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SUPERFUND &
EMERGENCY
MANAGEMENT DIVISION

MEMORANDUM

DATE: September 22, 2022

SUBJECT: Preliminary (30%) Design Report Riverbank Source Control Measure
Crawford Street Site, Portland, OR
ECSI #2363
June 15, 2023

FROM: Laura Hanna, RG
Remedial Project Manager

TO: Kevin Dana
Cleanup Project Manager
Oregon Department of Environmental Quality

The following are comments from the U.S. Environmental Protection Agency (EPA) regarding the Preliminary (30%) Design Report (PDR) for a Riverbank Source Control Measure (RBSCM) pertaining to the Crawford Street Site (site) prepared by GeoEngineers, Inc. (GeoEngineers) on behalf of Crawford Street Corporation (CSC) and Steel Hammer Properties, LLC (Steel Hammer). The approximate 11-acre site is located at 8424 N Crawford St. in Portland, Oregon, on the eastern side of the Willamette River, just upstream of the St. John's Bridge, at approximately River Mile 6.3 east (RM 6.3E). The site is adjacent to two Portland Harbor Superfund Site (PHSS) project areas—Cathedral Park and Willamette Cove—and is listed in the Oregon Department of Environmental Quality (DEQ) Environmental Cleanup Site Information (ECSI) as #2363. The PDR was prepared in accordance with Section C of Exhibit B (Scope of Work) of the DEQ Order on Consent No. LQVC-NWR-21-2 (Consent Order).

EPA's comments are categorized as "Primary," which identify concerns that must be resolved to achieve the objective; "To Be Considered," which, if addressed or resolved, would reduce uncertainty, improve confidence in the document's conclusions, and/or best support the objectives; and "Matters of Style," which substantially or adversely affect the presentation or understanding of the technical information provided in the document.

Primary Comments

1. The PRD describes an action that is anticipated to be conducted under DEQ oversight as a Source Control Action under the upland Consent Order. Remove all references in the PRD that indicate an intention to conduct the work subject to the PH ROD and/or CERCLA, or, if the parties prefer to conduct the work under CERCLA, a meeting with EPA and DEQ should be held to discuss the options.

2. **Coordination with Adjacent Sites:** At this point in the process, EPA recommends a technical meeting with the two adjacent properties, including the Willamette Cove and Cathedral Park in-

water remedial design project areas. EPA believes there is value in meeting to discuss the technical details of the evolving designs in order to provide a contiguous remedy as the designs transition from one site to another.

3. **Section 5.3.1.5 Endangered Species Act.** EPA's current understanding is that this work is being overseen by DEQ, so the PDR would not be covered by the Programmatic Biological Assessment nor the forthcoming Biological Opinion so an individual consultation will be necessary.

4. **Geotechnical Data and Evaluations:** Include geotechnical investigation data (field and lab) and calculation backups in the pre-final (90 to 95%) design report. The requested additional supporting information is necessary for reviewing geotechnical design assumptions used in preparing the remedial design. Examples of additional supporting information include:

    a. Field and laboratory geotechnical investigation data and calculation backups used to develop assumptions for soil properties in the stability evaluation.

    b. The Preliminary Report of Geotechnical Engineering Services (GeoDesign 2015) cited in Section 6.7.

    c. An existing condition slope stability calculation. Comparing proposed conditions to existing conditions is important for understanding the impacts of the proposed design, especially in circumstances where the proposed design does not meet acceptable safety factors.

    d. Slope stability evaluation for the condition related to removing 5 feet of sediment from the toe of the cap (distance 125) to 150 feet offshore (approximate distance 270) as shown on the cross sections in Appendix J. This area is part of the SMA assumed for dredging offshore of XS1 through XS3.

