



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

CECW-SPD

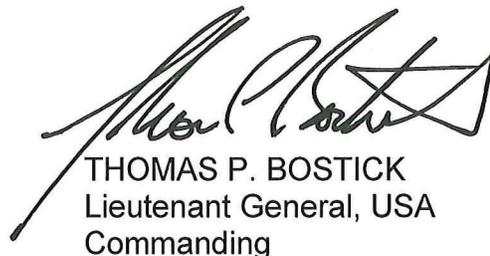
DEC 18 2015

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Los Angeles River Ecosystem Restoration Integrated Feasibility Report, Los Angeles, CA – Final U.S. Army Corps of Engineers (USACE) Response to Independent External Peer Review

1. Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-2-214, and the office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).
2. The IEPR was conducted by Battelle Memorial Institute. The IEPR panel consisted of four panel members with technical expertise in Arid Region Riverine System Ecology, Socioeconomics, Hydrologic and Hydraulic Engineering, and Geotechnical Engineering.
3. The final written responses to the IEPR are hereby approved. The enclosed document contains the final written responses of the Chief of Engineers to the issues raised and the recommendations contained in the IEPR report. The IEPR Report and the USACE response have been coordinated with the vertical team and will be posted on the internet, as required in EC 1165-2-214.
4. If you have any questions or concerns, please contact me or have a member of your staff contact Mr. Bradd Schwichtenberg, Deputy Chief, South Pacific Division Regional Integration Team, at (202) 761-1367.

Encl



THOMAS P. BOSTICK
Lieutenant General, USA
Commanding

**Los Angeles River Ecosystem Restoration
Integrated Feasibility Report**

**U.S. Army Corps of Engineers Response to
Independent External Peer Review
December 2015**

Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-2-214, and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review (2004)*. The goal of the U.S. Army Corps of Engineers (USACE) Civil Works program is to provide the most scientifically sound, sustainable water resource solutions for the nation. The USACE review processes are essential to ensuring project safety and quality of products USACE provides to the American people.

Battelle Memorial Institute (Battelle), a non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to conduct the IEPR for the Los Angeles River Ecosystem Restoration Integrated Feasibility Report (IFR) which includes the Environmental Impact Statement (EIS). The Battelle IEPR panel reviewed the Draft IFR, as well as the supporting documentation. The Final IEPR Battelle Report was provided November 8, 2013, and an Addendum on Public Response was issued on January 23, 2014.

Overall, seventeen comments were identified and documented in the IEPR Report. Of the seventeen comments, one was identified as Economics related; two were Plan Formulation related; six were Hydrology or Hydraulic related; one was Hydrological and Geotechnical related; two were Cost Engineering related; one was Environmental related; one was related to Hazardous, Toxic and Radioactive Waste (HTRW) issues; one was Environmental and Hydrologic related; one was both Environmental and Cost Engineering related; and one was related to Hydrology and Hydraulics, Environmental and Cost Engineering, and Environmental issues. Four comments were identified as having high significance, eleven comments had medium significance, and two comments had low significance.

The Addendum on the Public and Agency Comments provided one additional Environmental-related technical concern of high significance.

- 'High': Describes a fundamental problem with the project that could affect the recommendation, success, or justification of the project.
- 'Medium': Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project.
- 'Low': Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project.

The following discussions present the USACE Final Response to the Comments.

1. Final Panel Comment 1 (Hydrology and Hydraulics) – *High Significance* – Flood risk management has not been effectively integrated with the objectives of the ecological restoration project, yet is a primary purpose and function of the Los Angeles River.

There were five recommendations to resolve the issue. Two recommendations were adopted, and three recommendations were not adopted as discussed below.

USACE Response: Adopted

Action Taken/To Be Taken: The third recommendation was to explain in the IFR how the Tentatively Selected Plan (TSP) could (or could not) accommodate an increased level of flood protection (decreased flood risk) in the ARBOR Reach. It has been suggested that widening the channel and laying back the side slopes at Taylor Yard may provide some incidental flood risk improvements in portions of the ARBOR reach (see IFR Section 7.5.2). Detailed analyses of the Recommended Plan will take place during the preconstruction engineering and design phase (PED) as indicated in IFR Section 7.5.3 and in the Hydrology & Hydraulics Appendix (Appendix E) Section 23. At that time, USACE will be able to conclude whether the conveyance in the additional channel area is offset by the addition of vegetation. It also may be possible to determine whether there are incidental flood risk benefits that can be achieved. This recommendation will be adopted in the future.

