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Oregon Department of Environmental Quality (DEQ)
Northwest Region Office
700 NE Multnomah Street, Suite 600
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Attention: Kevin Dana, Cleanup Project Manager

Subject: Response to EPA Comments and Transmittal of Final BODR
Crawford Street South Site, Portland, Oregon
ECSI No. 2363
File No. 6209-010-01

This letter responds to comments on the Basis of Design Report (BODR) for the Crawford Street South site (ECSI # 2363) located in Portland, Oregon and transmits the Final BODR. A draft BODR was submitted to the Oregon Department of Environmental Quality (DEQ) on June 6, 2022. The U.S. Environmental Protection Agency (EPA) provided comments on the BODR to the DEQ on October 17, 2022. DEQ forwarded the EPA comments to Crawford Street Corporation (CSC) and GeoEngineers the same day and did not have additional comments. The EPA comments were organized into three categories: Primary; To Be Considered; and Matters of Style. The EPA comments are provided in italic font below, followed by our response in regular font.

RESPONSE TO PRIMARY COMMENTS

1. ***Section 4 Nature and Extent of COCS in Riverbank Soil, page 12:*** *The section related to PCBs should discuss the undefined depth of PCB exceedances at XS11-30-N and that the PCBs are not bound laterally towards the top of bank at the existing parking area. The BODR should discuss how these data gaps will be addressed, and identify what related design studies, if any, are needed to fill these data gaps to inform the remedial design.*

As shown on Figure 17a of the BODR, location XS11-30-N is located on the upland property, well beyond the top of the riverbank and the PCBs are present below a depth of 2 feet below ground surface (bgs). The upland parcel is being marketed for redevelopment. The presence of PCBs in the upland property will be assessed and integrated within the redevelopment of this parcel. The riverbank layback will be designed to allow integration into the upland redevelopment. However, the presence of the PCBs at this location does not currently present an unacceptable risk to human health, the environment, or the Willamette River, based on the depth, the fact that they are overlain by two feet of soil containing total PCB concentrations

below PHSS cleanup levels, and their location of more than 40 feet inland of the current top of bank and more than 20 feet inland of the top of the bank following the proposed riverbank source control measure (RBSCM). The text of the BODR has been revised with this additional detail.

2. *Section **4 Nature and Extent of COCS in Riverbank Soil, page 13:** The section related to PeCDD should discuss the undefined depth of exceedances at XS1, XS11, XS3, XS5, XS7, XS8 and XS10. Additionally, lateral extent of contamination has not been defined at XS1, XS11, XS3, XS7, and XS2. Figure 5 demonstrates the conclusion that contamination exists between adjacent transects but does not discuss the lateral extent of contamination beyond the outer edge transects. The BODR should discuss how these data gaps will be addressed and identify what related design studies, if any, are needed to fill these data gaps to inform the remedial design.*

As detailed in the BODR, the source of the chemicals of concern (COCs) identified in the riverbank is the fill material that comprises the bank. Extensive sampling was conducted during the four phases of investigation of the riverbank, including the collection of more than 270 samples of the riverbank fill soil for chemical analysis, to provide a comprehensive understanding of the quality of the material comprising the bank. Because one of the objectives of the riverbank investigations was to comprehensively characterize the quality of the fill, which was successfully completed, defining the vertical extent of individual COCs is not needed to develop the design of the RBSCM.

As discussed in the BODR, the RBSCM will include layback of the riverbank and a cap to provide physical and/or chemical stabilization for COCs remaining at and below the leave surface following the layback. Because the character of the material to be capped is extensively understood, defining the vertical extent of the PeCDD will not change nor affect the design of the RBSCM.

Similarly, because conservative assumptions are being used in the development of the capping layers for the RBSCM, further lateral definition of the COCs in not needed. Above the ordinary high water (OHW) elevation, the objective of the cap will be physical isolation to eliminate potential erosion of materials with COCs above remedial action levels (RALs) from reaching the Willamette River. Because the entire riverbank will be stabilized and capped, the currently defined lateral extent of PeCDD above OHW is adequate to complete remedial design of the RBSCM.

