APPENDIX B

REVIEW DOCUMENTATION

B.1

DISTRICT QUALITY CONTROL (DQC)

District Quality Control Certifications

for the

DRAFT

American River Common Features

General Reevaluation Report

and

Environmental Impact Statement/ Environmental Impact Report

Attachment A. Plan Formulation
Attachment B. Environmental/Cultural
Attachment C. Engineering - Civil
Attachment C-1. Engineering – Hydrology
Attachment C-2. Engineering – Hydraulics
Attachment C-3. Engineering – Geotechnical
Attachment C-4. Engineering – Cost
Attachment C-5. Engineering – Erosion
Attachment D. Real Estate
Attachment E. Economics

ATTACHMENT A

PLAN FORMULATION

DISTRICT QUALITY CONTROL CERTIFICATION
AMERICAN RIVER WATERSHED, COMMON FEATURES PROJECT, CALIFORNIA

COMPLETION OF QUALITY CONTROL ACTIVITIES

The District has completed review of the draft documentation of the American River Watershed, Common Features Project, California. Certification is hereby given that all quality control activities defined in the Project Review Plan appropriate to the level of risk and complexity inherent in the product have been completed. Documentation of the quality control process is enclosed. It is noted that several items have been identified for correction in the final document. None of the errors would change the selection of the recommended plan.

GENERAL FINDINGS

Compliance with clearly established principles and procedures, utilizing clearly justified and valid assumptions, has been verified. This includes assumptions, methods, procedures and materials used in analyses; the appropriateness of data used and level of data obtained; and the reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy. All appropriate DQC comments have been incorporated into this project. The undersigned recommends certification of the quality control process for this product.

Jerry Fuentes
Quality Control Reviewer

Date 3/10/15

QUALITY CONTROL CERTIFICATION

As noted above, all issues and concerns resulting from technical review of the product have been resolved. The project is recommended to proceed to policy review by SPD.

Mark E. Cowan
Chief, Water Resources Branch

Date 3/10/2015

American River Common Features Draft Report
DQC Comments
Reviewer: Jerry Fuentes, RTS

19 February 2015

Comment	Response	Backcheck
Page 1-1, Section 1.2 - authorized cost of $320,728,000 not consistent with PACR which rounded to $320,700,000. Address inconsistency.	Cost of $320,728,000 in chap 1 was changed (rounded) to $320,700,000 to be consistent with PAC. (DPT)	Response accepted. Comment closed.
Page 1-3, Section 1.2.4 - Location is not the sole factor for determining if an effort is within the Chief's discretionary authority. Strengthen this statement.	Added a caveat saying "and necessary for the project as authorized to function as intended" in addition to the location factor. (DPT)	Response accepted. Comment closed.
Page 1-8, Section 1.3.4 - Highlighted 192,000 population should be confirmed and highlight removed.	Table 2-4 reports 440,000. Reference in chap 1 to population at risk was changed to conform to table 2-4. (DPT)	Response accepted. Comment closed.
Page 1-9, Figure 1-3 - No reference to this figure in text. This comment also applies to Figures 1-5, 1-6, 1-7	Figures 1-3, 1-5, 1-6, and 1-7 were identified in the text. (DPT)	Response accepted. Comment closed.
Page 1-11, Section 1.4.1, 3rd paragraph - "continue to govern the operation and maintenance requirements of the levee system." Revise to make reference to system more inclusive - O&M is for more than just the levees.	Changed to "continue to govern the operation and maintenance requirements of the entire SRFCP (levees as well as the adjoining channel)". (DPT)	Response accepted. Comment closed.
Page 1-14, Section 1.4.2, 1st paragraph next to last sentence - "adjacent to Natomas Basin" should be clarified to state these are Natomas levees.	Actually, it was both the Natomas basin and the ARN basin that this work was constructed in. Clarifying language added. (DPT)	Response accepted. Comment closed.
Page 1-17, Table 1-1 - Authorized features for Natomas (WRRDA 2014) are not consistent with PACR, which lumps them all together. Address inconsistency.	Modified features in the PAC to include the line items included in Chap 1 for WRRDA 2014. (DPT)	Response accepted. Comment closed for GRR. Need to crosscheck with PACR. *PACR backcheck completed 3/10.*
Page 1-18, Table 1-2 - These numbers are not consistent with those reported in the PACR. Address inconsistency.	Numbers in the PAC are the most recent and have been put into Table 1-2. (DPT)	Response accepted. Comment closed.
Page 1-18, Sections 1.4.3 and 1.4.4 - please address inconsistent reference to the 2010 Natomas documentation. See no reason that we should reference both the GRR and PACR.	The Natomas 2010 document was made consistent citing the Natomas Post Authorization Change Report (Natomas PACR). (DPT)	Response accepted. Comment closed.
Page 1-20, Section 1.5.1.2 - References Section 104 credit. However, since that credit is no longer available, I'm	It is not subject to a waiver, it was approved prior to the ASA making the	Response accepted. Comment closed.

