



OFFICE OF LAND AND EMERGENCY MANAGEMENT

WASHINGTON, D.C. 20460

March 26, 2026

MEMORANDUM

SUBJECT: Contaminated Sediments Technical Advisory Group (CSTAG) recommendations on the Lower Hackensack River Superfund Site, milestone 1 review

FROM: Karl Gustavson, Chair, on behalf of CSTAG, Office of Superfund and Emergency Management, U.S. Environmental Protection Agency (EPA)

TO: Jennifer LaPoma, Remedial Project Manager, Superfund and Emergency Management Division, EPA Region 2

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BACKGROUND

OSWER Directive 9285.6-08, *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (February 12, 2002)¹, established CSTAG to "monitor the progress of and provide advice regarding a small number of large, complex, or controversial contaminated sediment Superfund sites," which are known as "Tier 2" sites. CSTAG members are site managers, scientists, and engineers from EPA and the U.S. Army Corps of Engineers (USACE) with expertise in Superfund sediment site characterization, remediation, and decision-making. One purpose of CSTAG is to guide site project managers to appropriately manage their sites throughout the Superfund process in accordance with the 11 risk management principles described in the 2002 OSWER Directive, the 2005 Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (EPA-540-R-05-012)², and the 2017 OLEM Directive on Remediating Contaminated Sediments (OLEM Directive 9200.1-130).³

The Lower Hackensack River Superfund Site is a Tier 2 sediment site, and the contaminated sediment areas and actions are subject to CSTAG review per CSTAG's policies and procedures.⁴

¹ Available at: <https://semspub.epa.gov/src/document/HQ/174512>

² Available at: <https://semspub.epa.gov/src/document/HQ/174471>

³ Available at: <https://semspub.epa.gov/src/document/11/196834>

⁴ Available at: <https://semspub.epa.gov/work/HQ/100003253.pdf>



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BRIEF DESCRIPTION OF THE SITE

The Lower Hackensack River Superfund Site includes the lower (tidal) portion of the Lower Hackensack River in Bergen and Hudson Counties, New Jersey. The site spans approximately 22 river miles (RM) from south of the Oradell Dam to near Newark Bay and includes portions of the Hackensack Meadowlands (the largest brackish estuarine complex in the New York-New Jersey Harbor Estuary) and several tributaries. This site has been the location of industrial activities for over 200 years, where decades of sewage and industrial discharges into the river, its tributaries, and the Hackensack Meadowlands have contaminated surface water and sediment with hazardous substances, including but not limited to metals (such as arsenic, chromium, lead, and mercury), dioxin (such as 2,3,7,8-tetrachlorodibenzo-P-dioxin), several polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

EPA placed the site onto the National Priorities List on September 9, 2022. To date, EPA has identified three operable units (OUs) in the Lower Hackensack River: OU1 is from south of the Oradell Dam to near Newark Bay at approximately RM 1; OU2 is from RM 2 to 5.5; and OU3 is generally located between RM 13 and 17, including Overpeck Creek up to the Degraw Avenue/Fort Lee Road bridge crossing.

SITE REVIEW

The Lower Hackensack River Superfund Site was nominated for CSTAG review by EPA Region 2 in April 2023. An introductory site meeting was held in December 2023. The milestone 1 CSTAG review was held on October 8, 2025, via webinar, and Jan 12-13, 2026, in New York City, NY. This was an initial review of the site management approaches and planned remedial investigation in OU2, including OU1 baseline sampling. This review was conducted early in the process, prior to development of sampling plans for the OU2 Targeted Remedial Investigation (TRI) and Focused Feasibility Study (FFS).

The review included a stakeholder input session attended by the New Jersey Department of Environmental Protection (NJDEP), the Lower Hackensack River Community Advisory Group (CAG) chair, and Respondents to the OU2 Administrative Settlement Agreement and Order on Consent (ASAOC) and their technical consultants as well as the OU2 Respondent's Project Coordinators. The natural resource trustees (National Oceanographic and Atmospheric Administration and the Fish and Wildlife Service) were invited but did not participate. The Region summarized review materials in a Tier 2 site consultation memo⁵ and presented on those materials. The Region also provided a site characterization report⁶, a draft CSM (undergoing

⁵Lower Hackensack River Superfund Site Operable Unit 2 Summary Memorandum for CSTAG Tier 2 Site Characterization Milestone Meeting. January 2026.

