Revised DEQ Comment Response Matrix
Supplementary Source Control Evaluation Work Plan
Willamette Cove

Reviewer Comment No.	Section Name/ Topic	Section/Table/ Figure No.	DEQ Comments December 19, 2024	Port/Metro Response/Action
General 1	Sampling and Concentration Coverage	N/A	DEQ understands it is the Port and Metro's intention to assess concentrations of COCs in groundwater between upland monitoring wells and offshore porewater sampling locations along three transects aligned generally perpendicular to the shoreline. DEQ encourages the Port and Metro to consider collecting additional porewater samples between the transects to address gaps in coverage based on existing data (see Specific Comment 4).	In the introduction of the December 19, 2024 comments on the *Supplementary Groundwater Source Control Sampling Work Plan* (SCE Work Plan), the Oregon Department of Environmental Quality (DEQ) reiterated that groundwater discharge appears to represent a low recontamination risk to Willamette River sediments and DEQ is unlikely to compel the Port and Metro to implement additional upland source control measures for this pathway. The Port and Metro acknowledge DEQ's position and designed the proposed additional SCE sampling to provide a better understanding of the fate and transport of contaminants of potential concern in groundwater from the West Parcel. That is, the proposed sampling is intended to monitor the attenuation of COCs in groundwater from the monitoring wells to groundwater beneath the river. Therefore, at this time, no porewater samples are proposed to be collected t.
General 2	Groundwater Flow Paths	Figures 7, 13-15	To facilitate evaluating the appropriateness of proposed boring and sample locations/depths as shown in Figures 13-15, please overlay the estimated flow net and groundwater flow paths as depicted in Figure 7 onto cross-sections A-A', B-B' and C-C'.	The estimated flowpaths shown on Figure 7 will be overlain on Cross Sections A-A', B-B' and C-C' (Figures 13 through 15) as requested.
Specific 1	Purpose and Objectives	Section 1.1	As indicated previously, DEQ does not consider groundwater discharge to be a significant recontamination risk to Willamette River sediments. With that said, the objectives of the proposed investigation are not clearly stated in this section. Please provide further discussion regarding the goals of the investigation (e.g., documenting changing redox conditions favorable to lowering arsenic concentrations as groundwater approaches discharge zones, comparing COC concentrations between groundwater and porewater to support or rule out groundwater influence altogether, etc.).	Comment noted. Section 1.1 will be revised to more clearly state the purpose and objectives of the additional proposed sampling. Additionally, the work plan will be revised indicating that the sampling will be conducted in two phases. Phase 1 will include the onshore angled borings. The data will be used to update the lines of evidence evaluation. Phase 2, the in-water borings, will be conducted only if warranted based on the updated lines of evidence evaluation.
Specific 2	Groundwater Gradients	Section 3.2.4	a. Observations of an upward vertical gradient on a regional scale do not preclude the potential for localized variations in the direction of the vertical gradient (i.e., as has been observed at the Seaport Midstream Partners terminal between river miles 4.8 to 5.0 on the west side of the Willamette River). While a regional trend can be considered a line of evidence in support of limited downward vertical flow, it should not be solely relied upon. Shallow-deep monitoring well pairs provide the best source of data for evaluating the direction and magnitude of vertical flow. Please revise the discussion to note this uncertainty. b. To date, DEQ has not observed evidence of a laterally extensive aquitard in the Willamette Cove upland. Also, it is overly simplifying to state that by virtue of the presence of a confining unit the perched shallow groundwater containing dissolved COCs is "by definition" vertically isolated from deeper regional aquifers. Even where known to be laterally continuous, confining units can be "leaky" due to heterogeneity and allow vertical flow. Please remove this language and revise discussion to more accurately reflect this source of uncertainty.	a. The discussion of vertical groundwater gradient in Section 3.2.4 will be revised to note that there is potential uncertainty in the local downward vertical flow given the absence of nested shallow and deep monitoring well pairs that would allow direct measurement. b. The discussion of vertical groundwater gradient in Section 3.2.4 will be revised to note this potential uncertainty.
Specific 3	Groundwater Discharge Model	Section 3.3	Based on the variable geology encountered at the site and lack of data regarding measured vertical gradients, please explain the basis for the assumption of isotropic groundwater conditions. For example, if there are data regarding hydraulic conductivity measured in the horizontal and vertical directions, please provide and discuss accordingly.	Note that the assumption of isotropic conditions was the starting point for producing the flow net model. As discussed in Section 3.3, anisotropic conditions (assuming up to 35 times greater lateral hydraulic conductivity relative to vertical hydraulic conductivity) were considered). Figures 7b, 13b, 14b and 15b will be added showing that in highly anisotropic conditions (figures represent lateral hydraulic conductivity 35 times greater than vertical), the proposed sampling locations will intercept the shallow groundwater flowpaths, representative of groundwater discharging to the river from the upper 50 to 100 feet of the aquifer.

