U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 2

February 27, 2020

BY ELECTRONIC MAIL

Robert Law, Ph.D.
de maximis, inc.
186 Center Street, Suite 290
Clinton, New Jersey 08809

Re: Re: Draft Upper 9-Mile Source Control Interim Remedy Feasibility Study (FS) – Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (Agreement) CERCLA Docket No. 02-2007-2009

Dear Dr. Law:

The U.S. Environmental Protection Agency (EPA) has reviewed *Appendix D (the Adaptive Management Plan) of the draft Interim Remedy (IR) Feasibility Study (FS) Report*, prepared by Integral Consulting, Inc. (Integral) on behalf of the Cooperating Parties Group (CPG) for the Lower Passaic River Study Area (LPRSA) Remedial Investigation (RI)/FS. The draft *Appendix D* was received from the CPG on September 25, 2019. Comments from partner agency, New Jersey Department of Environmental Protection (NJDEP) were incorporated. In addition, modifications were made according to the January 31, 2020, Contaminated Sediments Technical Advisory Group (CSTAG) recommendations. In accordance with Section X, Paragraph 44(d) of the Agreement, EPA has enclosed an evaluation of CPG's *Draft FS* with this letter.

Please proceed with revisions to the *Appendix D* of the *Draft FS* within 30 calendar days consistent with the enclosed comment evaluations. If there are any questions or clarifications needed on EPA's enclosed comment evaluations, please contact me to discuss.

Sincerely,

Diane Salkie, Remedial Project Manager
Lower Passaic River Study Area RI/FS

Enclosure

616111

Cc: Zizila, F. (EPA)
Sivak, M. (EPA)
Hyatt, B. (CPG)
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EPA Comments – February 2020

Draft Upper 9-Mile Source Control Interim Remedy Feasibility Study Appendix D

Lower Passaic River Study Area Remedial Investigation/Feasibility Study

No.	Section	General or Specific	Page No.	Comment
1.	N/A	General	N/A	Clearly indicate in Appendix D that the Adaptive Management Plan is currently more a detailed framework than a comprehensive plan, and that the plan will be more fully developed through the FS process, and it is anticipated it would be expanded into a comprehensive plan at the IR design stage. EPA recognizes that the Adaptive Management Plan may still be subject to certain revisions after the IR design stage based on information learned during longer-term monitoring (see Comment #11). Also indicate in Appendix D what specific guidance is being adhered to in developing the Adaptive Management Plan. Notably, the Adaptive Management Plan should be cognizant of any guidance that results from EPA's current adaptive management pilot studies and/or guidance documents.
2.	N/A	General	N/A	OLEM Directive 9200.1-130 (2017), Recommendation 8, indicates that the first step in a structured adaptive management plan should be establishing measurable remedial objectives, and that an adaptive management plan should specify indicators tied to the objectives, trigger criteria that might result in a change in action, and additional actions that may be tied to attainment or non-attainment of trigger criteria. In addition, in its October 2018 letter directing the CPG to move forward with evaluating an IR in the upper 9-mile reach, EPA indicated that the adaptive management principles should include the evaluation of IR performance and possible triggers for additional action, among others. The IR itself and the final remedial action taken for the upper 9 miles each would be guided by measurable objectives (i.e., SWAC targets for the IR and final risk-based RGs for the final remedial action) and would be subject to potential additional actions based on the evaluation of attainment or non-attainment (e.g., potentially addressing additional actionable sources to satisfy the intent of the IR or potentially performing additional remediation if the selected final remedy does not attain risk-protective conditions in a reasonable timeframe). In accordance with EPA's guidance on structured adaptive management, these two activities should be included as components of Appendix D. In addition, the current draft Adaptive Management Plan puts too much weight on the development and refinement of PRGs and identification of final RGs as an adaptive element. Development of PRGs and RGs are typical elements of the CERCLA remedy selection process. Revise the Adaptive Management Plan, including all text, tables, and figures, to be structured around the following adaptive elements: 1. IR Design and Implementation 2. System Response 3. System Recovery Within the IR Design and Implementation adaptive element, include hypotheses/decision questions related to 1) adequately capturing sediment sources in the IR design and 2) demonstrating attainment of IR RAOs and success/completion of the IR. Within the System Response adaptive element, include hypotheses/decision questions related to 1) demonstrating adequate system response to the IR (i.e., adequately accelerated system recovery) based on empirical monitoring data and 2) demonstrating comportment of the model suite/CSM to empirical site data and the ability of the models/CSM to support accurate predictions. EPA recognizes there are uncertainties in the relationships between sediment and tissue concentrations that pose challenges for establishing PRGs, and that there are uncertainties in input parameters to PRGs that would be reduced over time through collection of additional Site data for this purpose. EPA also recognizes that relationships between sediment and tissue concentrations may be affected by the implementation of the IR. As such, EPA also recognizes that PRGs may be subject to refinement over time until such time as final RGs can be identified, and that this refinement represents an adaptive process for the upper 9-mile remedy. Because PRGs and ultimately final RGs are logical components of assessing system recovery, move information related to the adaptive aspect of PRG refinement and RG development to the System Recovery adaptive element. Also, within the System Recovery adaptive element, include the hypothesis/decision question related to achieving risk-protective conditions in a reasonable time frame, as this relates to management decisions regarding selection of a final remedy. Lastly, because the ultimate intent of adaptive management is to prioritize information needed to select and signify attainment of final remedy objectives, include in the System Recovery adaptive element a hypothesis/decision question related to actually demonstrating ultimate attainment of risk-protective conditions. This will help to more clearly evaluate the IR in the context of final remediation objectives. EPA is providing an attachment to this comment set to convey an outline of the anticipated revision to the Adaptive Management Plan. This attachment should be taken as a general sketch of the anticipated revisions to the plan, and not as an exhaustive summary of expected revisions.
3.	N/A	General	N/A	The CPG's application of the CSM to the IR supports the conclusion that the IR would induce a large step change in concentration, resulting in a faster rate of recovery from that point towards yet to be determined PRGs/RGs. It is understood that the current model's grid resolution relative to the remedy footprint, and the somewhat limited ability to predict small-scale erosion and deposition patterns, combine to produce model results (presented in the IR FS to provide for relative comparison among alternatives) with less of a response to the IR than that anticipated based on the CSM. The Adaptive Management Plan addresses the need to refine the model to incorporate additional data and a model grid more consistent with the scale of the IR footprint. If the refined model, incorporating the pre-design data, does not forecast the desired response to the IR, there should be a pathway within the Adaptive Management Plan to address this unresolved inconsistency between the CSM and model before or in conjunction with moving forward with IR implementation. Revise the document accordingly.