⁶ Final Site Characterization Summary Report. Lower Hackensack River Superfund Site Remedial Investigation/Feasibility Study Work Plan Bergen and Hudson Counties, New Jersey. November 1, 2024.

EPA review at time of transmittal)⁷, an adaptive site management plan⁸, the OU2 ASAO for the TRI/FFS, the supplemental River Investigation of the former Koppers Seaboard Site (a NJDEP state lead site), and other supporting references.

RECOMMENDATIONS

1. Support for the Adaptive Site Management Framework. The Lower Hackensack River (LHR) project team presented an adaptive site management (ASM) strategy to address potential elevated risks early in the Superfund process while working towards selecting final, risk-based cleanup goals. The approach, consistent with EPA’s 2022 Sediment Assessment and Monitoring Sheet⁹, is to conduct an early (interim) action in high risk or contaminant source areas, while collecting additional site data and evaluating the response to the action (or series of actions) to inform subsequent actions. Thus far, the Region has identified two OUs (OUs 2 and 3) that contain “elevated contaminant concentrations that may be a potential source of contamination to the rest of the river and may pose an unacceptable risk to human health and the environment due to the presence of contaminants that persist in the environment and can build up in fish and shellfish”.

To guide this process, the Region has developed an ASM plan (ASMP) that includes steps identified in the ASM guidance. The Region’s plan reflects that, at this time, not all elements of the ASM process are known, such as final remediation goals and anticipated timeframes to achieve them. However, “future iterations of the ASMP will reflect the considerations related to development of timeframes which project attainment of the final remedial action’s goals.” CSTAG notes the Region’s intent to develop time points for data review and decisions, and to regularly (“e.g. once a year”) review the ASMP to determine if new information should be incorporated. This will be necessary to keep the plan and conceptual site model (CSM) updated and accurate, however, considering the nature of multi-party decisions at Superfund sites, the process may also prove challenging.

This is one of the first times the ASM process has been incorporated this early in the Superfund sediment site decision-making process. It represents an opportunity for learning and assessing whether ASM increases the efficiency of cleanup at complex Superfund sediment sites, or if formulating interim decisions and designs takes as long as a final remedy.

Recommendation. CSTAG is encouraged by the LHR project team’s commitment to an ASM strategy. It appears that the Region has been thorough and deliberate in targeting areas with the greatest potential need for remediation while developing ASM procedures to continue to gain knowledge of sitewide characteristics and the system’s response to

⁷OU2 Preliminary Conceptual Site Model Report Lower Hackensack River TRI/FFS. December 2025. [not yet reviewed by Region 2 at the time of transmittal]

⁸Lower Hackensack River Adaptive Site Management Plan. Version 1 – February 26, 2025.

⁹ Available at: <https://semspub.epa.gov/work/HQ/100003040.pdf>

remediation. CSTAG supports the Region's efforts to build frequent evaluations into the project's ASMP to assess current efforts and to increase efficiency. To streamline this process, CSTAG recommends that the Region consider defining the structure of the ASMP updates to the extent possible, for example by specifying the timing, nature of decisions, type of inputs and evaluations, and sources of information to be used.

2. Site Characterization Program and Timing. Traditionally, remedial investigations at large sites use phased sampling to satisfy immediate decision objectives and inform subsequent sampling phases. This helps to manage costs and lessen the possibility of unnecessary sampling. However, each sampling phase can be subject to negotiations, legal agreements, and (perhaps multiple) iterations of document review to align views of the level of effort necessary to satisfy that phase's objectives. This process can significantly extend remedial investigation (RI) timeframes and counter any efficiencies gained using an early action/ASM approach. In addition, the long timeframes create technical issues related to data "freshness" and combining non-contemporaneous data, which can then lead to multi-phase pre-design sampling efforts subject to the same delays.