Below OHW, the objective of the cap will be to provide physical and chemical stability. The design will assume that groundwater seepage can occur through the cap anywhere below the OHW elevation. This is a very conservative assumption since the depth to groundwater at the top of the bank is well below the OHW elevation and there is no indication of groundwater seeps.[1] As detailed in Section 8 of the BODR, design studies will be performed (i.e., CapSim modeling) to develop a cap design which will mitigate the potential for dissolved phase transport of PeCDD from discharging through the cap at concentrations above PHSS surface water cleanup levels or accumulating within the cap at concentrations above PHSS sediment cleanup levels. The CapSim modeling will assume that PeCDD is present in soil at and below the leave surface across the entire areal extent of the riverbank and sensitivity analyses will be performed using the highest detected concentrations of PeCDD to ensure that a conservative and protective cap design is identified. Because the source of the PeCDD is the riverbank fill, the range in identified PeCDD

[1] Seeps identified at the site are due to stormwater ponding at the top of the bank and seeping through the upper parts of the bank, which will be mitigated by the planned interim stormwater source control measure.

concentrations is representative of the material to be capped. Therefore, the currently defined lateral extent of PeCDD is sufficient to complete the CapSim modeling and develop the requirements of the cap for the area below OWH.

As identified in EPA's comment, the lateral definition indicates that the PeCDD extends beyond the RBSCM project boundaries in some areas. As identified in the BODR, it will be important to coordinate with the adjacent in-water remedial design parties to ensure that the remedies proposed by these in-water groups will be compatible at the boundaries between the project areas.

3. ***Section 4 Nature and Extent of COCS in Riverbank Soil, page 13:*** *The section related to Total PAHs should discuss the undefined depth of PAH exceedances at XS3 the fact that the lateral extent of contamination has not been defined at XS1, XS11, XS2, XS3, and XS7 and 8. Additionally, the area east of XS8, XS14, and XS9 is not delineated laterally towards the parking area (shown on Figure 8). The BODR should discuss how these data gaps will be addressed and identify what related design studies, if any, are needed to fill these data gaps to inform the remedial design.*

Please see the response to Primary Comment #2 above.

Additionally, please note that there are no total PAH exceedances of the CUL or RAL on transects XS3, XS1, XS11, XS2, or XS-7 (see Figure 8 of the BODR). Lateral exceedances that extend off-property at XS13 will be coordinated with the Willamette Cove in-water group. Exceedances on XS8 and XS14 on the upland property will be coordinated with the redevelopment of the property.

4. ***Section 8.1 Flood Rise Evaluation, page 28:*** *Section 8.1 describes the flood rise evaluation planned for use at Crawford Street. The US Army Corps of Engineers (USACE) has recently developed a new HEC-RAS flood rise model for use at the Portland Harbor site. The model has been reviewed by the City of Portland and the Federal Emergency Management Agency (FEMA) and meets the requirements of a Corrected Effective Model. EPA is providing this new model to in- water project designers and will provide it to the Crawford Street design team.*

Noted. Thank you.

RESPONSE TO "TO BE CONSIDERED" COMMENTS

1. ***Section 5.1.4 Use of Green Remediation Practices, page 16:*** *EPA is supportive of green remediation practices being implemented at this site. EPA recommends a revision to the text to specify when the green remediation plan will be drafted during the design process. A clearer sense of timing is important for review and to verify elements that apply to RD data gathering activities are applied in a timely fashion.*

The green remediation plan will be prepared during the preliminary design phase (30 to 60% design) and included with the pre-final riverbank design report.