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4.	N/A	General	N/A	The Adaptive Management Plan describes that working PRGs would be developed as ranges, which would be evaluated and refined/constrained over time. EPA has previously communicated to the CPG that PRGs should not be developed as ranges but rather as single point estimates. Evaluating PRGs as ranges could result in a confounded evaluation of system recovery and an inability to identify diagnostic issues (e.g., relative similarity or difference between sediment and tissue responses) and respond adaptively to long-term monitoring data. Single point estimates for PRGs can be derived using best current understanding of the system and CSM. PRGs will first be developed (i.e., in parallel with the IR design) after the food web model (FWM) has been finalized and peer reviewed. While the FWM would still be subject to potential refinement from that point forward, the existing model would support the derivation of point value PRGs. Notably, the current ongoing calibration of the FWM should not be considered itself an adaptive process, as such initial calibration is a standard requirement to develop and apply a model. Similarly, the initial derivation of PRGs should not be considered itself an adaptive process. However, as EPA has previously expressed, if justified, point value PRG estimates would be subject to adaptive refinement as additional Site information is learned, which is intended to improve certainty in the PRGs, facilitate selection of final RGs, and support the assessment of system recovery to risk-protective conditions. Revise Appendix D to remove “ranges of PRGs” and instead frame all discussion of PRGs/RGs around point values.
5.	N/A	General	N/A	The Adaptive Management Plan notes that the IR completion evaluation is documented in a separate appendix (Appendix H). To the extent that the post-IR completion decision-making framework is itself an adaptive management component and is associated with adaptive decision-making for the IR Design and Implementation adaptive element (see Comment #2), it should be acknowledged as such in more detail in the Adaptive Management Plan, including in relevant tables and on relevant figures, even if details associated with it are included in Appendix H.
6.	N/A	General	N/A	The decision time frames for the adaptive management elements are generally specified as synchronizing with the five-year review milestones. While five-year reviews may provide a reasonable and logical opportunity to document decisions, the gathering of Site information will not be constrained to the five-year review timescale and important decisions may be made outside of the five-year reviews themselves. The decision time frames for the adaptive elements should therefore not be constrained to the five-year review process. The time frames should be based on the availability of new information and decision milestones that are more appropriate to assess the action and apply adaptation to the benefit of the program. Revise the document accordingly to reflect that decisions will be made in conjunction with five-year reviews or otherwise as benefits the program.
7.	Appendix D, Acronyms and Abbreviations List	Specific	vi-vii	Verify the acronyms and abbreviations list. For instance, “BMPs – best management practices” is included in the list but is not used in the body of the appendix.
8.	Appendix D, Section 1, Paragraph 1, Sentence 1	Specific	1-1	Revise the paragraph to reflect that adaptive management is an ongoing guiding principal for the LPRSA, including the IR itself as an action (see Comment #2), rather than suggesting that the principles of adaptive management would guide the remediation of the upper 9 miles of the LPRSA <u>following</u> an IR. Gathering information to support the IR, considering the uncertainty surrounding what is and what is not source, and implementing and demonstrating the success/completion of the IR are components of an overall adaptive management process. The first adaptive management element described in the Adaptive Management Plan should be IR Design and Implementation, and this element includes the baseline sampling performed in support of the IR remedial design, performance monitoring during the IR, and the IR success/completion framework.
9.	Appendix D, Section 1, Paragraph 4, Sentence 1	Specific	1-2	Provide additional context regarding what triggered the series of discussions between EPA, NJDEP, and the CPG that culminated in the February 2018 CSTAG review. Also, update this section to describe the more recent, January 31, 2020, CSTAG recommendation memo to evaluate the program at the draft IR FS stage
10.	Appendix D, Section 1, Paragraph 5	Specific	1-2	The text in this paragraph expresses that “the [IR FS] work plan further specifies that the IR FS will present a framework for an adaptive management program” and that “this plan addresses that requirement”. As noted in Comment #1, Appendix D is more a detailed framework than a comprehensive plan. Revise the text to clearly indicate this, and that the plan will be more fully developed through the FS process, and ultimately it is anticipated it would be expanded into a comprehensive plan at the IR design stage.
11.	Appendix D, Section 1, Last Paragraph, Sentence 1	Specific	1-2	Provide additional information that describes the boundaries around what revisions would be expected and acceptable for the Adaptive Management Plan, as substantive revision to the underlying adaptive management elements and the critical tenets thereof would not be reasonable. While some manner of update to the Adaptive Management Plan may be necessary based on new guidance (see Comment #1), and while additional detail will be added and refinements to the process may be needed, the fundamental framework of the Adaptive Management Plan (the critical identified uncertainties and the overall approach to gathering additional information that would support reducing those uncertainties and making management decisions) should not be subject to change or it will not be possible for the Adaptive Management Plan to be approved as part of the IR FS and ultimately as what EPA anticipates would be a comprehensive plan at the IR design stage.
12.	Appendix D, Section 2, Paragraph 1, Sentence 1	Specific	2-1	The Adaptive Management Plan indicates that it provides a number of opportunities to improve the likelihood that a source control IR would succeed in addressing COC sources and site risks, meeting the requirements of CERCLA, and fulfilling the IR RAOs. However, addressing site risks is not a direct goal of the IR. If the intent is to generally introduce that the adaptive management framework would allow mitigation of site risks to be considered through the overall adaptive management