While it is unlikely that a site like the LHR could ever be characterized in a single phase, time frames can be expedited if parties design sampling in a way that foresees and satisfies likely future decisions and data needs to the extent possible, and leverages sample collection to meet multiple objectives. One opportunity is to sample in a manner that is sufficiently robust enough to preclude the need for subsequent RI phases and support design. Another example is to use RI sampling to support technology evaluations, consistent with the TRI/FFS objective to "evaluate different cleanup response options for [OU2]". This concept is discussed in EPA's 2017 sediment directive to "Ensure adequate data collection during the remedial investigation/feasibility study to support the evaluation of alternatives". It recommends that "site teams should consider focusing efforts on collecting data to evaluate and compare remedial alternatives early in the RI/FS". (CSTAG provides technology- and objective-specific recommendations later in this document.)

Recommendation. If ASM is to be worthwhile, it will need to achieve its objective of expedited early actions. CSTAG recommends that the Region work with respondents to complete the TRI in as few stages as possible, and in a manner that can support the TRI, technology evaluation, and design objectives to the extent possible.

3. Site Characterization Sampling. Respondents to the OU2 ASAOC have agreed to conduct sampling to support the OU2 TRI/FFS and an initial round of sampling to characterize baseline conditions throughout OU1. As described in the ASAOC, the OU2 TRI/FFS sampling focuses on the nature and extent of contamination including contaminant source and non-aqueous phase liquid (NAPL) areas, the fate and transport of contaminated sediments, and informing risk evaluations. The sitewide baseline sampling objectives are to adequately establish and characterize baseline conditions.

A comprehensive baseline investigation will serve as a template for subsequent investigations, permit direct comparisons between time points, and use indicators and methods that can fulfill underlying study questions. In OU2, sampling will need to satisfy TRI/FFS and baseline objectives and ultimately support the evaluation of remedies. To be most useful, the sampling efforts should be designed so collected data can fulfill multiple objectives and remain relevant for decision making for the greatest amount of time.

At the time of the CSTAG meeting, the descriptions of the baseline and TRI sampling programs were limited with details to be developed in future deliverables. However, the media to be sampled¹⁰ and listed data gaps presented in the site characterization report and draft CSM appeared appropriate, and in several instances are consistent with CSTAG recommendations. Below, CSTAG provides a few general guidelines and possible opportunities to consider when developing the sampling program.

a. Sampling design. A probabilistic, unbiased sampling approach (e.g., stratified random or systematic design) can satisfy multiple objectives and potential future uses. For example, it can fulfill baseline sampling objectives, source ID objectives, and permit the development of surface weighted average concentration (SWAC) estimates with uncertainty bounds over multiple spatial scales for comparison to SWAC-based remediation goals (if those are developed). The approach also enables valid comparisons of conditions over time in natural recovery and remedy effectiveness evaluations. One concern with unbiased sampling approaches is that they do not inherently consider information related to areas of likely contamination. To address this concern, areas of interest based on site characteristics (e.g., potential source areas, sediment fines, or nearshore areas) can be designated as distinct strata and those areas sampled at a greater density in an unbiased manner.

Recommendation. CSTAG recommends that the Region consider employing an unbiased sampling approach (e.g., stratified random design) for baseline sampling where the design is informed by site characteristics such as sediment bed type, geomorphology, or other factors that influence contaminant level and variability. An unbiased design could also be included in the TRI for OU2 for hotspot delineation by incorporating different strata and higher sample densities in areas of interest. One advantage of this approach is that unbiased data sets can be combined to develop SWACs in various spatial areas of the site.¹¹

¹⁰ “EPA anticipates that the baseline sampling will include the collection of biota, surface sediment, surface sediment texture, sediment cores, bathymetry, hydrology, and surface water/suspended solids chemistry samples, which will be necessary to develop the OU2 TRI/FFS and inform the selection of an appropriate interim remedy to control sources for OU2.” (ASAOC Appendix C, p. 6).

¹¹ CSTAG does not intend for this recommendation to preclude biased sampling such as step out sampling for characterization or design. That approach is effective for delineating high concentrations areas and can be rapidly implemented to identify hotspots. However, using biased samples in SWAC estimates biases the

b. Source identification. In large systems with multiple contaminant sources and potentially unknown historic discharges, it is common for sampling efforts to identify previously unknown contaminant sources, NAPL, or areas of high contamination. Finding those areas later in the process, especially after remediation, is highly problematic for site management and remedy completion. Existing knowledge from historical images and documents will guide source identification efforts but may not be sufficient to identify all areas where sources may exist. The LHR's historic disposal practices, wide distribution of contaminant releases, and transport throughout the watershed and wetland complexes emphasize the importance of this objective for ensuring appropriate source control.