        As commented during the BODR, the design of the toe support must be independent and not rely on any surrounding sediments for geotechnical stability. The PHSS ROD Selected Remedy in the shallow region states that dredging to a depth of 5 feet with placement of a cap/backfill to grade may occur adjacent to the reinforced toe; that scenario must be factored in the design and stability modeling assumptions.

    e. Other geotechnical evaluations needed to perform cap design. The PDR should identify when bearing capacity, cap settlement, and veneer stability calculations will be performed.

    f. An alternate design option that has a factor of safety above 1.1 for liquefied conditions and evaluation of the post-seismic event with SMA dredging to 5 feet adjacent to the toe of the cap. Additionally, provide a measurable number associated with "strong shaking" such as a modified Mercalli intensity value or other quantifiable measure.

        EPA has concerns regarding the liquefied condition slope stability factor of safety below the minimum. Figure J-3 depicts not only the localized slip surface on the cap at FS=0.62 but the entire slope representing a global stability failure from the top of bank (FS depicted in this zone are between 0.62 to 0.92). Failure of the bank slope in areas adjacent to the in-water SMA may impact the in-water remedy. Additionally, the in-water remedy, which would potentially remove up to 5 feet of sediment, will further decrease the factor of safety for the design bank cap.

5. **Chemical Isolation Modeling Evaluation:** Revise the assumptions, input, and boundary conditions used in the chemical isolation modeling evaluation in the pre-final (90 to 95%) design

report. The requested revisions and additional supporting information are necessary for correctly applying the CAPSIM model for remedial design. Examples of revisions include:

a. Revise the text to include acenaphthene as a surrogate for polycyclic aromatic hydrocarbon (PAHs). Acenaphthene should be included as a surrogate PAH to provide a conservative estimate of PAH transport through the cap. Acenaphthene has the lowest log K_{oc} value and, as such, it is the most mobile compound out of the four noncarcinogenic PAHs most frequently detected in groundwater.

b. Revise the text to provide the log K_{oc} partition coefficient for di-n-butylphthalate. The text states that BEHP has similar transport properties as di-n-butylphthalate. This statement needs to be supported by partition coefficient information to verify that BEHP can be used to represent di-n-butylphthalate transport through the cap.

c. Revise or remove the text in Appendix K page K-6 that states that the amendment dose is overestimated owing to conservative cap design. EPA agrees that conservative modeling assumptions have been used for cap design. However, the groundwater data used to determine flux rates and porewater concentrations are based on limited rounds of groundwater sampling. The text goes on to state that development of site-specific partitioning coefficients is not recommended. In the absence of additional empirical data collection, EPA supports relying on a conservative design. Because of the uncertainty in model inputs based on limited groundwater monitoring data and the acknowledged variability in these results, it cannot be said with certainty that the amendment dose is an overestimate.

d. Revise all model simulations to use the "mass transfer" benthic boundary type and measured surface water concentrations to realistically simulate mass transfer to and from the water column. Based on review of the model output files in conjunction with the boundary conditions described in this section, it appears that the top boundary condition was set to a fixed concentration of 0 at the surface. As noted in the CapSim 4.0 Quick Start Manual, "If the surface boundary condition is set to 0 concentration, then breakthrough of contaminant might never be observed since the concentration at the surface is always forced to be 0. A better condition might be to employ a mass transfer boundary condition at the surface with the overlying water concentration." Because the benthic boundary condition type was selected as "fixed concentration", the mass transfer coefficient described in the text will have little to no effect on accurately simulating mass transfer to and from the surface water column. It is evident from the model outputs that the concentration at the surface is being artificially forced to 0.

e. Considering the uncertainty due to lack of empirical porewater and seepage flux data, final filter layer thickness, and constructability issues for such a low granular activated carbon (GAC) dose, EPA recommends (pending any revisions to cap design based on additional data collection) using a GAC dose of 0.25% in a 30 cm sand cap. Additional rounds of groundwater monitoring data would be useful to reevaluate groundwater flux rates and input porewater concentrations in the pre-final design.