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				process (i.e., through the evaluation of system recovery to PRGs/RGs, through interim goals that might be selected to facilitate communication of risk reduction [see Comment #34], at the final ROD stage when selecting a final remedy, and when demonstrating attainment of final RGs), then the language in the Adaptive Management Plan needs to be revised to more appropriately introduce this. In this first sentence, the language should be revised to reflect that adaptive management provides opportunities to improve the likelihood that a source control IR would succeed in addressing COC sources and fulfilling the IR RAOs. The text should also note that adaptive management provides opportunities to effectively and efficiently mitigate site risks (i.e., through a final ROD that will contain final RGs and through ultimate verification of the attainment of risk-protective conditions) and meet all requirements of CERCLA, while also assessing this mitigation over time following the IR. Revise the document accordingly.
13.	Appendix D, Section 2, Paragraph 2, Sentence 1	Specific	2-1	This sentence implies that adaptive management would correlate to the IR by way of the IR ROD, but would not correlate to the information gathering supporting the IR implementation or post IR monitoring period. Revise this language to more clearly indicate that it is anticipated that adaptive management would be implemented by way of the IR itself and the monitoring to precede the IR, during the IR, and to follow the IR.
14.	Appendix D, Section 2, Paragraph 2, Sentence 2	Specific	2-1	Delete “and represented as ranges” from the sentence beginning “Working PRGs would be identified…” The Adaptive Management Plan should consider PRG development and refinement as being based on point value estimates and not ranges. Also, revise this sentence to indicate that PRGs “may be modified”, as opposed to “would be modified”. There should not be the presumption that PRGs would necessarily be modified unless there is new information available (that is derived from a structured sampling approach) that supports such modification.
15.	Appendix D, Section 2, Paragraph 2, Footnote 2	Specific	2-1	Footnote 2 on page 2-1, taken from EPA guidance (USEPA 1991), is cited outside of its original context, to support developing a range of working PRGs that are re-evaluated and refined over an extended period of time. The cited EPA guidance is meant to identify the shorter-term process of PRG development contained within the latter stages of risk assessment and within an FS, and the process of RG selection, which is generally performed within a relatively short time frame (~ 1-2 years), typically comprising the time between a Proposed Plan (PRGs) and ROD (RGs). As conceived by the guidance, CERCLA remedial actions are shaped by alternatives developed to meet site-specific goals, which are intended to be identified early in the decision-making process and not at the end. Also, the cited guidance does not specifically suggest that ranges of PRGs are appropriate. Revise the text in this paragraph where this footnote appears to more accurately reflect the context of the cited guidance (i.e., that the guidance is meant to identify the shorter-term processes of PRG development, contained within the latter stages of risk assessment and an FS, and RG selection).
16.	Appendix D, Section 2, Paragraph 2, Last Sentence	Specific	2-2	Revise this sentence to explicitly indicate that the final ROD will address all remaining site risks for sediment in the upper 9 miles and for surface water throughout the 17-mile stretch, instead of suggesting that the final ROD would “identify any additional action(s) needed to achieve the long-term protectiveness of remedial actions.”
17.	Appendix D, Section 2, Paragraph 3, Sentence 1	Specific	2-2	The text states that adaptive management provides an opportunity to respond to changed or unforeseen conditions. This statement, while accurate, is overbroad. Replace “respond to changed or unforeseen conditions” with “respond to improved Site understanding.”
18.	Appendix D, Section 2, Paragraph 4	Specific	2-2	Revise the text in this paragraph to indicate that adaptive elements may be represented by either a single or multiple primary decision questions, and to indicate that multiple decision trees may be included to identify critical information inputs needed to support project decision-making and to select appropriate response options.
19.	Appendix D, Section 2, Final Paragraph, Sentence 1	Specific	2-3	Include a footnote that defines the numerical models being referenced.
20.	Appendix D, Section 2.1	Specific	2-3	Identify federal trustees as stakeholders, along with their role (i.e., providing general review and feedback on response actions as well as oversight of resource protection).
21.	Appendix D, Section 2.1, Paragraph 2, Sentences 4 & 5	Specific	2-3	Remedial actions cannot be implemented under an AOC. While it is expected that the IR design would be performed under an administrative order separate from the current RI/FS AOC, implementation of the IR would be performed pursuant to a Consent Decree or other CERCLA enforcement instrument. Revise the text accordingly.
22.	Appendix D, Section 2.2, Paragraph 1, Sentence 1	Specific	2-3	This sentence states that adaptive management hinges on the ability to make appropriate decisions in response to new information. Revise the language to indicate that adaptive management hinges not only on the ability to make appropriate decisions in response to new information, but on the ability to identify critical uncertainties and systematically plan for the collection of additional information to reduce the uncertainties (i.e., to systematically generate the new information needed).
23.	Appendix D, Section 2.3, Sentence 1	Specific	2-4	The description of Figure 2-4 in the text should indicate that this general timeline reflects a “best case” scenario where the final ROD does not require any further action, only monitoring of ongoing recovery towards NFA.
24.	Appendix D, Section 2.4, Final Paragraph	Specific	2-5	Revise this paragraph in light of the new structure of the adaptive elements (see Comment #2). Describe that there are uncertainties associated with implementation of the IR and that sampling is anticipated to be performed before, during, and after the IR to evaluate completion of the IR itself (Adaptive Element 1), and then describe that LTM would be performed to address uncertainties in the response of the system to an IR (Adaptive Element 2) and in PRGs and system recovery (Adaptive Element 3).