assuming this is subject to a waiver and we should document that waiver here.	decision of no new 104s. I did not make any revisions here. Let me know if you think we need to state that the 104s were approved prior to the moratorium. (DPT)	
Page 1-23, Section 1.5.1.6 - Status of the CVFPP update is outdated as is the CVIFMS information provided in this section. I've inserted updated information in the current draft document. I also deleted the two sentences that close Section 1.5.1.10.	Concur with revisions incorporated. Thanks! (DPT)	Response accepted. Comment closed.
Page 2-1, Section 2.1, last sentence - NED is the plan that reasonably maximizes net benefits.	The sentence has been modified to include "reasonably".	Response accepted. Comment closed.
Page 2-2, Real Estate bullet, last two sentences - As written, these sounds pre-decisional. How is a construction footprint known sufficiently to eliminate examination of certain encroachments as sources of an overall problem?	The last two sentences in this paragraph have been removed from Chapter 2. The public concern is still sufficiently described.	Response accepted. Comment closed.
Page 2-5, General Description of Flood Flows, 2nd paragraph - This needs to be rewritten to eliminate reference to Folsom Dam/200-year per HQ comments. For W. Sac we chose the 200-year as a representative floodplain. Consult that document for consistency.	Concur. The sentences referencing SB 5 and Folsom operations have been deleted and language regarding analysis of the full range of flood frequencies has been added as well as a sentence saying the 200 year event shows the depth and extent of a very large flood event.	Response accepted. Comment closed.
Page 2-6, Table 2-2 - Add flows for the 100-year as well as the 200-year.	Basin centering deleted and 100-year added. (DPT)	Response accepted. Comment closed.
Page 2-7, Figure 2-2 has no reference in the text. As part of that reference, indicate why 200-year was selected to be shown.	The reference for Figure 2-2 is on page 2-5 within the discussion of the flood flows and the revised 200 year discussion. The figure has been moved closer to the reference.	Response accepted. Comment closed.
Page 2-8, Effects of Folsom Dam... - Bulk of this sub-section discusses how Folsom Dam will operate, not the effect on downstream levees. Consider re-titling.	The heading has been revised to state "Folsom Dam Operational Improvements"	Response accepted. Comment closed.
Page 2-12, Vegetation and Encroachments. This section needs substantial revisions based on HQ comments. Delete paragraph 2, last bullet starting with "Burrowing animals...", delete remainder of text after bullet list to next subsection. Consult W. Sac document for consistency.	Text has been deleted as directed.	Response accepted. Comment closed.