6. **Preliminary (30%) Design Drawings:** Revise the design drawings to include a complete set of drawings for review in the pre-final (90 to 95%) design. A complete set of drawings is needed to support construction that will meet remedial design objectives. Examples of revisions and additional information to be included in the drawings include:

a. Provide Excavation Grading Plans. Excavation of soil and sediment are needed to install the cap. The current plans only show the proposed finish ground with the top of cap grading. Grading for the soil and sediment removal will be 4 ft to 6 ft deeper and will need to consider impacts on adjacent properties.

b. Revise the Proposed Grading Plan – West (Sheet 3.0). The daylight slope tying into the western property is exceptionally steep. The current design shows a slope of 8.5H:9V (approximately 1H:1V) between Elevations 19 and 28. A proposed slope steeper than 1H:1V does not meet the stability considerations provided in the report and is likely to fail. The design should provide acceptable slopes or a retaining wall. Revise the design to provide acceptable slopes or a retaining wall on the daylight grading back to adjacent properties. Area parallel to the river cross sections should be provided to show how it will be capped and successfully daylighted. Add boring and sediment sample locations to the plan sheets and associated cross sections.

c. Revise the Proposed Grading Plan – East (Sheet 3.1). Similar to the west side, the daylight slope tying into the eastern property is exceptionally steep. The current design shows a slope of 12H:17V (approximately 0.75H:1V) between Elevations 17 and 34. Additionally, a proposed oversteepened slope is shown between Elevations 4 and 11 where cap slopes are shown with a slope of 13H:7V (i.e., steeper than 2H:1V). Revise the design to provide acceptable slopes or a retaining wall. Area parallel to the river cross sections should be provided to show how it will be capped and successfully daylighted. Add boring and sediment sample locations to the plan sheets and associated cross sections.

d. Revise the Proposed Grading Sections (Sheet 3.2). The cap toe is ending inside of the Cathedral Park SMA where there are known RAL exceedances. The added material to help support the cap at the toe should be constructed of cap material along the horizontal toe and 3:1 slope so that the entire area impacted is capped. Depending on the final remedy for the in-water SMA shallow zone, this will also allow for a cap transition. EPA is currently investigating the edges of the Cathedral Park SMAs and is likely intending to dredge rather than cap adjacent to the northern end of the site. Provide granular filter and amended sand under the full extent of the cap toe.
Show the extents of the adjacent in-water SMA and indicate next to the toe of the slope that sediment will be removed during the in-water work. Additionally, the design should be consistent with requirements in the shallow zone related to habitat and top of cap elevation.

To Be Considered

1. **Section 3.4. Existing Habitat Conditions, page 7:** Revise the text in the pre-final (90 to 95%) design report to clarify that the NMFS (not the U.S. Fish and Wildlife Service [USFWS]) is anticipated to provide a biological opinion. The USFWS concurred with EPA's finding that implementation of the PHSS cleanup is not likely to adversely affect the bull trout or its designated critical habitat. Therefore, no formal consultation with USFWS was needed and USFWS is not preparing a biological opinion.

2. **Section 4 Nature and Extent of COCs in Riverbank Soil, pages 11 and 12:** Revise the text in the pre-final (90 to 95%) design report to indicate that COC exceedances beyond the top of bank will be characterized in accordance with the upland Consent Order and that upland

characterization will include an evaluation of COCs against the Joint Source Control Strategy (JSCS) screening level values (SLVs) and the PHSS ROD CULs. This comment is based on EPA's previous comments on the BODR regarding the lateral extent of contamination for polychlorinated biphenyls (PCBs), 1,2,3,7,8-pentachlorodibenzo-p-dioxin (PeCDD), and total polycyclic aromatic hydrocarbons (PAHs) beyond the top of bank toward the existing parking area.