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25.	Appendix D, Section 3	Specific	3-1 to 3-4	As noted in Comment #2, revise the Adaptive Management Plan to restructure it around the primary adaptive elements of 1) IR Design and Implementation, 2) System Response, and 3) System Recovery. Also move the information associated with Development of PRGs and Final RGs to instead be a component of the System Recovery adaptive element. When revised, Section 3 should contain discussion of (and tables and figures supporting, as relevant) the IR Design and Implementation adaptive element, centered around the hypotheses/decision questions associated with adequately capturing sediment sources in the IR design and demonstrating attainment of IR RAOs and success/completion of the IR. It should also contain all other related discussion of uncertainties, data needs, potential outcomes, diagnostic assessments, and adaptive responses. Other specific comments below on Section 3 convey revisions that should be made to the information currently contained in Section 3 upon relocating this information to be a component of the System Recovery adaptive element.
26.	Appendix D, Section 3, Paragraph 2, Sentence 1	Specific	3-1	This sentence implies that PRGs have not been developed simply because the action being considered is an interim action. PRGs have not been developed because risk mitigation is not an explicit goal of the IR. Revise this sentence to convey this concept (e.g., "PRGs are not developed in the IR FS because the goal of the IR is to address higher contaminant concentrations representative of source areas and not specific risks; to this end, and the IR FS develops and compares sediment source control alternatives").
27.	Appendix D, Section 3, Paragraph 2, Sentences 4, 5, and 6	Specific	3-1	Remove "ranges of PRGs" from this discussion and replace with language that describes the derivation of point estimate PRGs. EPA expects that point estimate PRGs would be developed from input parameters, including sensitive input parameters from the FWM, that are selected reasonably from a range of possible input values. For example, this could be done through a standard approach to select a statistic such as a 90th percentile (or other standard representative statistic) to represent the distribution of potential values for the input parameter. Under this approach, additional Site information would be used to perform refinement, as appropriate. Revise the document accordingly. Also, revise the language that indicates that PRG refinement would occur in conjunction with five-year reviews to indicate that PRG refinement would (if and as appropriate) occur in conjunction with five-year reviews or as otherwise reasonable or beneficial to the program.
28.	Appendix D, Section 3, Paragraph 2, Last Sentence	Specific	3-1	The "USEPA 1999" reference is for ROD/PRAP guidance. Describe how it relates to refinement of PRGs. Note that the progressive development of PRGs does not itself imply that a range of PRGs is appropriate, and the progressive development of PRGs can be applied to point values.
29.	Appendix D, Section 3, Footnote 3	Specific	3-1	Replace "OU4" with "LPRSA."
30.	Appendix D, Section 3.1, Paragraph 1, First Sentence, and Second Paragraph	Specific	3-2	As written, the Decision Question for Development of PRGs and Final RGs is predicated on a range of PRGs and a hypothetical possibility that a remedy with different scope or approach would be dictated by the ends of the range. The question should be framed around reasonable determination of RGs (i.e., sufficiently constrained uncertainty in PRG inputs), and not around selection of a final remedy. Revise this Decision Question to be "Is uncertainty in the key variables that influence PRGs adequately constrained so that RGs can be established?" Revise the language in the second paragraph to be consistent with the revised Decision Question and this understanding of the PRGs/RGs.
31.	Appendix D, Section 3.1, Paragraph 4	Specific	3-2	Remove "ranges of" from this paragraph when discussing PRGs. Also revise the text to reflect that refinement of PRGs may occur at the five-year review or at some other timing as appropriate and of benefit to the program. The first sentence in this paragraph suggests the FWM will be peer-reviewed during the IR design, which is when PRGs will be first developed. In fact, the FWM may be peer reviewed earlier than that based on current understanding. Revise this sentence to simply indicate "the peer-reviewed FWM" instead of the "the FWM that will be peer-reviewed during remedial design."
32.	Appendix D, Section 3.2, Paragraph 1	Specific	3-2 to 3-3	With regard to PRG development, the text states: "Key input parameters and data uncertainties for PRG development are identified in Table 3-2. Some of these variables have substantial uncertainties that may be reduced through additional data to be collected during the ongoing current conditions sampling program and post-IR LTM." a. Table 3-2 discusses opportunities to better characterize complex relationships, refine the FWM, and better characterize calibrated processes. If it is intended that Development of PRGs and Final RGs includes focused data collection to support refinement and recalibration of the FWM, this should be stated in Section 3.2, and these activities should be accounted for in timelines and decision trees. b. Revise the text to reflect that the PDI will also provide information to potentially reduce uncertainties, in addition to the current conditions sampling and post-IR LTM. Supplement the text and Table 3-2 to identify which data in support of PRG development are collected during the current conditions sampling and/or PDI and which would be collected during post-IR LTM.
33.	Appendix D, Section 3.2, Paragraph 2, Sentences 2 and 3	Specific	3-3	Remove "ranges of" from PRGs. The Adaptive Management Plan should consider PRG development and refinement as being based on point value estimates and not ranges. Also, revise the text to reflect that refinement of PRGs may occur at the five-year review or otherwise when appropriate and of benefit to the program.
34.	Appendix D, Section 3.2, Paragraph 3, Sentence 1	Specific	3-3	The text indicates that it is assumed that PRGs for the fish consumption pathway would be expressed both as protective tissue concentrations and as sediment concentrations that can be related to protective tissue concentrations using the CFT model and the FWM. Revise the document to indicate that PRGs would be developed for sediment only, back calculated from fish and crab