At present, it is not clear to CSTAG which portions of the connected waterways and wetlands will be included in baseline sampling and source identification efforts (although the site characterization report indicates the lack of data in adjacent wetlands and tributaries). There are ways to increase the likelihood that all significant contaminant source areas have been identified, with most related to designating a comprehensive sampling area, increased sediment surface and subsurface sampling density, and water column/suspended sediment sampling to identify nearby sources. Future baseline sampling efforts could also expand sample coverage to increase the likelihood of identifying unknown areas (e.g., by using new randomized sample placement in stratified or systematic design described in recommendation 3a [i.e., not reoccupying original locations]). A sampling and archiving program could help make sampling efforts more cost-efficient.

Recommendation. CSTAG supports the Region's source identification objectives and recommends that sediment and water column sampling efforts include an assumption that not all likely source locations can be identified *a priori*. The OU2 TRI work plan, which will include a minimum of one round of OU1 baseline sampling, should indicate which areas, including connected waterways and marshes, will be included or excluded in sampling, and provide a supporting rationale. Above, CSTAG provides a few approaches that the Region could consider for achieving source identification objectives.

c. NAPL. Some areas of the OU2 sediment bed near the Koppers Seaboard Site are known to be impacted by NAPL. Several investigations have been completed, focusing on CSM development and characterizing the horizontal and vertical distribution of PAHs and NAPL in sediment. The Region indicates that "NAPL impacts were observed in the upper portions of the sediment bed (i.e., from the surface to depth of 6 feet or less) with a few exceptions as deep as 12 feet." Upland source areas have been remediated, including nearshore remediation of the sediment bed and installing barriers to isolate upland deposits and groundwater from the waterway. The geomorphology of this portion of the river includes a turning basin and sharp bend that

SWAC estimates, lessening the utility of the combined data sets. This recommendation is for sample design teams to consider if unbiased approaches are advantageous in their situation for achieving source or hotspot delineation while preserving data for other uses such as SWAC development.

terminates in a steep drop to the navigation channel, both of which can impact sediment fate and transport. Bathymetric change evaluations presented in the Supplemental River Investigation and draft CSM (2005-2020 and 2018-2025) do not appear to show substantial depositional areas, and some scour areas are evident.

Recommendation. NAPL deposits are a likely target for early actions with future remedial decisions based on the NAPL ARAR (Applicable or Relevant and Appropriate Requirements) interpretations, considerations of the physical and chemical stability of NAPL-impacted sediment, and toxicity of constituent PAHs within the bioactive zone. CSTAG recommends that the Region complete determinations on upland NAPL source connectivity and control, conduct evaluations to assess sediment stability and implications for potential NAPL transport, and plan for NAPL treatability testing for in-situ treatment (if in-situ approaches will be considered). A benthic preliminary remediation goal (PRG) for NAPL-related constituents derived from site-specific toxicity testing could also help circumvent potential disagreements on establishing benthic remediation goals.

d. Natural recovery. At least in portions of the system, monitored natural recovery (MNR) is likely to be part of the alternative evaluations and risk management strategy. The current site characterization effort is an opportunity to support MNR evaluations with lines of evidence to establish whether and where natural recovery is occurring, the mechanisms driving this recovery, and if recovery would be anticipated to continue in the future.

Several resources on MNR lines of evidence are available and familiar to the Region and respondents.¹² Some useful lines of evidence to evaluate MNR trends and mechanisms could include repeat intervals of baseline sampling (sediment, water, and biota); sediment and contaminant transport evaluations; sediment core stratigraphy to evaluate changes in contaminant and physical characteristics; determinations of areas prone to deposition or scour; and, depending on the contaminant, the evaluation of degradation products to demonstrate chemical degradation. Over the longer term, CSTAG anticipates that MNR evaluations will be valuable sitewide (OU1) and in the early action areas to support alternative evaluations and help set expectations for recontamination in remediated areas.