One comment response indicated that delineation was not necessary for the upland portion of the site and that PCBs do not present an unacceptable risk to human health, the environment, or the Willamette River, based on the following: (1) the depth, (2) the fact that they are overlain by 2 feet of soil containing total PCB concentrations below PHSS CULs, and (3) their location of more than 40 feet inland of the current top of bank. Two other comment responses indicated that further lateral delineation of COCs (PeCDD and total PAHs) is not needed because conservative assumptions are being used in the development of the capping layers for the RBSCM. While COCs in the upland portion of the site are not required to be delineated laterally as part of the RBSCM, characterization of the uplands should follow the upland Consent Order and be protective of the Willamette River. The PHSS ROD CULs do not apply as remediation thresholds for upland soil but can be used for purposes of identifying contaminant sources with pathways that are threats to the Willamette River. The source control pathways for upland soil include overland flow and groundwater. The PHSS human health and ecological risk assessments do not address upland terrestrial exposure scenarios.

3. **Section 5.1. Overview of Planned Riverbank Source Control Measure, second paragraph, page 13:** Revise the text in the pre-final (90 to 95%) design report to include warning of substantial erosion (e.g., visible barrier material after a storm event) as another purpose in placement of a geotextile fabric demarcation layer between underlying contaminated soils and the clean cap above. The requested revision is needed so that the demarcation layer is appropriately included in long-term monitoring plans.

4. **Section 5.2.1. RBSCM Components, Vegetation Removal, page 13:** Revise the second sentence regarding "salvaged vegetation" to read as "selected salvaged native vegetation". Non-native vegetation and native vegetation not supportive of salmon habitat should not be incorporated into any habitat enhancement.

5. **Section 5.2.1. RBSCM Components – Riverbank Layback, page 13:** The text states that concrete debris found on-site may be crushed and reused. Large or buried debris could have been in contact with contamination and potential contamination should be considered and evaluated before reuse. Describe the proposed approach, if any, to evaluate the suitability of concrete debris for reuse, with respect to potential chemical contamination in surrounding soil in the pre-final (90 to 95%) design report.

6. **Section 5.2.1. RBSCM Components – Construction of Cap, page 13:** Revise the term "protective material" to "armor stone or armor layer" in the pre-final (90 to 95%) design report. The term "protective material" is unnecessarily vague for a design report and should be revised to identify and introduce the armor layer.

7. **Section 5.2.1. RBSCM Components, Institutional Controls, page 14:** Vegetation Removal, revise the second sentence regarding "salvaged vegetation" to read as "selected salvaged native vegetation" as non-native vegetation and native vegetation not supportive of salmon habitat will not be incorporated into any habitat enhancement. Revise this section and Section 7.10 in the pre-final (90 to 95%) design report to consider institutional controls (ICs) to prevent digging, as well

as other more aggressive IC measures. Additional ICs may be appropriate to prevent digging in this area, consistent with the IC easements to ensure measures are permanently in place.

8. **Section 5.3.1.3. Section 404 of the CWA, pages 15–16:** Revise this section in the pre-final (90 to 95%) design report to note that USACE administers Section 404 in this jurisdiction while EPA administers aspects related to wetlands. The text is incorrect in that it states EPA has no role in CWA 404 implementation.
9. **Section 6.0 Engineering Design Considerations, page 18:** Revise the third sentence to include erosive forces from vessel propeller wash.
10. **Section 6.13. Habitat Considerations, page 31:** The text incorrectly states that the PHSS ROD does not require habitat improvements. Habitat improvements such as bank layback, vegetation, and inclusion of habitat layers are required for disturbed areas to compensate for short-term impacts of the cleanup. Do not include the statement that the ROD does not have habitat improvement requirements in the pre-final (90 to 95%) design report.
11. **Section 6.3. Groundwater Flux Rate, pages 21–23:** Revise the text in the pre-final (90 to 95%) design report to consider evaluating groundwater flux rates using seepage meter data that may be collected before the final design.