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				tissue concentrations. Fish tissue concentrations would be monitored over time to evaluate recovery in tissue as a diagnostic tool, however PRGs are expected to be sediment concentrations. In addition, EPA expects that interim thresholds for fish tissue concentrations (and/or fish meals) would be developed to communicate risk reduction expectations and progress to stakeholders over the course of long-term recovery assessment.
35.	Appendix D, Section 3.2, Paragraph 4, Sentence 1	Specific	3-3	The text suggests that regional background surface water concentrations (i.e., above Dundee Dam) may exceed the New Jersey surface water quality standards (SWQS) for several COCs, including 2,3,7,8-TCDD, 4,4'-DDE, 4,4'-DDT, and total PCBs. Confirm that this is true for TCDD and DDE/DDT and provide the information that supports this conclusion.
36.	Appendix D, Section 3.2, Paragraph 4,	Specific	3-3	The discussion on the reasons why surface water quality standards (ARARs) cannot be attained and the possibility of a TI waiver lacks a clear connection to the overall adaptive management approach for the Site. Currently, this paragraph and listing a possible TI waiver in the uncertainty matrix in Figure 2-2 (see Comment #74) are the only mentions of TI in Appendix D. What is the relevance of considering a TI waiver in the adaptive management plan? The logical connection of this information to the overall adaptive management approach needs to be clearly provided. Revise the document accordingly.
37.	Appendix D, Section 3.3	Specific	3-4	Revise Section 3.3 to reflect the potential outcomes and responses based on the derivation and successive refinement (if and as warranted) of point value PRGs towards the selection of final RGs, rather than framing adaptive responses around the influence of PRG ranges on the selection of a remedy. Also, provide clear information regarding the inputs, evaluations, and criteria that would support ongoing reevaluation of the PRGs.
38.	Appendix D, Section 4, Paragraph 1, Sentence 2	Specific	4-1	Revise the text to indicate that the FWM will undergo peer review prior to or during the IR design. EPA's current expectation is that the FWM will be peer reviewed prior to the IR design.
39.	Appendix D, Section 4, Paragraph 2	Specific	4-1	Revise the text to explicitly state that the empirical evidence will also be evaluated on its own, to assess the adequacy of system response to the IR and to inform updates to the CSM, potential adaptation in the LTM program, and decision-making within the System Recovery adaptive element, and not solely be used to refine the models. Revise the text in the fifth sentence to indicate that adaptive refinements to the **LTM program, CSM, and/or** models may be warranted during the post-IR recovery of the LPRSA as LTM data are collected and evaluated.
40.	Appendix D, Section 4.1, Paragraph 1	Specific	4-1	A single decision question is presented for the System Response adaptive element, related to consistency of the system response with the CSM and model projections. A second decision question is also relevant in this adaptive element (see Comment #2) that tests the hypothesis that the IR does in fact trigger adequate improvement in recovery trajectories. This question supports adaptation within the LTM to generate additional data that might be important to properly evaluate system response and also supports decision-making and potential adaptation within the System Recovery adaptive element (i.e., that the IR yields improved recovery that supports attainment of risk-protective conditions in a reasonable timeframe). Add this second hypothesis/decision question and update Section 4.1 overall accordingly.
41.	Appendix D, Section 4.1, Paragraph 2	Specific	4-1 to 4-2	Revise the first DQO for system response to: "1. Establish post-IR conditions in tissue, the water column, and sediment to support trend evaluation**, evaluation of recovery trajectories, and refinement of the CSM**." Revise the second DQO to account for possible diagnostic assessment and refinement of the LTM program.
42.	Appendix D, Section 4.2	Specific	4-2	Revise Section 4.2 to incorporate information related to the uncertainty in actual system response to the IR, as opposed to focusing solely on consistency of model projections with empirical data and potential refinement of the models.
43.	Appendix D, Section 4.2	Specific	4-2	Specifically describe in the text how the LTM data collection would support the testing of specific hypotheses that inform the CSM, including: • Natural recovery of surface sediment COC concentrations occurs principally as a result of lower concentration depositing particles burying surface sediment or diluting surface sediment via cyclical erosion and deposition. • The rate of recovery is likely controlled by net erosion of higher concentration sediment and cyclical erosion and deposition that bring higher subsurface concentrations into the surface layer. • Sediment is a net source to the water column where sediment concentrations are greater than those found on particles depositing from the water column.
44.	Appendix D, Section 4.2.1.1	Specific	4-4	As noted elsewhere in the IR FS (i.e., Appendix H), another comprehensive bathymetric survey will be completed, which will be compared to the 2019 survey to better understand erosion and deposition throughout the upper 9 miles. The CPG has also committed to performing a bathymetric survey after a high-flow event. Include this information in the text.
45.	Appendix D, Section 4.2.1.3, Paragraph 1, Sentence 3	Specific	4-4	The text indicates that the PWCM will be performed to capture a range of flow conditions. Revise this to indicate that the range of flow conditions will specifically include a high-flow event, if such an event occurs.
46.	Appendix D, Section 4.2.1.3, Paragraph 2, Sentence 3	Specific	4-4	The text describes the CWCM program as being essentially twice per month, when in fact the program is intended to capture a range of flow conditions similar to the PWCM program even if the frequency may be twice per month. Revise the text accordingly.