Biota concentrations will be central to evaluating risk reduction over time in evaluations of MNR and remedial effectiveness. Choosing fish species to include in a monitoring program is complicated by variations in site fidelity and the species' ability to represent site-related risk. For example, some species (e.g., mummichog, *Fundulus heteroclitus*) with small home ranges or shorter lives can represent localized or more recent contaminant exposures, but they are only

¹² For example, the Strategic Environmental Research and Development Program's 2009 Technical Guide on Monitored Natural Recovery at Contaminated Sediment Site (available at: <https://cluoin.org/download/contaminantfocus/sediments/ER-0622-MNR-FR.pdf>) and EPA's 2014 Technical Resource on Monitored Natural Recovery (available at <https://semspub.epa.gov/work/HQ/174390.pdf>).

consumed by ecological receptors. Other wide-ranging species such as the striped bass (*Morone saxatilis*) may not be closely linked to site conditions but are more frequently consumed by anglers.¹³ Standardization of sample collections (e.g., biota characteristics and sampling areas) and isotopic tracers can help to address the variability in contaminant bioaccumulation that is independent of site-related contaminant exposure and may improve comparisons of data sets collected over time.

Recommendations

1. CSTAG recommends an early emphasis on collecting lines of evidence on MNR trends and mechanisms to support future decision-making. It's anticipated that TRI and baseline sampling can be leveraged to ensure parameters, spatial coverage, and time intervals can also support natural recovery objectives.

2. Species selection and standardization of biological sampling will need to be carefully considered. CSTAG recommends that the Region monitor species that can reflect human and ecological risk and are closely linked to the site changes to the extent possible (or at least be clear if collected species are less suited for tracking site contamination). Isotopic tracers (e.g., light isotopes) could be considered to support species selection by increasing the understanding of their migration, habitat reliance, and primary areas of residence (e.g. within the river compared to the bay).

e. Sediment stability. An understanding of sediment bed stability is necessary for the sediment transport CSM, MNR evaluations, and for evaluating remedial alternatives. Defining areas prone to erosion or deposition under typical tidal-driven and storm-driven flows will be important to establish whether buried or capped contaminants will remain isolated over time. Current and future site use can directly impact sediment stability, for example through construction or navigation activities which can alter flows or disrupt previously stable bed and bank features. Available bathymetric change evaluations demonstrate the total erosion or deposition between surveys in the surveyed areas. CSTAG agrees with the Region's site characterization report that the lack of comprehensive bathymetric data is a data gap that should be completed with "temporally spaced bathymetric surveys conducted after this baseline is conducted, including in association with storm events."¹⁴ The Sediment and Erosion Deposition Assessment (SEDA) Guidance¹⁵ developed by USACE for the EPA discusses lines of evidence used to evaluate sediment stability such as comparative bathymetry, core stratigraphy, evaluation of sediment bed

¹³ Recommendation 5 of the 2017 sediments Directive provides further discussion of this topic.

¹⁴ CSTAG anticipates that the time interval between surveys will be based on decision needs. For example, there may only be a short duration between surveys for early action areas where information is needed more quickly. For longer term monitoring of site conditions, a longer survey interval (e.g., 5 years) to support five-year reviews may be appropriate.

¹⁵ Available at: <https://semspub.epa.gov/work/HQ/174625.pdf>

chemical, geotechnical, and radiologic characteristics, and in-stream and modeled sediment settling/flow/velocity measurements.

Recommendation. CSTAG recommends that the Region includes sediment stability evaluation objectives in its characterization efforts. The SEDA methodology describes several lines of evidence and approaches to achieve those objectives. Repeated high resolution multibeam bathymetry has already proven useful at the site. Comprehensive survey areas and more intervals would further understanding of sediment stability and transport and support remedial technology evaluations.¹⁶ Determinations of likely future use including a USACE navigation needs analysis will also be essential to inform technology selection (and ARAR compliance).

4. Data Gaps

a. Per- and polyfluoroalkyl substances (PFAS). The Region identified that limited PFAS data were available for the site (although some preliminary sediment and water results near the PJP Landfill Superfund Site were presented). The site characterization report recommends “a more robust PFAS investigation would allow identification of areas where PFAS contamination may pose a risk to human health or the environment. Initial PFAS investigations could focus on areas adjacent to manufacturing facilities known to use PFAS.” A lack of PFAS data in potential source areas could create uncertainty and delays on whether and how to remediate these areas.