    Cap designs below ordinary high water for other areas at PHSS are collecting empirical groundwater flux rates using seepage meters instead of relying on flux rate estimates based on groundwater gauging data. The need for such data is evident from the temporal variability in groundwater flux rates presented in Table 6.3-1 and Appendix H. A seepage meter data collection event, targeting the period of maximum anticipated groundwater discharge to the river, should be considered to refine cap design, as needed.
12. **Section 7.2 Site Preparation, Erosion Control, and Pollution Prevention, pages 34–35:** CWA 401 requirements should be similar to those being required for EPA in-water actions, specifically to include COC monitoring at the outset of the project. See also the comment on Section 5.3.1.4, above. Include COC monitoring at the outset of the project in the pre-final (90 to 95%) design report.
13. **Section 7.7. Riverbank Cap Profile, pages 37–38, and Section 7.8 Cap Design, pages 38–39:** A habitat layer is mentioned in Section 6.13 ("an engineered beach mix layer consisting of 2.5-inch minus gravel to the uppermost layer of all caps…") but is not described in Sections 7.7 or 7.8. Revise the text in the pre-final (90 to 95%) design report to discuss the habitat beach mix that is mentioned in Section 6.13. Clarify if that material is the same as the armored cap material and if the same habitat or armor stone will be used along the entire cap even in areas above ordinary high water. Provide an estimated mean particle diameter (D50) range for the habitat and/or armor layer.
14. **Section 7.9. Riverbank Restoration, page 40:** Develop a design detail in the pre-final (90 to 95%) design report for the proposed large woody material (LWM) and evaluate/discuss how embedded LWM could affect cap integrity over time with respect to LWM mobilization and localized scour.

    The stability analysis in Appendix N evaluates three different configurations for LWM installation, including two options for deep embedment into the beach zone. To better ensure proper installation and structure stability, a design detail depicting LWM structure installation

should be included in future design phases. Also, LWM tends to mobilize, even when anchored or embedded, and can induce localized scour around the root wad or exposed end. Cap design and LWM installation methods should consider the potential for scour or LWM mobilization.

15. **Section 7.10. Institutional Controls, page 40:** Clarify in the pre-final (90 to 95%) design report that a project-area-specific Institutional Control Plan will be required.

16. **Appendix J Geotechnical Stability Considerations, Design Seismic Event, page J-2:** Provide background backup information and maps related to calculation of site class and site coefficients (i.e., PGA_M , PGA, F_{PGA}) in the pre-final (90 to 95%) design report. Section 6.7 provides rationale about how the PGA for the 475-year return period was calculated. The table provided in Appendix J is confusing because it does not discuss the 200-year return period that is associated with the mapped PGA of 0.168. Additionally, the 0.246 g associated with this table as a modified peak ground acceleration is the PGA value for the 475-year return period, not the modified value. The documentation maps would be easy to add to the appendix as a quality control check.

17. **Appendix J Geotechnical Stability Considerations, Conclusions and Recommendations for Slope Maintenance, pages J-4 and J-5:** Provide estimated vertical deflections for the post-seismic (liquefied) case scenario in the pre-final (90 to 95%) design report. The description provided under this section identifies that preventing or mitigating the effects of soil liquefaction would require ground improvement, but it is not discussed in detail which vertical deflections would trigger the need for ground improvement measures or the potential for those trigger levels to be observed at the site. It is not understood if the liquefied scenario has the potential to result in catastrophic failure.

18. **Appendix J Geotechnical Stability Considerations, Slope Stability Methodology, page J-4:** The requested revision is necessary for compliance with State of Oregon regulations. Provide minimum factors of safety in accordance with the State of Oregon, rather than the Washington State DOT regulations provided, in the pre-final (90 to 95%) design report.

19. **Appendix J Geotechnical Stability Considerations, Slope Stability Methodology, page J-4:** Perform slope stability evaluation based upon assumed scour potential in the pre-final (90 to 95%) design report. It should be stated if the potential for scour in areas along the slope is significant and what the estimated scour potential is. It is recommended that a stability analysis be performed based on the anticipated scour, as there may be certain storm events or conditions that trigger the need for additional survey and immediate repair work to be completed.

20. **Appendix K Chemical Isolation Modeling Evaluation, Section 2.1. Dioxins/Furans, page K-1:** The text states that PeCDD has similar transport properties as TCDD, TCDF, and HxCDF. This statement needs to be supported by partition coefficient information to verify that PeCDD can be used as a representative compound for all dioxins/furans. Expand the discussion in the pre-final (90 to 95%) design report to provide the log K_{oc} partition coefficients for TCDD, TCDF, PeCDD, and HxCDF.