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47.	Appendix D, Section 4.2.3.2	Specific	4-6	Include passive sampling in the water column as part of the LTM approach. Passive sampling measures the freely dissolved concentrations of COCs in surface water, which for certain chemicals may be strongly correlated to tissue concentrations in multiple trophic levels. It also provides a time-weighted sample with lower detection limits that could prove valuable in the long-term assessment of trends and in evaluating the attainment of risk-protective conditions in surface water, which is one of the ultimate objectives of remediation in the upper 9 miles. To provide the ability to track and compare passive sampling results throughout the monitoring program for the upper 9, also include passive sampling of the water column in the current conditions sampling program (Section 4.2.1.3).
48.	Appendix D, Section 4.2.3.2, Sentence 1	Specific	4-6	Clarify that "event-based" refers to flow conditions, or otherwise indicate what types of events would trigger water column monitoring.
49.	Appendix D, Section 4.2.3.3, Sentence 2	Specific	4-6	Delete "once" when describing post-IR sediment sampling for purposes of assessing IR completion, as the post-IR sediment sampling program may include sampling over more than one event and not only at one fixed time. Also, since the longer-term post-IR sediment sampling plan and frequency has not been finalized, include language that indicates that the sediment sampling frequency is uncertain at this point with a final frequency to be determined later.
50.	Appendix D, Section 4.2.3.4	Specific	4-6	Provide additional detail related to the triggers for conducting post-IR bathymetric surveys. If bathymetry will be performed periodically at consistent intervals, describe what that frequency is expected to be. Clarify if "following a high-flow event" qualifies "periodically" or if following a high-flow event is separate from/in addition to the general frequency.
51.	Appendix D, Section 4.3	Specific	4-6	Overall, update this section to also incorporate diagnostic assessment and potential adaptive response related to the decision question that tests the hypothesis that post-IR recovery is adequately accelerated. In the first sentence, clarify if the "anticipated range of responses" is the predicted rates of system recovery from the model, expressed as a range. In the second sentence, delete reference to ranges of PRGs. Also, the second sentence suggests that a diagnostic assessment may not be necessary if recovery is progressing adequately. To the extent that this adaptive management element is intended to ensure that the model accurately reflects the system and CSM, and as it would inform reliable predictions within the System Recovery adaptive element, then lack of consistency between model projections and empirical observations should be meaningful regardless of the observed rates of recovery. Update the text accordingly. Revise the third sentence to reflect that adaptive assessment would occur in conjunction with the five-year review process or at some other frequency as is reasonable based on the availability of information and as benefits the program. In the third bullet of the bulleted list of specific activities potentially performed during diagnostic assessment for model consistency, clarify what is meant by "sources" and if this has a different context than sources as defined for the purpose of the IR itself. Finally, include in the text of this section a potential adaptive outcome that would see the models, if they cannot be brought into satisfactory alignment with the empirical data despite appropriate amounts of sampling and attempts at model refinement, assigned a secondary role to the actual empirical data and empirically calculated trends in forecasting future conditions.
52.	Appendix D, Section 5	Specific	5-1 to 5-4	Revise Section 5 to incorporate the development of PRGs and RGs as a component of the System Recovery adaptive element (see Comment #2 and Comment #4), including the related hypothesis/decision question, relevant figures and tables, and associated discussion of uncertainties, data needs, and potential outcomes and adaptive responses. Also, Section 5 currently states that "a primary goal of the LTM would be to document system recovery to attainment of PRGs and RGs", but the narrative does not address ultimate attainment of RGs as a true component of adaptive management. Revise Section 5 to more thoroughly address ultimate attainment of risk-protective conditions as a discrete component of adaptive management, including through an associated hypothesis/decision question and discussion of uncertainties, data needs, and potential outcomes, diagnostic assessments, and adaptive responses (and supported by relevant tables and figures).
53.	Appendix D, Section 5	Specific	5-1 to 5-4	Remove all references to ranges of PRGs throughout this entire section and all subsections. PRGs should be developed as point estimates and refined, as needed, as point estimates, and evaluation of progress towards PRGs will be as progress towards these point estimates.
54.	Appendix D, Section 5.1, Paragraph 1	Specific	5-1	The evaluation of system recovery should not be constrained to the five-year review process necessarily. Revise the text to indicate that evaluation of system recovery will occur in conjunction with five-year reviews or at some other frequency based on new information and as beneficial to the program. Notably, the first sentence in this paragraph suggests that LTM data would be evaluated on an ongoing basis, and evaluations should be performed, and decisions made when the available information suggest those evaluations and decisions are appropriate. The text specifically indicates that it is unlikely that a confident assessment of recovery can be completed before the 2031 five-year review and therefore the first recovery assessment is assumed to occur under the 2036 five-year review. It seems inappropriate to wait seven years from the end of the IR to assess recovery. At a minimum, the 2031 five-year review milestone should be used as an opportunity to determine if sufficient information is available to assess system recovery rather than presuming this to be not possible.

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55.	Appendix D, Section 5.1, Paragraph 1	Specific	5-1	The decision question for Adaptive Element 3 includes “a reasonable time frame”. Specify what a reasonable time frame is or provide further information as to how this will ultimately be determined. The concept of “reasonable time frame” will be very important to stakeholders and should not be left ambiguous.
56.	Appendix D, Section 5.1, Paragraph 3	Specific	5-2	Given the relevance of ultimate attainment of risk-protective conditions as a component of adaptive management under Adaptive Element 3, the second DQO should also describe decision-making around the assessment of actual recovery to RGs and attainment of RGs (as part of a final remedy as implemented, as opposed to as part of assessing needs for a final remedy prior to implementation).
57.	Appendix D, Section 5.2, Bulleted list after Paragraph 2	Specific	5-2 to 5-3	Delete the bulleted list. This assessment to ranges of PRGs is not a basis to evaluate the recovery of the river.
58.	Appendix D, Section 5.2, Paragraph 3	Specific	5-3	The text indicates that a diagnostic evaluation will be performed if recovery is not at an acceptable rate. Specify what an acceptable rate is or provide further information as to how this will ultimately be determined.
59.	Appendix D, Section 5.2, Paragraph 4, Sentence 1	Specific	5-3	The text indicates that data analyses may include statistical and graphical representations of recovery. Revise the text to indicate that statistical representations will be given greater weight, as a graphical representation is at best qualitative and may not reveal the true trend.
60.	Appendix D, Section 5.2, Paragraph 5	Specific	5-3	Include in the text a condition where the models may be assigned a secondary role to the actual empirical data if the models cannot be brought into agreement with observations despite ample data and attempts to refine the models. Specifically, in the second bullet under this paragraph, explain why in the condition where there is an inability to identify agreement between observed conditions and the FWM, a diagnostic evaluation would not be triggered.
61.	Appendix D, Section 5.3, Paragraph 1, Sentence 2	Specific	5-4	Describe the (or provide examples of what types of) further evaluations of existing data would be conducted at this stage.
62.	Appendix D, Section 5.3, Paragraph 1	Specific	5-4	In the bulleted list, the final two bullets allude to evaluation of potential source areas. As the overall intent of the IR is to address sediment sources, including in erosional areas, and as there is a completion determination framework for the IR to conclude that all sources were addressed, further explain how the diagnostic assessment would evaluate what might be considered source.
63.	Appendix D, Table 2-1	Specific	N/A	Revise Table 2-1 to follow the new structure of adaptive elements and to incorporate each of the relevant decision questions within those elements (see Comment #2) and ensure that the adaptive elements and decision questions are expressed consistent with the narrative of the Adaptive Management Plan.
64.	Appendix D, Table 2-1	Specific	N/A	Under Decision Question for Development of PRGs and Final RGs, revise the question to be “Is uncertainty in the key variables that influence PRGs adequately constrained so that RGs can be established?” Under Key Inputs for System Response and Development of PRGs and Final RGs, include pre-IR/PDI data Under Key Inputs for System Recovery, remove “ranges of” before “working PRGs” Under Key Inputs for System Response, include RGs as well as PRGs, include sediment data under long-term monitoring data, and include “definition of reasonable timeframe” Under Decision Criteria for Development of PRGs and Final RGs, remove “ranges” from the first and third bullets Under Decision Criteria for System Recovery, first bullet, remove “ranges of” before “working PRGs” Under Decision Time Frame(s) for all elements, acknowledge that decisions may be made outside the five-year review process if and as appropriate and beneficial to the program
65.	Appendix D, Table 2-2	Specific	N/A	Under Activity, include IR performance and post-IR sampling, along with an Adaptive Management Objective of “Evaluation of IR Performance and Confirmation of IR RAO Attainment”; all sampling media should be included for this activity Under Adaptive Management Objective for Long-Term Monitoring to Final ROD, delete “ranges of” before “working PRGs” Under Adaptive Management Objective for Long-Term Monitoring to NFA, specify that this is post-Final ROD For footnote a, specify what would trigger periodic collection of sediment and bathymetric data
66.	Appendix D, Table 3-1	Specific	N/A	Revise the first note. PRGs should be developed for sediment. Tissue concentrations may be developed for monitoring purposes and to support interim goals that facilitate communication of risk-reduction to stakeholders (see Comment #34) but will not be used as PRGs.