2. ***Section 5.2.2 Future Land Use, page 19:*** *Appendix D, Figure 2 of the RDGC (EPA, 2021) shows a recreational beach in the Crawford Street project area. This section should describe the future use of a possible recreational beach following construction of the riprap cap/revetment.*

The beach in the Crawford Street South project area is privately owned and not constructed for recreational beach use. There are no plans for a recreational beach following construction of the riverbank stabilization project. The existing, privately owned beach will not be rebuilt after capping.

3. ***Section 5.3.1 Groundwater Pathway, pages 19 and 20:*** *This section, or another new sub-section, should discuss the groundwater to surface water pathway and riverbank seeps which showed exceedances of groundwater criteria. The assessment of the groundwater pathway should include the current stormwater infiltration and future use of the property that may include stormwater infiltration basins.*

The assessment of the groundwater pathway is being evaluated in the groundwater source control evaluation report. The data relevant to the design of the RBSCM (i.e., groundwater elevation and analytical data in support of mass flux analyses for the cap design) is discussed and included in Section 8.4 of the BODR.

4. ***Section 6.2.5 Habitat Considerations, page 24:*** *This section mentions habitat features that could be enhanced as part of the project mitigation plan. Revise the section to clarify the components of the project mitigation plan and the schedule for its development and note that the project area resides within critical habitat for salmonid species (as described in the ROD and PBA).*

The project mitigation plan will be developed during the preliminary design phase (30 to 60% design) in consultation with National Marine Fisheries Services (NMFS), Oregon Department of Fish and Wildlife (ODFW), and the United States Forest Service (USFS). The BODR was revised to identify this process and notes that the project area is within critical habitat for salmonid species.

5. ***Section 8.4.1 COCs to be Evaluated, page 29:*** *Chemical isolation modeling will need to demonstrate that the cap can contain contaminant concentrations in the top 30 centimeters of the cap below the Table 17 CULs for a design period of 100 years. Therefore, all Table 17 contaminants with sediment and groundwater CULs should be evaluated.*

Section 8.4.1 identifies PAHs, PCBs, TCDD, and PeCDD as the COCs to be included in the chemical isolation modeling based on their presence in riverbank soil below OHW at concentrations above RALs. In response to this "To Be Considered" comment, the riverbank soil and groundwater data were screened to identify Table 17 COCs that should be considered in the chemical isolation modeling to design a more conservatively protective cap.

Chemical isolation modeling will assess two mechanisms for transport of COCs into an overlying cap: (1) COCs in riverbank soil becoming entrained or leaching into groundwater as it fluxes through the soil and

either being deposited in the soil cap or being discharged into surface water, or (2) groundwater containing COCs at concentrations above CULs fluxing through the soil cap and depositing COCs in the soil cap or discharging COCs to surface water. To identify potential COI from the PHSS Table 17 COCs to include in the chemical isolation modeling via these two mechanisms, site soil and groundwater data, respectively, were screened.

Soil Data Screening and Evaluation. Based on groundwater assessments performed over the past year, the groundwater table within the riverbank is consistently well below the OHW level, and groundwater will not flux through riverbank soil at elevations at or above OHW. Therefore, to evaluate the first mechanism, analytical data from riverbank soil samples collected below OHW was screened against Table 17 CULs for riverbank soil to assess COCs to include in the chemical isolation modeling. Table E-1 of Appendix E in the Final BODR tabulates the results of this screening. Tables 2 through 13 of the BODR summarize the soil data.

The following PHSS ROD Table 17 COCs are present in riverbank soil located below OHW at concentrations above CULs:

- HxCDF, TCDF
- Chlordane
- Dieldrin
- cPAHs
- Arsenic, cadmium, copper, lead, mercury
- BEHP, Di-n-butylphthalate

However, chlordane and dieldrin were detected above the CUL in just one sample each, and lead and mercury were detected above the CUL in fewer than 8% of the samples collected below OHW. Additionally, copper, while slightly more widespread, was detected in just two samples below OHW with exceedance factors more than 1.7. Therefore, given the limited presence or magnitude of chlordane, dieldrin, copper, mercury, and lead in riverbank soil, these COIs do not need to be included in the chemical isolation modeling based on the soil screening.