The fourth recommendation was to explain in the IFR how the alternatives, including the TSP, would provide robustness, resilience, and redundancy consistent with the potential threat to public safety inherent in the project. This explanation was included in the IFR Sections 6.2.1 and 7.5.2. The Recommended Plan features were designed to ensure there will not be any increase in flood risks over existing channel level of protection. During PED, a more detailed engineering analysis will be used to verify this. Risk and uncertainty will be documented as indicated in IFR Section 7.5.3 and Appendix E Section 23. Risk and uncertainty will also be accounted for in the Operations and Maintenance (O&M) requirements (see IFR Section 7.5.2).

USACE Response: Not Adopted

The first recommendation was to consider integrating flood risk management into the existing list of planning objectives. USACE agrees that incorporating flood risk management as an objective could be beneficial, but flood risk management is not within the scope of the current Ecosystem Restoration Feasibility Study as agreed upon with the non-Federal sponsor. The non-Federal sponsor does not have jurisdiction for flood risk management, which is performed by the Corps and the Los Angeles County Department of Public Works. In addition, in 1992 the Corps of Engineers performed a flood risk re-evaluation study for the entire Los Angeles County Drainage Area Project (LACDA). The results of the study indicated no improvements to the upper Los Angeles River were economically justified at that time. The upper Los Angeles River includes the study reach (also known as the ARBOR reach),

The second recommendation was to acknowledge and discuss in the IFR that the de facto level of flood risk may not prove acceptable and will have to be decreased, which could complicate the current project as formulated and potentially change the TSP and affect project cost and schedule. However, USACE policy precludes proposing a project that will compromise the flood risk levels of the current project. A major constraint of the ecosystem restoration study is that the proposed features will not have an impact on the level of protection currently afforded by the Los Angeles River channel. There are currently no proposals to study flood risk management improvements in the ARBOR reach. If a flood risk management study were to be undertaken in the future, by the Corps and/or non-Federal interests, the implementation of any of the restoration alternatives would not preclude potential flood risk management improvements, as discussed in text added to IFR Section 6.2.1. While some typical flood risk

management measures would likely be excluded as inconsistent with the restoration project, other measures could be considered and implemented. Any future flood risk management measures will need to take account of and be consistent with the ecosystem restoration project. There is minimal risk of significant change to the Recommended Plan.

The fifth recommendation was to clarify the intent to identify a non-Federal sponsor to investigate flood risk management in the future for this project. The Corps has discussed sponsorship for an update to the 1992 FRM study with the current LACDA non-Federal sponsor (Los Angeles County Department of Public Works) and with the City. No interested non-Federal sponsors have been identified.

- 2. Final Panel Comment 2 (Cost Engineering)– *High Significance* – The cost schedule risk analysis does not adequately account for uncertainties in capital and O&M costs, especially related to long-term restoration success.**

USACE Response: Adopted

Action Taken: There were four recommendations made as part of this comment, all of which were adopted. The first and fourth recommendations suggested a full Cost Schedule Risk Analysis (CSRA) or a more comprehensive discussion of the reason for and methods and assumptions applied in an Abbreviated Risk Analysis (ARA) method. A full CSRA has been conducted and can be found in Attachment 12 to the Cost Appendix (Appendix C).

The second recommendation was to conduct a separate risk analysis of O&M costs, especially the costs of long-term adaptive management of restored ecosystem services. A more detailed description of O&M has been included in IFR Section 7.5.2 and Appendix C Attachment 4, and a Monitoring and Adaptive Management Plan (MAMP) has been included as Appendix H-2 and is discussed in IFR Section 7.5.4. Appropriate contingencies have been applied to the cost estimates for O&M and monitoring and adaptive management, commensurate with other USACE ecosystem restoration projects.

Recommendation three was to articulate assumptions related to O&M costs of ensuring habitat function. A more detailed description of O&M activities and their costs is included in the IFR in Section 7.5.2. O&M considerations and costs are also included in Appendix C. Some of the additional detail was developed after the circulation of the draft IFR.