21. **Appendix K Chemical Isolation Modeling Evaluation, Section 3.2. Model Domain and Target Levels, Model Media, page K-3:** Revise the text in the pre-final (90 to 95%) design report to clarify that groundwater concentrations were used as reported, and soil concentrations were used to determine equivalent porewater concentrations using equilibrium partitioning to derive porewater concentrations for model inputs.

    The text states that COC concentrations in groundwater samples and riverbank soil samples were used to derive porewater equivalents for model input values. This

statement makes it sound like groundwater data were also processed in some manner to obtain equivalent porewater concentrations. EPA assumes this is not the case, so the text should be revised to accurately describe any post-processing of groundwater and soil sample data for determining porewater concentration inputs.

22. **Appendix K Chemical Isolation Modeling Evaluation, Section 4.1. Porewater Concentrations, Riverbank Groundwater Data, page K-4:** Revise the text in the pre-final (90 to 95%) design report to provide additional discussion as to why November/December 2021 groundwater results were not considered representative of current conditions.

    The text states that, "Groundwater results from the samples collected in November/December 2021 were not used because these samples were collected right after the wells were installed and developed and the data are not representative of current conditions." The discussion should be expanded to provide further clarification, using the 2021 results to support the discussion.

23. **Appendix M Preliminary (30%) Design Drawings:** It is unclear whether the cap layer and sand/streambed thicknesses are minimums or expected. This would also clarify what the expected material gradations are beyond stating coarsened streambed material or clean sand. Provide a cap detail sheet in the pre-final (90 to 95%) design report, including details for all cap layers and sand/streambed armor sizes (e.g., D15, D50, D85). The details should also include minimum and expected over placement allowances.

24. **Appendix M Preliminary (30%) Design Drawings, Proposed Grading Sections, Sheet 3.2:** Reference of the vertical datum used in the design is needed to ensure the correct datum and elevations are used during implementation. Include a reference to the vertical datum used in the general notes or on each sheet in the pre-final (90 to 95%) design report.

25. **Appendix M Preliminary (30%) Design Drawings, Restoration Plan – West and Restoration Plan – East, Sheets 4.0 and 4.1:** The only mention of a beach zone within the 30% design is on Sheets 4.0 and 4.1. Descriptions and details regarding design and performance objectives of this area should be included in the design. Provide additional details regarding the beach zone in the pre-final (90 to 95%) design report.

Matters of Style

1. **Section 6.3. Groundwater Flux Rate, pages 21 to 23:** The second to last sentence in this section refers to Appendix G for calculation detail. Appendix G presents Cross-Sectional View of COCs at Leave Surface. Revise the text to reference Appendix H for flux rate calculation details in the pre-final (90 to 95%) design report.
2. **Appendix J, Figures J-1 to J-3:** Figures appear to be duplicated and attached twice. Remove duplicate figures from Appendix J in the pre-final (90 to 95%) design report.

References

ASTM. 2017. *Standard Guide for Greener Cleanups*

DEQ. 2021. *Order on Consent - Crawford Street Corporation, Steel Hammer Properties, LLC*.

Executive Order No. 14008 *Tackling the Climate Crisis at Home and Abroad* (2021).

EPA. 2021a. *Programmatic Biological Assessment, Portland Harbor Superfund Site.* Seattle, Washington: EPA Region 10.

EPA. 2021b. *Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site, Portland, Oregon.* Seattle, Washington: EPA Region 10.

EPA, 2017. *Portland Harbor Superfund Site Record of Decision.* Seattle, Washington: EPA Region 10.

EPA. 2009. *Statement of Work – Gasco Sediments Site*. Seattle, Washington: EPA Region 10.

GSI. 2022. *Final Willamette Cove In-Water Remedial Design Group Basis of Design Report Willamette Cove Project Area.* GSI Water Solutions, Inc. November 2022.