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Specific 4	BaP Eq in Porewater	Figure 9	DEQ notes there are gaps in porewater sample coverage between section lines A-A' and B-B' (i.e., landward of WC-P012 and WC-P027) and between section lines B-B' and C-C' (i.e., landward of WC-P031 and WC-P028). The Port and Metro should consider collecting additional porewater data between the transect lines. Comment similarly applies to porewater data for DDD as shown in Figure 11. See also General Comment 1.	Comment noted. See response to General Comment 1.
Specific 5	Analytical Testing Program	Section 3.0	Please analyze groundwater samples for total PCB as congeners instead of total PCBs as Aroclors and revise Table A-2 accordingly.	The purpose of the PCB sampling is to characterize the concentration of total PCBs. Virtually all historical groundwater analyses have been done by the Aroclor method. For comparability, the additional groundwater samples will be analyzed using the Aroclor method (EPA 1668C).

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Primary 1	Goals/ Objectives	N/A	The goals/objectives for this sampling are too general and should be defined more clearly with data quality objectives for each planned event (e.g. angled borings and offshore borings) aligned with specific evaluations planned after data collection. Absent this, EPA cannot determine if the current work described in the Work Plan will be adequate and appropriate for future evaluations. For example, the Updated SCE (Apex, 2023) presented an evaluation of and conclusions on attenuation from the uplands to the river based on concentrations of groundwater in the upland monitoring wells compared to porewater samples offshore. However, as pointed out in previous EPA primary comment 5 (EPA 2024), the offshore porewater sampling locations were too distant to be representative of the shallower groundwater flow paths that intercept the log pond area and its greater potential for contaminant transport to the river as illustrated in Figure 22 in the Updated SCE and Figure 7 in this Work Plan. The result of the evaluation was a potential biased attribution of the lower concentrations seen in the offshore porewater samples to attenuation when the lower concentrations could potentially be due to much deeper groundwater flow paths, outside the area of upland contamination, captured by those porewater samples. While the Work Plan now includes angled borings with locations that appear to be better aligned with the flow paths to characterize maximum contaminant transport from the log pond, it is unclear what purpose the proposed offshore borings have with future evaluations. Inconsistent with the previous EPA comment request (see EPA primary comment 5, EPA 2024), the offshore borings are not located laterally within 25 feet of the river/shoreline intersect as defined by the 10 foot msl NAVD88 datum. It is probable the deeper discrete sampling depths from these offshore borings will target groundwater flow paths not representative of the highest contaminant concentration pathway from the former log pond area.	Additional details regarding the goals/objectives for the angled borings and offshore borings will be added. As indicated in the Port and Metro's response to EPA's primary comment 5 on the Updated Source Control Evaluation (Updated SCE, Apex, 2023), cross sections were added to the Updated SCE that display the porewater samples collected in nearshore locations (P003, P005 and P006) and are representative of shallow groundwater discharge in the area of the former log pond. The existing porewater dataset (including nearshore and offshore) will be used in combination with the proposed additional sampling to assess whether COCs detected above screening levels in upland monitoring wells are adversely impacting the river sediments or surface water. Based on the groundwater discharge model described in the Updated SCE (Apex, 2023), the primary discharge of groundwater with COCs is estimated to be within 200 feet of the shoreline and represent the upper 50 to 100 feet of the shallow aquifer. Four figures have been added (Figures 7b, 13b, 14b and 15b, see response to DEQ Specific Comment 3) that show the proposed sample locations will intercept the upper 50 to 100 feet of the shallow aquifer. The overall dataset should provide enough information to draw conclusions regarding potential migration of COCs throughout the groundwater column that discharges within 200 feet of the shoreline. No porewater sampling is planned.