- 3. Final Panel Comment 3 (Hydrology and Hydraulics) – *High Significance* – The hydrologic analyses and hydraulic modeling are focused on design storms and flood event conditions to assess conveyance capacity, but do not consider the more frequent seasonal flows and low flows to understand how the restored river system can be sustained over time.**

USACE Response: Adopted

Action Taken/To Be Taken: All five recommendations for resolution of this comment were adopted. Recommendation one was to discuss the fundamental change from an ephemeral to perennial hydrologic condition and how this change may affect the ability to restore the physical functions and ecological habitats that were historically present in the Los Angeles River system. IFR Section 3.4.4 explains that this section of the river has historically been perennial because of its close proximity to ground water and is currently perennial due to treated effluent.

The second recommendation was to expand the hydrologic and hydraulic analyses in Appendix E to include the perennial effluent base flow, the channel-forming discharge, and a flow duration analysis. These analyses will take place during PED as indicated in Appendix E Section 23 and IFR Section 7.5.3 and will not result in an impact to the Recommended Plan.

The third recommendation was to clarify whether and how the “malodorous” negative aesthetic of the treatment plant effluent combined with debris and litter will change with the TSP. The IFR has been revised and no longer uses the term “malodorous” with reference to tertiary treated water from the treatment plant in IFR Section 3.10. Text has been added in IFR Section 5.10 to state that because the dominant water source is tertiary treated, nutrients are not anticipated to negatively affect restoration success or associated aesthetics, and aesthetics associated with water quality are expected to be improved through incidental “polishing” and filtration from restored vegetation.

Recommendation four was to clarify the hydrologic and hydraulic design of the low flow channel. This recommendation will be implemented in PED as noted in IFR Section 7.5.3 and Appendix E Section 23. Detailed analyses of the Recommended Plan will include any low flow channels through the modified sections.

The fifth recommendation was to expand the discussion in Appendix E on how the HEC-RAS and HEC-GeoRAS models were applied to achieve planning objectives and why other models, such as HEC-EFM, were not applied in this project. Appendix E Section 18 has been revised to explain how the HEC-RAS model was applied to ensure the proposed alternatives did not have an adverse effect on the existing conveyance of the channel and to focus on areas of high velocities, while the CHAP model was used to capture habitat impacts and benefits instead of a model such as HEC-EFM. The HEC-EFM model was not used because the proposed features will not have an effect on the overall flow regime, which is the focus of that model. CHAP was a better method for evaluation of habitat benefits. The reasons for using CHAP are included in IFR Section 4.9 and the CHAP Appendix (Appendix G).

4. Final Panel Comment #4 (Geotechnical and Hydrology) – *Medium Significance* – The proposed replacement of grouted rip-rap and reinforced concrete on affected channel slopes by geosynthetic HPTRM has not been analyzed or fully qualified for structural and geotechnical stability during extreme flood conditions.

USACE Response: Adopted

Action Taken/To Be Taken: All three recommendations were adopted. In response to recommendation one, the discussion of High Performance Turf Reinforcement Mat (HPTRM) abilities has been incorporated into the IFR in Section 4.4.5, in the description of measure 4.a. The second and third recommendations, to identify measures to prevent unacceptable performance, and to confirm that where HPTRM is used, the TSP can be implemented to achieve ecological objectives while preventing unacceptable performance, will be implemented during PED as stated in IFR Sections 4.4.5 and 7.5.3. Channel protection products will be evaluated to ensure they meet USACE specifications and surpass all hydraulic, geotechnical, and structural criteria. As noted in IFR Section 4.4.5, the ability of HPTRM or other soft methods to achieve ecological objectives while resisting anticipated erosion, including site specific subsurface investigation and engineering analysis will be evaluated during PED. At some level, a soft armored slope bank, which may be compatible with ecosystem restoration, will not be effective in resisting erosion. HPTRMs present higher uncertainties with respect to maintenance, repair, and/or replacement and may need to be augmented by more traditional channel protection measures.