Page 2-16, Natomas Basin, next to last sentence - unclear antecedent: replace "it" with "levee raising in the Natomas Basin."	Concur. (DPT)	Response accepted. Comment closed.
Page 2-19, Section 2.3.2 - In the problem statement, add "Potential" before "Consequences" per HQ comment on W. Sac.	Concur. (DPT)	Response accepted. Comment closed.
Page 2-19, Population at Risk - Address inconsistency with Report Synopsis and use text from it for this subsection.	There was a discrepancy between tables 2-3 and 2-4. Per input from econ, table 2-3 was deleted. This was done with the corresponding table in the synopsis as well. (DPT)	Response accepted. Comment closed for GRR. Need to backcheck change to PACR. *PACR backcheck completed 3/10.*
Page 2-19, Life safety - Delete paragraphs 2, 3 and both bullets per HQ comments on W. Sac. Retain final paragraph and Table 2-4.	Concur. The corresponding information in the synopsis relating to the paragraphs HQ said to delete were also deleted. (DPT)	Response accepted. Comment closed.
Page 2-31, Section 2.8.7 - Suggest last paragraph be deleted or substantially revised to simply state that the development moratorium could be lifted through local efforts only. Avoid specifics on levee certification since that is not germane to this report.	Planning division management wanted this information in there to be transparent about development in the floodplain. Please let me know if you disagree so we can elevation. (DPT)	Response accepted. Comment closed.
Page 2-31, Section 2.8.8 - Fail to see the relevance of this section under the future without-project condition. Does this factor into our plan formulation or evaluation in any way? If not, delete.	Development Impact Fee is also covered in Chap 4, residual risk so was deleted from here. (DPT)	Response accepted. Comment closed.
Page 2-32, Section 2.8.10 - First sentence states an analysis was conducted but no results of said analysis is provided. Explain.	First three sentences were deleted since nobody has any idea about the details of this analysis. The synopsis was also correspondingly modified. (DPT)	Response accepted. Comment closed.
Page 3-1, Section 3.1 - Implementability is not a screening criteria used later in the chapter.	Implementability was dropped as a screening criteria. (DPT)	Response accepted. Comment closed.
Page 3-2, Transitory Storage - Need to explain why the 200-year was used to assess these measures. Avoid use where possible.	This was revised to describe various frequency flood events and not just the 200-year. (DPT)	Response accepted. Comment closed.
Page 3-5, Yolo Bypass Improvements - Reference made to a report that is not sourced. COE, locals? Please clarify.	This report was developed for the Comp Study which was added to the statement. (DPT)	Response accepted. Comment closed.
Page 3-5, Stray map legend. Please delete.	This legend goes with Figure 3-1 and has been moved back to it's home. (DPT)	Response accepted. Comment closed.

Page 3-7, Seepage Cutoff Walls - This measure is not mentioned in report synopsis. Address inconsistency.	Synopsis called them "Slurry Walls". In the synopsis, they were changed to "Slurry Seepage Cutoff Walls". (DPT)	Response accepted. Comment closed.
Page 3-8, Geotextile Materials is labeled "Reconstruct with Geotextile Materials" in report synopsis. Address inconsistency.	"Geotextile Materials" retitled to "Reconstruct with Geotextile Materials" on page 3-8. (DPT)	Response accepted. Comment closed.
Page 3-10, Section 3.8 - Identification of non-structural measures is not consistent with report synopsis. Address inconsistency.	Local building codes was found to be inconsistent. It was added to tables where it was not previously included, tables in both Chap 3 and the synopsis. (DPT)	Response accepted. Comment closed.
Page 3-15, Section 3.9 - This section and 3.10 should be combined into "Screening of Measures."	Section 3-9 and 3-10 combined into one section titled as indicated. (DPT)	Response accepted. Comment closed.
Page 3-16, paragraph beginning "An initial evaluation..." - "Constructability" is not an evaluation metric identified anywhere else in the document.	This section was rewritten to cite "the planning objectives plus when combined best meet the federal planning criteria of completeness, effectiveness, efficiency, and acceptability. (DPT)	Response accepted. Comment closed.
Page 3-19, Section 3.10, 2nd paragraph - environmental impacts are not included as a measures screening criteria in Table 3-4.	Last sentence of 2nd paragraph discussing environmental mitigation was deleted. (DPT)	Response accepted. Comment closed.
Page 3-24, Section 3.12, 2nd paragraph - At mid-paragraph is sentence containing the term "protecting." Replace term.	Concur. Sentence modified to state: "the No Action Alternative would not affect the current condition of the levees in the project area...".(SMS)	Response accepted. Comment closed.
Page 3-24, Section 3.12 - This section should focus only on descriptions of the alternatives. Eliminate statements of screening since your alternatives screening criteria has not yet been established. Move those statements to Section 3.13, Screening of Alternatives.	The section has been modified to remove the screening language. A new table has been created in section 3.13 to describe the evaluation and screening. (SMS)	Response accepted. Comment closed.
Page 3-27, Subsection 3.12.3, 1st paragraph, last sentence - "hydraulic constraints" is not clear based on what was provided in Chapter 2. Please clarify.	Hydraulic constraints refer to the fact that we can't move the levee out toward the river since that would cause a reduction in the channel capacity. The word "capacity" has been added to the sentence to clarify.(SMS)	Response accepted. Comment closed.
Page 3-28, Subsection 3.12.4 - This should focus on the physical description, then discuss how it performs.	This sentence helps explain why no levee improvements would be needed on the	Response accepted. Comment closed.