Primary 2	River Stage Condition	N/A	The dynamic river stage condition at the site should be used to direct the time each discrete sample is collected within the angled riverbank borings to ensure groundwater discharge conditions are present at the time of sampling as opposed to surface water recharge conditions. Optimally, the timing for groundwater sampling within these discrete intervals should target when the river stage is in a seasonal low (or in a lowering condition period) and near, or at its daily, tidally influenced, low point to ensure the samples are most representative of groundwater conditions as opposed to surface water recharge conditions. The Work Plan should include a section that presents the optimal seasonal conditions for sampling groundwater in the angled riverbank boreholes (see the Remedial Design Guidelines and Considerations document, Section 5.1.4 for guidance [EPA, 2021]) and steps the field crew should follow to time the sampling when groundwater discharge conditions are most likely occurring.	Based on the analysis of groundwater gradients, velocities and river level effects on groundwater flow (based on over two years of water level monitoring), groundwater flows from the upland toward the river with steeper gradients during low river levels. Groundwater flow reversals do occur in the winter/spring and appear to happen primarily in the Central Parcel area (monitoring well MW-4 and MW-5) during very high river level events. During the entire water level monitoring period, there was no evidence of flow reversal in the West Parcel area. Sampling will be conducted when the mean daily river levels are lower than 12 feet NAVD88. The water level monitoring at the site demonstrates that these conditions assure no substantive flow reversal (i.e., flow from the river to groundwater) even on the Central Parcel. To the extent practical, the timing of the additional sampling will be coordinated with planned riverbank characterization soil sampling being conducted by the In-Water Group. Section 5.3.1 of the Workplan will be revised to include a more detailed description of the timing of the sampling.
Primary 3	Purge Parameters and Methodology	Section 5.3.3	The Work Plan should clarify that the same purge parameters and methodology presented for Monitoring Wells in Section 5.3.3 will also be used for the grab samples in the riverbank and in-water borings.	Sections 5.3.1 and 5.3.2 will be revised to clarify that the same purge methodology and measurement parameters will be used for the grab samples as for the monitoring well samples.
To Be Considered 1	Pesticide Analytes	Section 5.4	The analytical method presented in Section 5.4 for pesticides should include and report DDD, DDE, DDT and DDx results.	Section 5.4 will be revised to include DDD, DDE, DDT and DDx.

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Comment 1	Acceptability of Work Plan	N/A	Based on our review of the work plan, the proposed investigation is robust and likely to achieve the purpose and objectives described in Section 1.1 of the work plan.	Comment noted.
Comment 2	Soil Screening	Sections 5.3.1 and 5.3.2	Sections 5.3.1 and 5.3.2 indicate that borings "will be continuously cored, and the soil cores will be logged and recorded using the Unified Soil Classification System." These sections of the work plan also state that no soil samples will be collected for laboratory analysis. We recommend that the plans indicate that visual and olfactory observations will be recorded and that soil cores will be screened in the field using portable gas samplers. Further, we recommend that the plan include contingencies for collecting any visually contaminated or anomalous soil samples for laboratory analysis. In particular, the two easternmost angle borings will be drilled within the area of the former log pond. Therefore, contaminated soil may be encountered and, if so, should be further evaluated.	In addition to using the Unified Soil Classification System, field screening of soil will be conducted including sheen testing, use of a photoionization detector and observation of visual indications of contamination. As the SCE Work Plan indicates, no soil samples will be collected for laboratory analysis as part of the SCE. Note that the riverbank angled borings will be co-located with the In-Water Group riverbank characterization borings that include soil sampling for laboratory analysis.
Comment 3	Sampling Ferrous Iron	Section 5.3.3	Section 5.3.3 indicates that ferrous iron will be sampled in the field during purging of groundwater monitoring wells. We recommend the work plan provide a more detailed description of how this will be done.	Section 5.3.3 of the SCE Work Plan will be revised with additional details on the field testing methodology for ferrous iron.
Comment 4	Project schedule	Section 6.1	In Section 6.1, the project schedule lists spring 2025 as the anticipated timeframe to conduct field work. Also, in Section 5.3.2, with respect to the in-water sampling, the work plan states, "If the in-water sampling will be conducted outside the July 1 through October 31 work window, a variance will be obtained through the U.S. Army Corps of Engineers and DSL [Oregon Department of State Lands] (joint variance request)." If there is a technical rationale for conducting in-water sampling in the spring (e.g., river stage), we recommend the work plan provide that justification; otherwise, we recommend the in-water work be conducted within the designated work window.	See response to EPA primary comment 2 above. If possible, the SCE sampling will be conducted in coordination with the In-Water Group bank characterization work for efficiency. However, if the In-Water work is scheduled for a period of high water (early spring, increasing the potential for groundwater flow reversal), consideration will be given for scheduling the SCE work at a later date when water levels are low and within the in-water work window (July 1 to October 31). If the In-Water work is scheduled for later in the season when water levels are decreasing but maybe not at the seasonal low and outside of the in-water work window, a variance will be obtained so that the SCE work can be coordinated with the In-Water work.