- 5. Final Panel Comment #5 (Hydrology and Hydraulics, Environmental and Cost Engineering) – *Medium Significance* – Risk and uncertainty associated with various aspects of the project have not been clearly identified and communicated, particularly regarding the hydrologic and ecological restoration components.**

USACE Response: Adopted

Action Taken/To Be Taken: All three recommendations were adopted. The flood risks identified during the 1992 LACDA Feasibility Study are still applicable for this study; however, to address the first recommendation, IFR Section 7.5.3 and Appendix E Section 23 document that flood risk and uncertainty for the selected plan will be examined in more detail during PED to ensure there are no adverse impacts to the current level of protection. To address the second recommendation, a Monitoring and Adaptive Management Plan (MAMP) has been included as Appendix H-2 and is summarized in IFR Section 7.5.4. The MAMP addresses the risk and uncertainty associated with the ecological restoration, including identifying uncertainties, outlining how success will be determined, and identifying potential adaptive management actions. Lastly, to address the third recommendation, the Adaptive Management and O&M costs for the Recommended Plan include appropriate contingencies to account for the potential for higher than expected O&M costs to achieve restoration goals (see Appendix C and Appendix H-2).

- 6. Final Panel Comment #6 (Environmental, Geotechnical) – *Medium Significance* – Post-project monitoring, maintenance, and adaptive management, while necessary for success of the TSP, are not well described in the IFR.**

USACE Response: Adopted

Action Taken: All four recommendations were adopted. A Monitoring and Adaptive Management Plan (MAMP) has been included as Appendix H-2 and is summarized in Chapter 7.5.4. The MAMP includes details of monitoring and success criteria. Monitoring will document impacts of human use on the restoration, such as vandalism and human intrusion through general observation during vegetation monitoring.

Areas where limited scour and sedimentation are anticipated to occur in accordance with natural ecosystem functioning will be evaluated at the time of inspection. The O&M discussion in IFR Section 7.5.2 has been revised to include a statement that inspection would include evaluation of scour, sedimentation, and integrity of geotechnical structures. Appendix H-2 Section 2.3.2 states that geotechnical and structural considerations will be assessed as part of the Geotechnical O&M procedures. Section 7.5.2 of the final IFR outlines anticipated operation and maintenance activities, frequency, and costs. A full O&M Plan will be developed during construction.

- 7. Final Panel Comment # 7 (Environmental) – *Medium Significance* – The interaction between the restored landscapes and the wider ecosystems has not been fully considered.**

USACE Response: Adopted

Action Taken: All three recommendations were adopted. Recommendation one was to discuss the interactions – both positive and negative – between the restored landscapes and the surrounding environments, including consideration of (a) hydrologic flows, (b) urbanized areas, and (c) semi-natural areas outside of the riparian corridor. Discussion on these interactions has been included in IFR Section 6.1.2. Recommendation two was to specify which species would benefit from the increased connectivity.

Increased connectivity would allow for improved movement for all wildlife, with contributions to future regional opportunities for larger mammal species (e.g., coyote and bobcat). This elaboration is included in IFR Sections 6.1.2 and 7.1.10. Recommendation three was to better document current recreation use and the assumed level of future restoration, with considerations of how recreation activities may affect restoration. Information on current recreational use, assumed level of future restoration and considerations of the affect of recreation on restoration can be found in IFR Sections 3.9, 5.5.3, and 5.9, as well as in the recreation plan descriptions in Sections 4.16 and 7.2 and Appendix B Attachment 1. Appendix H-2 includes monitoring and adaptive management measures to assess and address effects of human intrusion on restored areas.

8. Final Panel Comment 8 (HTRW) – *Medium Significance* – Conflicts and issues related to cleanup of HTRW chemicals and CERCLA hazardous waste may emerge during plan implementation as cleanup issues and costs manifest, affecting the TSP.

Five recommendations were made and four were adopted as discussed below. One was not adopted as explained below.