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67.	Appendix D, Table 3-1	Specific	N/A	The benthic invertebrate ecological receptor group is missing. Revise accordingly.
68.	Appendix D, Table 3-2	Specific	N/A	Regarding the Input "Fish movement", clarify if there is any intent to perform fish tagging studies or other studies to further evaluate the movement of fish/crabs, and if there is such intent, specify this with as much detail as possible in Appendix D.
69.	Appendix D, Table 3-2	Specific	N/A	The "Sediment exposure depth" input lists the 0 - 15 cm sediment depth as an uncertainty and promotes the 0 - 2 cm depth. The EPA's June 28, 2016 LPRSA Dispute Resolution letter (resulting from CPG's November 13, 2015 formal dispute) on sediment depth states that the top 15 cm represents contaminant concentrations applicable to the biological exposure depth. The Dispute Resolution letter referenced several EPA communications with CPG in which the CPG's assertion that 2 cm was appropriate was determined to not be scientifically defensible (the sediment transport model cannot predict 2cm; the sediment profile imaging [SPI] on which CPG based the 2cm depth is also unreliable; EPA guidance states 15 cm is biologically active zone [BAZ]). Therefore, the "Sediment exposure depth" row of Table 3-2 should be deleted.
70.	Appendix D, Table 3-2	Specific	N/A	Regarding the Input "FWM parameters that could be refined with refined model calibration": To ensure that the discussion incorporates the plan to evaluate more than one value per parameter and to assess alternative calibrations, update the last part of the Discussion of Uncertainty to read "The updated empirical tissue data set and corresponding CFT model inputs will help refine calibrated parameter values. Whether there is more than a single acceptable value for these parameters will also be evaluated. Updated tissue data can also be used to assess the relative quality of alternative calibrations."
71.	Appendix D, Figure 2-1	Specific	N/A	Revise Figure 2-1 consistent with the modified structure of adaptive elements and include all relevant decision questions; ensure that the adaptive elements and decision questions are expressed consistent with the narrative of the Adaptive Management Plan.
72.	Appendix D, Figure 2-1	Specific	N/A	For Development of PRGs and Final RGs, the decision question should read "Is uncertainty in the key variables that influence PRGs adequately constrained so that RGs can be established?", the same as for this element in Table 2-1. Revise the document accordingly.
73.	Appendix D, Figure 2-2	Specific	N/A	It is unclear how the uncertainties identified for each phase of the program connect to the adaptive management elements. For example, it is unclear how "constructability", which is identified as an uncertainty for IR implementation and completion, connects to "overall system response" or to "recovery assessment to attain PRGs/RGs". Constructability would be a design-phase consideration and it does not appear that the current version of the Adaptive Management Plan conceives of any specific information that would improve the level of certainty. Similarly, it is not clear how "construction completion" would connect to "PRG/RG development and refinement". Revise Figure 2-2 to convey the new structure of adaptive elements (see Comment #2 and Comment #74).
74.	Appendix D, Figure 2-2	Specific	N/A	In light of the new structure of adaptive elements, revise the phases represented in Figure 2-2 to be: Current Conditions Monitoring and IR Design; IR Implementation and Completion; Post-IR LTM; and Development and Implementation of Final ROD In light of the new structure of adaptive elements, revised the adaptive management elements represented in Figure 2-2 to be: IR Design and Implementation; System Response; and System Recovery Instead of listing uncertainties and then placing check marks under the adaptive management elements to signify connections (which implies that all uncertainties are relevant to that adaptive management element when this is not the case), list the relevant uncertainties within the cell beneath the appropriate adaptive management element to provide a clearer representation of these connections. For IR Design and Implementation and the phase Current Conditions Monitoring and IR Design, list pre-IR conditions (including erosion/deposition), SWACs, spatial distribution of sources, model framework/calibration, constructability, and PRGs. For IR Design and Implementation and the phase IR Implementation and Completion, list effectiveness of BMPs and IR RAO attainment. For System Response and the phase IR Implementation and Completion, list post-IR conditions and impact of lower 8 remedy. For System Response and the phase Post-IR LTM, list long-term conditions (including erosion/deposition), system response to IR, system recovery, model accuracy, and CSM accuracy. For System Recovery and the phase Development and Implementation of Final ROD, list PRGs, RGs, system recovery, reasonable timeframe definition (unless the Adaptive Management Plan can in fact define this unambiguously), sufficiency of MNR, constructability, TI, construction completion, and NFA. Also, see the attachment provided to this comment set.
75.	Appendix D, Figure 2-3	Specific	N/A	Given that "community acceptance" is acknowledged as a function of the involvement of local governments and the community, "state acceptance" should be acknowledged as a function of the involvement of the NJDEP. In addition, include federal trustees on the figure, along with their role. Revise the document accordingly.
76.	Appendix D, Figure 2-4	Specific	N/A	Revise this figure to reflect the new framework of adaptive elements (see Comment #2 and the attachment provided to this comment set). The first adaptive element IR Design and Implementation should have milestones, at a minimum, for "Develop IR Design" (approximately 2024) and "Assess IR Completion" (approximately 2029). The third adaptive element System Recovery should incorporate Development of PRGs and Final RGs. Delete "ranges of" everywhere on this figure