Groundwater Data Screening and Evaluation. To evaluate the second mechanism, PHSS ROD Table 17 COCs in groundwater samples collected from wells installed in the riverbank were screened against the PHSS ROD Table 17 CULs for groundwater. The tabulated groundwater monitoring results are contained in Appendix D of the BODR. As can be seen from the tables, the groundwater data showed consistent improvement between the first and third events, as the groundwater in the formation equilibrated with the monitoring wells. Therefore, to identify COCs representative of groundwater conditions, PHSS ROD Table 17 COCs that were present above the Table 17 CULs in samples from 3 or more monitoring events in 2 or more riverbank wells were identified for potential inclusion in the chemical isolation modeling. The following lists the COIs based on the groundwater data screening:

- DDD, DDE
- Arsenic, cadmium

Table E-2 summarizes the screening results and is included in Appendix E for reference. Although arsenic was detected at concentrations above CULs, the detected groundwater concentrations were consistent with regional background levels for arsenic in groundwater[2], therefore, arsenic does not need to be included in the chemical isolation modeling based on the groundwater data screening. Similarly, DDE was detected in two wells above CULs in 3 or 4 events; however, the exceedance factors for the detections were 3 or less in all but one sample, and this sample was collected during the first sampling event. Exceedance factors in the samples from both wells during the final two sampling events were less than 1.5. Because of the limited magnitude and presence of DDE in groundwater, this constituent does not need to be included in the chemical isolation modeling.

Summary. Based on the screening of the soil and groundwater data against the Table 17 CULs, the following COIs will be included in the chemical isolation modeling in addition to PCBs, PAHs, TCDD, and PeCDD:

- HxCDF, TCDF
- DDD
- cPAHs
- BEHP, Di-n-butylphthalate
- Arsenic, cadmium

The screening of the soil and groundwater data against Table 17 CULs has been added to the revised Final BODR including the above discussion of the screening results.

6. ***Section 8.4.3 Model Inputs, page 30:*** *EPA does not recommend using average COC concentrations for cap design. An upper bound estimate such as the 90th percentile should be considered for cap design. The COC concentration dataset should be statistically evaluated further to confirm that use of the proposed concentrations is adequate for design.*

A 90 percent upper confidence level on the mean will be used instead of the average concentration.

7. **Figure 17 Series:**
    a. *Anticipated Leave surface: The green anticipated leave surface in some sections is above the existing ground surface on the beach area. The leave surface in areas where the proposed plan is not showing a remedy would be the existing ground surface not the 3H:1V projection of a conceptual slope. As a result, over steepened slopes approximately 1.5H:1V appear to be present on figures (See figure 17b). Clarify that the excavation cuts provided will be assessed for stability and/or that the existing ground will be backfilled with clean fill in areas*

[2] A 1999 study of wells in the Willamette Basin identified naturally occurring arsenic concentrations ranging from 1 to 840 ug/L (USGS, 1999). A Washington state study performed by the Department of Ecology in 2022 identified concentrations of naturally occurring arsenic across the state ranging between <1 to 150 ug/L, and identified background arsenic to range from 4.9 to 15.4 ug/L (Ecology, 2022).)

where the existing conditions may not have any dredging.