USACE Response: Adopted

Action Taken/To Be Taken: Recommendation one was to explain in the IFR that existing channel sediments have not been tested for HTRW chemicals and CERCLA hazardous waste, which may exist in the sediments because of the historical and present use of the Los Angeles River as a dumping ground for solid waste and receiving body for storm drain discharges. An explanation has been added to IFR Section 3.11.2 to indicate that while contaminated sediments which existed in the channel prior to construction of the LACDA project were likely removed by grading operations, and discharges to the river today from storm drains are regulated by the Regional Water Quality Control Board, no investigation of channel sediments has been conducted at this time. Recommendation three was to conduct an appropriate field sampling and testing investigation for potential sediment contamination to inform the ecological study, including alternatives formulation and selection of the TSP. Sampling, testing, and engineering in the areas of channel modifications will be conducted during PED, as identified in IFR Sections 5.11.3, 5.11.4, 7.5.3 and 7.5.5 and the HTRW Survey Report (Appendix K). Recommendation four was to address the effect on the TSP of potential future chemical contamination or recontamination of river sediments, including operations and maintenance issues. The Recommended Plan is not expected to have an adverse impact on the potential for future chemical contamination or recontamination because discharges into the river today from storm drains are regulated by permits issued by the Regional Water Quality Control Board and future O&M activities for the ecosystem restoration project are not anticipated to involve substantial disturbance of current channel sediments, although O&M of Taylor Yard may require some removal of sediment as stated in IFR Section 5.11.3. Sediment management needs will be further defined during PED as identified in IFR Section 7.5.3, and all necessary HTRW investigations will be undertaken as indicated in Appendix K and IFR Sections 5.11.3 and 7.5.5.

To address recommendation five, a random order of magnitude cost estimate for HTRW cleanup is included in Appendix K along with associated risks and uncertainties, and risks of HTRW cleanup costs are captured in the CSRA that is Attachment 12 to the Cost Appendix (Appendix C). Further risk management will be conducted during PED as indicated in Appendix K. In the event that unknown contamination is discovered during construction, the approach to such contamination will be governed by the Project Partnership Agreement, as stated in IFR Section 5.11.3.

USACE Response: Not Adopted

Recommendation two was to address in the IFR the potential effect of contaminated channel sediments on the alternatives, particularly the TSP. It was not adopted because the restoration alternatives do not propose to plant in or change the depth of the existing soft-bottom channel and sampling, testing, and engineering will be conducted during PED in areas where channel modifications are being proposed. The non-Federal sponsor will respond to or ensure Responsible Party response to existing HTRW soil contamination prior to construction at project sites. Thus, a significant amount of residual existing contaminated sediment is not expected, after this remediation, along the existing or proposed soft bottom sections of the channel.

9. Final Panel Comment 9 (Hydrology and Hydraulics) – *Medium Significance* – The water budget discussion in Appendix E characterizes water budget parameters, but these parameters have not been applied in a water budget analysis.

USACE Response: Adopted

Action Taken: All four recommendations were adopted. The purpose and objectives of the water budget provided in Appendix E Section 10 are to confirm the long-term and seasonal availability of water to restore and sustain the vegetation and open water areas. The water budget analysis including all pertinent factors was completed, and an expanded description of how the water budget demands were determined using the habitat polygons generated by the CHAP analysis has been included in Appendix E Section 10. Both an annual and a seasonal period were analyzed. Information on the seasonal availability of water to restore and sustain habitat is described in Appendix E Section 10 and shown in Tables 8 and 9. A summary of the water budget is found in IFR Section 3.4.5.

10. Final Panel Comment 10 (Hydrology and Hydraulics) – *Medium Significance* – Groundwater conditions specific to the project reaches have not been fully described and data are lacking, especially on groundwater/surface water exchanges.

Three recommendations were made to resolve this comment. USACE adopted the first recommendation as discussed below and did not adopt recommendations two and three.

USACE Response: Adopted.

Action Taken: In response to the first recommendation, the IFR documents that there is available groundwater and surface water in the channel to support channel aquatic and riparian habitat vegetation. Appendix E Section 10 provides a water budget for the Recommended Plan that shows that, even excluding groundwater, adequate water supplies are available from surface water and precipitation to support all features that have a direct connection to the river. Groundwater levels, which are discussed in Section 5 of the Geotechnical Appendix (Appendix D), were based upon the geotracker database and visual observations of seepage within the channel, which shows groundwater at or near the elevation of the existing channel bottom in the soft bottom reaches of the study area.

