux should be provided for EPA review in the revised BODR. The relative comparison of cost and water quality impacts would have ideally included additional supporting information to support the rationale for screening out the hybrid options (see also General Comment No. 1).

    b. Bullet point 1 ideally would have clarified whether this hybrid configuration requires dredging to the feasible depth of excavation and capping the remaining contamination or whether other simplifying assumptions were used to determine depth of dredging.

    c. Bullet point 2 would have benefited from the inclusion of the assumed distance from structures used for this evaluation.

    d. This section states that each of the hybrid options would need to manage advective flux through remaining contaminated sediments; however, this does not appear to be the case for the third hybrid option unless the third hybrid option excludes the ISS barrier wall. Ideally additional details would be included to support this statement regarding advective flux for the hybrid options.

    e. The text states that: "In the third configuration, only a small amount of the total PTW-NAPL was present in the shallow depth intervals, and removal of this small volume would be disproportionately costly without providing additional risk reduction." Any removal of PTW-NAPL is expected to provide additional risk reduction, even if the risk reduction is not substantial. This statement would have benefited from additional clarification.

    f. This section indicates that the hybrid options would complicate the design, listing the need to potentially include dredge residual management as part of the remedial approach and needing additional equipment staged in a small area. These are not considered to be complications to the design and are already required for the navigation channel portion of the project. Additionally, dredging equipment will also be needed for the "Full Dredge and ISS Design" alternative to manage swell.

3. **Section 2.3 Full Dredge and ISS Design Without ISS Barrier Wall, pages 4-5:** EPA has the following comments on this section:
    a. The text would have ideally clarified if this evaluation were based on the upland groundwater flow model or includes other lines of evidence. Additional details regarding

the supporting evaluations and benefits of the ISS approach should be provided in future design deliverables.

b. Future design deliverables should provide additional clarification and details regarding lack of protectiveness of the design without an ISS barrier wall.

To Be Considered Comment on the PAR, Appendix A, summary of Screened Out Revised Remedial Technologies**:**

a. This section would benefit from figures illustrating the hybrid configurations considered.

b. The bullet list describing the hybrid options considered is unclear. The descriptions of these options ideally would be revised for clarity.

Specific Comments on PAR, Appendix B, Detailed Analysis of Remedial Designs:

1. **Section 1: Introduction, pages 1-2:** EPA has the following comments on this section:
    a. The statement at the end of the 4th paragraph ideally would provide additional clarification regarding what the ISS prevents the deeper groundwater from. The language is unclear or potentially missing a word. “It also prevents deeper groundwater that does not pose a current or future potential risk.”

    b. EPA recognizes the following revision to the statement in the last paragraph in this section: "These analyses are presented ~~*as updates*~~ to *supplement* the ROD Section 12 summary of comparative analysis findings for the EPA-selected Alternative F Mod remedy.”

2. **Section 2.2: Primary Balancing Criteria, page 5:** EPA recognizes the following revision to the statement in the 1st bullet as follows: "Although a robust active cap can be designed to control these long-term contaminant migration pathways (as detailed in Section 6 of the Combined BOD-PDR), there exists some potential risk of long-term releases (e.g., compromised cap integrity due to seismic events, physical disturbance, or chemical isolation breakthrough) ***in comparison to the Full Dredge and ISS Design***.”

References

EPA. 2016. Consideration of Greener Cleanup Activities in the Superfund Process. EPA Headquarters memorandum dated August 2, 2016.