Notes have been added to the figures to clarify that areas where the green line is above the existing grade indicate areas of fill.

b. *Non-Perpendicular Transects: In the 30% design, provide a plan that consists of perpendicular transects to the slopes to allow for review of constructability and stability basis.*

Perpendicular transects will be provided as a part of the 30% design.

c. *A top of cap/habitat surface should be added to each of the figures to assess how the design concept will meet requirements in the RDGC related to shallow zone habitat.*

The purpose of the Figure 17 transects are to identify the sampling locations relative to the leave surface to demonstrate adequate chemical characterization; the intent is not to illustrate the conceptual model of the RBSCM, which is shown on Figure 20 of the Final BODR (Figure 19 in the draft BODR).

d. *The figures in this series should indicate the soil/sediments concentrations for other COCs in addition to PCBs (e.g., similar to Figure 18). The current figures depict only PCBs, making it difficult to determine which areas contain other COCs above CULs, RALs, and PTW thresholds. Identifying the depth of contamination at each core location (based on data from all COCs) along the section would clarify the approach and allow for more complete review of conceptual cap design.*

An additional transect series has been added to the BODR which identifies locations that exceed CUL, RAL, or PTW concentrations providing the vertical equivalent display of the data as presented laterally on Figure 18. The new cross-sectional figures are labeled in Figure 19a – 19g.

e. *Cross sections should clearly depict each of the river regions (Shallow, intermediate and Riverbank) as defined in the ROD and discussed in the RDGC and the Appendix D for riverbank guide (RBG). Adding callouts or extents lines to indicate each of the regions would improve clarity.*

The boundary between the Shallow and intermediate regions, as defined in Section 14.2.4 of the PHSS ROD is -2.0 feet CRD (3.2 feet NAVD88, based on Figure 3.1-6 Datum Relationship in Portland Harbor of the 2016 PHSS RI/FS). This boundary is beyond the extent depicted in the cross-sections and therefore, has not been added to the Figure 17 series.

The Riverbank region is defined in Section 14.2.5 of the PHSS ROD "as areas from the top of bank down to the river" and there is no in-river elevation provided to separate the Riverbank region from the Shallow region. Therefore, no boundary between the Shallow and Riverbank regions has been added to the Figure 17 series.

The top of bank is clearly evident in the Figure 17 series by the break in slope from the flat upland area to the steepened bank. Because the top of bank is clearly evident, it did not seem necessary to add a label to show the boundary between the top of bank and the adjacent uplands.

f. *On Figure 17a, cross section XS1 depicts an armored toe in the shallow zone adjacent to PTW exceedance at location XS1-TOE-S. The SCM must be compatible and consistent with any remedy needed to address PTW contamination at XS1-TOE-S and any adjacent shallow zone action. Therefore, the design of the toe support must consider probable impacts to the surrounding sediments for geotechnical stability. A baseline assumption for the PHSS Selected Remedy is that dredging to a depth of 5 feet will occur adjacent to the reinforced toe and that scenario must be factored in the design and stability modeling assumptions.*

Noted. Thank you.

RESPONSE TO "MATTERS OF STYLE" COMMENTS

1. ***Section 5.1.4 Use of Green Remediation Practices, first sentence, page 16:*** *Recommend revision of the first sentence to state "The RBSCM design process will be performed to meet the goals associated with green remediation documented in the RDGC (EPA 2021) and the ROD Section 14.2.12."*

Section 5.1.4 has been revised to include the sentence as stated above.

2. ***Section 6.2.3 Remnant Piles, page 23:*** *Revise this section to note that the programmatic biological assessment (PBA) requirements will be superseded by the Programmatic Biological Opinion (i.e., use "as required by the PBA or Programmatic Biological Opinion once issued.")*

Section 6.2.3 has been revised as suggested.

3. ***Figures 3-16****: Recommend the addition of riverbank features such as Top of bank, OHW, and MLW to these figures for clarity.*

The riverbank features of top of bank, OHW, MLW, and the boundary between Shallow and Intermediate in-water river regions (-2 Columbia River Datum [CRD]) have been added to Figures 3 – 16.

If you have any questions regarding this response to comments or the project in general, please do not hesitate to contact me at 503-577-1535 or aspencer@geoengineers.com.

Sincerely,
GeoEngineers, Inc.

Amanda Spencer, PE, RG
Principal Hydrogeologist

AS:mls

Transmittals:
Final Basis of Design Report (including one hard copy submittal)

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One copy submitted electronically and via hard copy