USACE Response: Not Adopted

Recommendation two was to provide data on the seasonal elevations of, and connections between, groundwater table and river and floodplain habitats, as called for in IFR Table 2-1. Table 2-1 and associated Figure 2-12 represent a conceptual model depicting the interactions between watershed

conditions and the riverine environment as well as stressors that contribute to degradation of that habitat and are not meant to call for additional data collection or detailed numerical analysis. IFR Section 3.4 describes the water resource conditions in the study area, which include both surface and groundwater. IFR Section 3.4.5 describes the water budget and references Appendix E Section 10 where it is contained in full.

Recommendation three was to incorporate hyporheic zone conditions in the water budget analysis. Though the recommendation was not adopted, additional discussion of the surface and groundwater conditions has been added to IFR Section 3.4. During PED, USACE will look for additional sources of existing data on groundwater-surface water interaction to incorporate into the water budget, as indicated in Appendix E Section 23 and IFR Section 7.5.3, but will not undertake data collection or modeling as it would not likely alter the selection of the Recommended Plan.

11. Final Panel Comment 11 (Environmental) – *Medium Significance* – The Integrated Feasibility Report and Appendices do not provide an analysis of sediment processes, which is a component of a planning objective for the restoration project.

USACE Response: Adopted

Action Taken/To Be Taken: USACE adopted all four recommendations. Detailed analyses of the Recommended Plan, including refining the hydraulic analysis and modeling sediment transport, will take place during PED, as identified in IFR Section 7.5.3 and Appendix E Section 23. This will include an evaluation of potential erosion/scour and sediment deposition locations as well as modifications to the existing flood risk management Operations, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R) Plan to allow some vegetation and local sediment deposition to remain as described in Appendix E Section 23 and IFR Section 7.5.2. A sensitivity analysis will be performed to determine how different amounts of vegetation and sediment influence the conveyance. Excess sediment trapped in the system will be managed and included in the OMRR&R Plan. Since the watershed is built out as discussed in IFR Section 1.2.1, no major land use changes that would result in increased sediment erosion, transport, or deposition into the river are anticipated in the future. The full statement from the City's General Plan on expected growth and lack of change to land use patterns in the future has been added to IFR Sections 3.3.4 and 5.3.3.

12. Final Panel Comment 12 (Plan Formulation) – *Medium Significance* – It is not clear whether the Tentatively Selected Plan is consistent with the goals of the Los Angeles River Revitalization Master Plan, as directed by WRDA 2007.

USACE Response: Adopted

Action Taken: USACE has reviewed and revised IFR Section 6.1.4 addressing the Revitalization Master Plan to ensure that the IFR is clear that the study and alternatives including the Recommended Plan are consistent with the direction in WRDA 2007.

13. Final Panel Comment 13 (Cost Engineering) – *Medium Significance* – Cost estimates for the eight specific reaches comprising the ARBOR Reach have not been identified for each of the four final alternatives and the TSP in particular.

Four recommendations were made to resolve this comment. USACE adopted three of the recommendations as discussed below and did not adopt one of the recommendations.

USACE Response: Adopted

Action taken: The cost of features by alternative and reach is displayed in Appendix C Attachment 5. It is broken down to the level of detail useful for plan selection. Total costs of the alternatives (not individual reaches) are included in the IFR in Chapters 6 and 7. Costs for final array alternatives used for plan formulation, evaluation, and comparison were initially developed based upon an abbreviated cost and schedule risk analysis and represent classification level 4 estimates as described in IFR Section 6.4. Subsequent to the circulation of the Draft IFR, final array costs were updated and refined as documented in IFR Section 6.6.3. A full CSRA has been developed for the NER Plan and Recommended Plan and can be found in Appendix C Attachment 12. Total project first costs and a Total Project Cost summary have been added to the final report in Appendix C Attachment 14. IFR Section 7.4 presents these cost estimates and specifies the classification levels in accordance with ER 1105-2-1302.

USACE Response: Not Adopted

Recommendation two was to break down the total cost for each reach and alternative by feature account. Costs of features in each reach for final array plans are shown in Appendix C Attachment 5. Costs are summed in total for the plans rather than by reach because these costs were developed after identification of final array plans and the focus once those plans were identified was to assess in more detail their overall benefits and costs at an alternative basis, rather than a reach basis. Total alternative costs were included in the IFR in Chapters 6 and 7.

14. Final Panel Comment 14 (Plan Formulation) – *Medium Significance* – Future without project conditions related to operation and maintenance, population growth, climate change and hydrology are not adequately described.