Recommendation. CSTAG agrees that the site’s limited PFAS data are a gap in establishing PFAS source areas. Being proactive on PFAS sampling in likely source areas can provide the information needed to inform future decisions. PFAS analytical capabilities and interpretations are relatively new, so the Region should consider requesting support from EPA’s Office of Applied Science and Environmental Solutions (OASES) staff to support PFAS sampling and results interpretation. CSTAG recommends that the Region be clear about the intended current uses of PFAS data following collection, which at this point may be limited to establishing the presence of ongoing, high-level sources to the LHR Site.

b. Methylmercury. Considering the expansive wetlands in the LHR and the widespread nature of inorganic mercury contamination, CSTAG was surprised at the lack of discussion on the nature, extent, and potential impacts of methylmercury. Methylmercury is a contaminant of concern (COC) at the adjacent and upstream Berry’s Creek Study Area, an OU of the Ventron/Velsicol Superfund Site. While the site characterization report describes the elevated production of methylmercury in wetlands and its bioaccumulation, the draft CSM provides little mention. The statement of work also does not specifically identify methylmercury, in the context

¹⁶ When developing figures of the bathymetric change between time periods, it would be useful to incorporate the uncertainty of the surveys and change analysis. For example, if the uncertainty range is between -0.5 to 0.5 ft, only depicting changes beyond this range will make it easier to identify areas that are net erosional and net depositional.

of the proposed “risk information evaluations” (although perhaps it is intended to be addressed with total mercury). The bioaccumulation potential and relatively high toxicity of methylmercury suggests that it may be an important risk driver at the site, especially for fish and piscivorous organisms. Although methylmercury will likely be less relevant in the immediate timeframe for establishing the early action areas based on inorganic mercury, it could be relevant in the future.

Recommendation. CSTAG recommends that the Region discuss how methylmercury will be accommodated in sampling and risk evaluations at the site. For example, it would be helpful to understand the Region’s rationale for including or excluding methylmercury, using total mercury as a surrogate (if relevant), and whether and how likely impacted areas will be sampled for methylmercury. If risk management at the site is to remain on an expedited timeframe, it will likely be important to foresee and manage this data need.

5. Preliminary Performance Metrics. In the ASMP, the Region refers to the remediation goals of the early action/interim remedy as “preliminary performance metrics (PPMs)”. These are quantitative metrics to ascertain performance of the early action. Importantly, they are not the OU’s final, protective remediation goals consistent with the NCP §300.430(e)(2).

Determining the interim remedy’s remediation goal will be one of the most consequential decisions of the interim action. At the time of the CSTAG meeting, the interim remedy remediation goals and methods for their derivation had not been determined. A primary question that would influence the interim remedy remediation goal is whether the risk management strategy is to conduct a larger, one-time early action in OU2 or if the interim remedy is intended to be one of several smaller iterative actions. Another question is whether the interim remedy remediation goals will be applied as an area average (e.g. a SWAC), a remedial action level to achieve a SWAC, or a not-to-exceed point concentration. That determination will influence the design of the remedy and the sampling methods for remedy completion. The interim remedy remediation goal determination will also be complicated by the range of contaminants, toxicity thresholds, and different receptors’ exposure pathways and exposure areas (particularly relevant if the interim action is intended to be at or near protective levels). A combination of point- and SWAC-based interim remedy remediation goals may be appropriate, depending on the COCs to be addressed.

During the stakeholder input session, questions were raised whether final, risk-based remediation goals would be available to inform the interim action’s remediation goals. As described in the 2022 ASM Sediment Assessment and Monitoring Sheet, final remediation goals are useful to understand and communicate the degree to which the early action is consistent with and makes progress towards the goals of a final remedy. Some early action sites (such as the LHR Site) may not yet have conducted risk assessments nor have well-developed site-specific goals.¹⁷ At these

¹⁷ EPA’s ROD Guidance states that “[w]hen an interim action is taken early in the process to mitigate immediate threats, it is likely that no formal RI/FS Report will be available yet. Although preparation of an

sites, PRGs¹⁸ can be used to gauge the degree to which an early action makes substantive progress toward that goal (or that significantly decreases current COC exposures). This issue is addressed in the Region's ASMP where it states "While final RGs [remediation goals] won't be available during the selection of an interim response action in a CERCLA decision document, we can anticipate that final RGs EPA has selected for other nearby, complex sediment sites (e.g., OU2 of the Diamond Alkali Superfund Site) may be similar to what might be developed for the LHR Site." In this regard, the Region recognizes that those values are not the final RGs, but approximations based on reliable, readily available information that can be used at an early stage to help gauge the impact of potential interim actions.