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				For all adaptive management elements, make note on the figure that assessments may occur at timescales other than the five-year review process if doing so would be of benefit to the program For System Recovery (which should include Development of PRGs and Final RGs), reevaluation of the PRGs should also occur at the 2031 milestone, as additional information may be available at this point from the pre-IR, IR, and post-IR monitoring to inform refinement For Adaptive Element 3, there should be a milestone for "Assess recovery to final RGs" before the "Confirm attainment of final RGs" milestone, consistent with Figures 5-1a and 5-1b
77.	Appendix D, Figure 3-1	Specific	N/A	Delete "Ranges of" before "Working PRGs".
78.	Appendix D, Figure 3-1	Specific	N/A	Define what the red, yellow, and green colors signify for the Key Variables.
79.	Appendix D, Figure 3-2	Specific	N/A	Revise this figure to represent the IR Design and Implementation adaptive element.
80.	Appendix D, Figure 3-2	Specific	N/A	With respect to the Development of PRGs and Final RGs, which will be integrated in the System Recovery adaptive element, reevaluation of the PRGs should also occur at the 2031 milestone, as additional information may be available at this point from the pre-IR, IR, and post-IR monitoring to inform refinement. Revise the document accordingly. Also, this figure demonstrates a case where recovery is progressing, but it does not appear there would be any fundamental change to the timeline of the refinement of PRGs and selection of RGs in the case where recovery is not progressing. Revise the document to include the case where recovery is not progressing or delete this caveat.
81.	Appendix D, Figure 3-2	Specific	N/A	The blue, gold, and red text, respectively, appears to differentiate project activity, EPA administrative activity, and adaptive management activity. However, the colors may mean something else or indicate another differentiation. In the figure define what the colors symbolize. This comment also applies to Figures 2-4, 4-1, and 5-1a/b.
82.	Appendix D, Figure 3-3	Specific	N/A	Delete "ranges of" everywhere on this figure.
83.	Appendix D, Figure 3-3	Specific	N/A	The question that states "is uncertainty in the ranges of working PRGs adequately constrained?" is not on its own sufficient to lead to refinement of the PRGs. This question should ask "is additional information available that suggests uncertainty can be further constrained for particular PRG inputs and that refinement of PRGs is warranted?", and "No" should lead to "Continue using current working PRGs" while "Yes" should lead to "Refine working PRGs". Add a pathway from the "No" back to "collect LTM data and other new information".
84.	Appendix D, Figure 4-1	Specific	N/A	Regarding assessment milestones, see previous comments on timeframes for assessment of system tied to the five-year review process alone. Also, ensure that this figure adequately represents all relevant decision questions (adequate system response to the IR and comportment of the models to empirical data) and that it suggests reevaluating the models and the CSM as well as the possibility of refining the CSM and not only the models.
85.	Appendix D, Figure 4-1	Specific	N/A	Provide the alternate version of this figure that demonstrates the timeline for this adaptive element in the case where system response is as expected.
86.	Appendix D, Figure 4-2	Specific	N/A	Under Diagnostic Assessment considerations, should any other options be considered if the diagnostic assessment is triggered, such as assessing potential remaining source or evaluating the system for newly identified erosional areas? Also, the figure demonstrates a decision process related only to comportment of the models with empirical data and the possible need to revise the models but does not capture a decision process related to identifying if adequate recovery is triggered by the IR. Revise as appropriate.
87.	Appendix D, Figure 4-2	Specific	N/A	Add a footnote stating status of project relative to ROD 1 RAOs for this process to be relevant.
88.	Appendix D, Figures 5-1a and 5-1b	Specific	N/A	Revise these figures to incorporate the milestones associated with Development of PRGs and Final RGs. As noted in Comment #87, reevaluation of the PRGs (although not assessment of recovery to PRGs) should also occur at the 2031 milestone.
89.	Appendix D, Figure 5-1a	Specific	N/A	Regarding assessment milestones, see previous comments on timeframes for assessment of system tied to FYR. Also, delete "ranges of" everywhere on this figure.
90.	Appendix D, Figure 5-1b	Specific	N/A	Regarding assessment milestones, see previous comments on timeframes for assessment of system tied to FYR. Also, delete "ranges of" everywhere on this figure.
91.	Appendix D, Figure 5-2	Specific	N/A	Delete "ranges of" everywhere on this figure.
92.	Appendix D, Figure 5-2	Specific	N/A	After either case of "Final ROD for LPRSA", where RGs are documented, there should be an assessment of recovery towards the RGs before construction completion, consistent with Figures 5-1a and 5-1b. Revise the document accordingly.