Four recommendations were made to resolve this comment. USACE adopted three recommendations and one was not adopted as discussed below.

USACE Response: Adopted

Action taken: Recommendation one was to provide information in the report to demonstrate that O&M of the Los Angeles River will continue unchanged into the future. O&M activities are largely dependent on funding, and we expect funding to remain the same; therefore, O&M would be about the same in the future. IFR Section 3.5.1 documents existing maintenance under the discussion of Low Density Urban vegetation. The description of future vegetation maintenance assumptions in the absence of a restoration project has been clarified in Section 5.5.3 under the discussion of the no action alternative.

Recommendation two was to provide information in the report to demonstrate that land uses within the study area under future without project conditions would be similar to existing conditions. Economic Appendix (Appendix B) Section 3 describes existing and projected land uses and population for the Study Area. As documented in the City's General Plan, the study area is essentially built out; nearly all new housing development activity will involve recycling of land, and no large-scale changes to land use patterns are anticipated. Annual growth in population for the study area is projected to decline to less than 0.3% over the next 25 years, with primary land use changes limited to redevelopment. The IFR states in Section 1.2.1 that the watershed is built out, and the full statement from the City's General Plan

on expected growth and lack of change to land use patterns in the future has been added to IFR Sections 3.3.4 and 5.3.3.

Recommendation four was to estimate peak flow increases and impacts on flood risk or restoration design due to climate change using available data and other published studies. In response, a discussion documenting the lack of information available to adjust future condition discharges based on climate change is included in Appendix E Section 9, and a qualitative discussion of possible effects of climate change on project features has been included in IFR Section 7.1.12.

USACE Response: Not Adopted

Recommendation three was to refine the future population projections using Southern California Association of Governments' data (SCAG, 2013) analyzed at the census tract level within the project reach. Since the watershed is completely built out, the effects of population growth will be insignificant.

15. Final Panel Comment 15 (Hydrology and Hydraulics) – *Medium Significance* – The validity of some aspects of the hydraulic and hydrologic analyses cannot be confirmed because several assumptions are unclear or supporting data are not provided. (Appendix E)

USACE Response: Adopted

Action Taken/To Be Taken: The recommendation to clarify twelve items in the hydraulic and hydrologic analyses in Appendix E was adopted. Revisions were made to Appendix E, Sections 14, 15.1, 15.3, 15.5.2, 15.8, 18.1, 18.2.2, 19, 20, 20.1, and 23. Revisions to address seven observations clarified technical or methodological issues (use of LiDAR data (Section 15.1), method of data merger to create cross sections (Section 15.3), use of Manning's n-values versus absolute roughness k values (Section 15.5), analysis of flow regime (Section 15.8), description of hydraulic model modifications in alternative reach plans (Section 18.1), source of data for current HEC-RAS modeling (Section 14), and review of peak discharge record (Section 20.1)). Revisions to address five observations clarified the level of analysis conducted during the feasibility phase and indicated that detailed hydraulic and hydrologic analysis of the Recommended Plan during PED will include daylighted storm drain design and evaluation, with determination of effective and ineffective flow areas (Section 19); verification and refinement of contraction/expansion coefficients for bridges (Section 18.2.2); consideration of energy grade line, shear stress, and possibly stream power for determination of vegetation size, density and extent (Section 20); assessment of specific vegetation species and associated bending and/or breaking or washing out (Section 20.1); and more detailed analysis of vegetation roughness using an appropriate tool such as ERDC's HYDROCAL (Section 20.1). Specific components of detailed analysis during PED are summarized in Section 23 and in IFR Section 7.5.3.

16. Final Panel Comment 16 (Hydrology and Hydraulics) – *Low Significance* – Reach cross sections for the Tentatively Selected Plan have not been presented in a consistent and clear way.