Recommendation. CSTAG recommends that when the interim remedy remediation goals are developed, the Region should be specific on how the interim remedy remediation goals fit into the risk management strategy, how they were derived, whether they will be applied on a point and/or area basis, and, if appropriate, how different COCs and receptor exposure areas are accommodated to satisfy the remedial action objectives of the interim remedy.

6. Modeling Strategy. The Region is considering the potential need for sediment transport and contaminant modeling within the LHR. This is not a trivial decision as significant time and resources are often devoted to model development, parameterization, evaluation, simulations, and model upkeep.¹⁹ From a decision-making perspective, one advantage of the ASM framework is that monitoring is used to demonstrate the impact of the interim action, inform the post-remedy CSM, and evaluate the need for additional actions. This contrasts with a final remedy where there is a stronger need for a calibrated and validated hydrodynamic-sediment transport-chemical transport model to predict whether a remedial alternative will achieve final, protective COC levels in the future.

However, modeling is not an all-or-nothing proposition. The SEDA guidance describes an approach to match decision needs to model complexity and limit unnecessary levels of analysis. Empirical approaches may be sufficient for some study questions. Hydrodynamic models, which are simpler than the linked hydrodynamic-sediment transport-chemical transport models, can satisfy others (e.g., to simulate water level responses to storm events or sediment bed elevation changes). Hydrodynamic models can also be used to inform the CSM, technology evaluations, and sediment stability evaluations by depicting areas of greatest hydrodynamic forces and the potential for erosion when output is compared to the critical shear stress of the sediment bed. If

RI/FS Report is not required for an interim action, there must be documentation that supports the rationale for the action to fulfill the NCP's Administrative Record requirements." The human and ecological risk information evaluations are anticipated to provide the risk basis and rationale for this early action.

¹⁸"Initially, preliminary remediation goals are developed based on readily available information, such as chemical-specific ARARs or other reliable information. Preliminary remediation goals should be modified, as necessary, as more information becomes available during the RI/FS" (NCP, 40 CFR 300.430(e)(2)(i)).

¹⁹ See also recommendation 7 in the 2017 Sediment directive.

the decision is made to use hydrodynamic models, the Newark Bay-Lower Passaic River model covers the Kill Van Kull, the Arthur Kill, Newark Bay, and both the Lower Passaic and Lower Hackensack Rivers (although the grid may need to be extended to the upstream dam). The Berry's Creek model could be added to represent the significant tidal flows and the watershed drainage into Berry's Creek, its tributaries, and the inundated phragmites marshes. Splicing the two grids together would not be a major task because both models use a curvilinear grid system.

Recommendation. CSTAG recommends conducting a site modeling needs evaluation similar to that described in the SEDA guidance. If empirical approaches and the simpler hydrodynamic models aren't sufficient to address study objectives (or additional approaches become necessary to explain observations collected during ASM) then more complex modeling may be warranted.

7. Community Involvement. During the stakeholder presentations, CSTAG had the opportunity to hear from community representatives regarding current and future site uses such as fishing, boating, and wildlife viewing. The Region also described community outreach efforts, including workshops held in several LHR communities. The community representative's comments indicated frequent information sharing by EPA and a strong and positive working relationship. These interactions can facilitate dialog and build relationships that will benefit the Region during the ASM process.

Recommendation. CSTAG supports the Region's deliberate and continued community involvement to foster a stronger site understanding and to better understand community perspectives. The likely duration of remedial actions, monitoring, and recovery highlights the importance of maintaining the relationship with the community as well as the site's biota consumption advisories that are intended to reduce human health risk. The Region and respondents are encouraged to continue or to expand their outreach as necessary on the public health risks of consuming fish from the LHR.