USACE Response: Adopted

Action Taken/To Be Taken: USACE adopted both recommendations. Recommendation one was to include in the IFR representative cross sections for each reach plan. An explanation noting that detailed design drawings were not developed for each project feature (e.g., habitat corridors) was added to the Design Appendix (Appendix A) in Section 4.0; however, descriptions are included in IFR Section 4.14 that reflect the channel modifications by reaches for each alternative. Typical cross sections were

developed for reaches of the study area where there are proposed modifications to the channel and banks. These were utilized for estimating purposes and the initial set of cross sections applied to all of the alternatives. Appendix A Attachment 3 includes maps of the final array of alternatives depicting project features on aerial photographs, and Attachment 4 includes channel cross sections associated with the final array of alternatives. The 13 sheets of cross sections in Attachment 4 depict the typical cross sections associated with the final array as described in the table. If the main channel is not being modified in the final array of alternatives (e.g., in Reach 1), cross sections were not developed. Detailed design drawings will be developed during PED as noted in IFR Section 7.5.3.

Recommendation two was to use more than one cross section per reach if appropriate to represent cross-sectional configuration changes within the reach (e.g., at Taylor Yard, the Arroyo Seco confluence, and Piggyback Yard). Multiple cross sections will be used and presented for each affected reach during PED, as noted in IFR Section 7.5.3.

17. Final Panel Comment 17 (Economics) – *Low Significance* – The reasonableness of key drivers in estimating recreational benefits has not been substantiated with local data.

USACE Response: Adopted

Action Taken: The Economics Appendix Recreation Analysis (Appendix B, Attachment 1) was expanded in Section 2.1 to further describe the basis for the visitation projections, and the sensitivity analysis was expanded to show the reduction in both baseline and with project visitation that would be required to reduce the benefit/cost ratios to below 1.0. This is in addition to the sensitivity analysis conducted to show the impact on economic justification of reductions in the UDV values, and a combined scenario of reducing both visitation and UDV values. Text was also added to Appendix B Attachment 1, Section 2.1 to describe the efforts made to obtain local and specific visitation data for the analysis, noting that specific trail/user data within the Study Area was not available. It also notes that any effort to conduct surveys to develop such data were beyond the scope, budget, and schedule of the Feasibility Study.

18. Final Panel Addendum Comment 18 on LA River Public and Agency Comments (Environmental) – *High Significance* – Stakeholder concerns noted in the public and agency comments suggest that the environmental benefits of the different restoration alternatives have not been fully captured and evaluated, particularly with regard to wildlife and hydrological connectivity.

Seven recommendations were made to resolve the issue. USACE adopted six recommendations and did not adopt one as discussed below.

USACE Response: Adopted

Action Taken: In response to recommendations 2 through 7, an analysis was conducted to quantify the beneficial outputs of hydrologic, local, and regional connectivity not fully captured in the alternatives analysis included in the draft IFR. The results of this analysis are summarized in IFR Section 6.1.3. Although quantifying connectivity showed more restoration output for each of the alternatives, the magnitude of the incremental costs relative to the incremental increase in benefits, did not provide sufficient basis to justify the selection of a larger scale plan as the NER Plan. A summary of the results of this analysis were also provided in responses to public comments (see Appendix L2) that made specific

reference to this issue. This analysis was performed prior to selection of Alternative 20 as the Locally Preferred and Recommended Plan.

Following public review, further analysis was performed that included a more detailed cost analysis. This analysis identified a more cost effective variation on Alternative 13 (referred to in this IFR as “Alternative 13v (variation)”) that is identical to Alternative 13 except for Reach 7, where it includes the reach plan included in Alternative 20 that provides 10 acres of marsh and a connection to the Los Angeles State Historic Park. After further analysis including cost updates, the Reach 7 plan included in Alternative 20 provides greater benefits in than the Reach 7 plan included in Alternative 13, at lower cost. This variation of Alternative 13 has been identified as the NER plan based on the analysis previously referenced. There is a slight increase in connectivity with this plan change in Reach 7, further supporting the choice of the NER Plan. The increase in connectivity for Alternative 13v over 13 is described in Section 6.1.2.

USACE Response: Not Adopted

Recommendation one was to quantify the length of cumulative corridors connected or created for each restoration option evaluated. It was determined in coordination with the USACE Ecosystem Planning Center of Expertise (ECO-PCX) that length of corridors is a poor measure of connectivity, as shorter corridors between nodes are better to facilitate wildlife movement. More important is the (short) length of corridors between two habitat patches, in relation to patch size. For this reason, the Corps focused on quantifying connectivity per the IEPR recommendations two and three.