Sentence beginning with "The effects of this diversion structure..." should be deleted.	Sacramento River downstream of the diversion structure and so it seems critical to the discussion of features. Sentence has been modified to discuss the rational for not needing the levee raises in general, rather than specific to this alternative. (SMS)	
Page 3-29, Subsection 3.12.5, 1st bullet - No setup has been established for the discussion of hydraulic mitigation prior to this statement and brings into question what our assumptions are based upon. Especially since we haven't discussed effects of alternatives yet, this statement seems misplaced.	This statement has been deleted. The evaluation of Alt 3 does not rely on this discussion. (SMS)	Response accepted. Comment closed.
Page 3-34, Table 3-13, Criteria 4 - Metrics aren't clear what the scale used is. Are they Y/N?	Metrics have been clarified and simplified. (SMS)	Response accepted. Comment closed.
Page 3-36, Table 3-14 - Annual costs appear high. Please recheck and if any changes are warranted, make sure report synopsis table is also changed.	Checked with Timi to confirm annual costs calculations. Annual Costs have been slightly modified to be reproducible with IDC calculation. A footnote has been added to the table which states: "Average Annual Costs include preliminary IDC calculations". Report Synopsis has been updated as well.	Response accepted. Comment closed.
Page 3-49, Table 3-18 - Total first cost is 1,469,515 in the report synopsis. Address inconsistency.	The table has been updated to be consistent with Synopsis and other tables in Chapter 3. Cost shown as 1,469,515. (SMS)	Response accepted. Comment closed.
Page 3-54, Section 3.15 - Evaluation of alternatives should focus on identification of the NED Plan. As written, it gives hydraulic effects, vegetation/encroachments, and Natomas the primary focus.	Concur. Section has been rewritten to include NED identification in the first paragraph. (SMS)	Response accepted. Comment closed.
Page 3-55, Natomas Basin - population is 400,000 in report synopsis. Address inconsistency.	Reference to population has been modified to state 500,000 in the floodplain, consistent with the Synopsis. (SMS)	Response accepted. Comment closed.
Page 3-55, Natomas Basin - On pages 39 and 40 of the report synopsis, it states that Natomas is still awaiting authorization. Please fix report synopsis.	The report synopsis has been updated with language on WRRDA 2014. The sentence now reads: "Federal involvement was authorized by WRRDA 2014 for implementation of the recommendations	Response accepted. Comment closed.

	contained in the Natomas PAC report." (SMS)	
Page 3-57, Section 3.16 - Comparison of Alternatives focuses on System of Accounts and other factors. If Assurance it to be retained, move it to after the System of Accounts.	The assurance table has been moved after the system of accounts discussion. (SMS)	Response accepted. Comment closed.
Page 3-59 - recommend deleting text discussing levee certification.	Text discussing levee certification has been moved to Chapter 4 in the discussion of Design Considerations. (SMS)	Response accepted. Comment closed.
Page 3-64, Table 3-24 - Numbers are consistent; however text on EQ is slightly different than report synopsis. Address inconsistency.	Text in Chapter 3 is more recent. Report Synopsis has been updated to match Chapter 3. (SMS)	Response accepted. Comment closed.
Page 3-67, Section 3.19 - Since cost-sharing has not yet been discussed or explained in the document, inclusion of Federal and non-Federal costs here is inappropriate.	Cost sharing language has been removed from this section. (SMS)	Response accepted. Comment closed.
Page 4-1, Section 4.1 - Description of TSP is not consistent with description in Chapter 3. Please reconcile.	Chapter 4 description of the TSP has been revised to match description in Chapter 3. (SMS)	Response accepted. Comment closed.
Page 4-1, Section 4.1 - Recommend format of detailed descriptions follow the sequence in bullet list.	Detailed descriptions for each waterway have been reorganized to follow the order in the numbered sections, i.e. 1. Sacramento River, 2. American River... (order established by worst first construction priority) (SMS)	Response accepted. Comment closed.
Page 4-2, 1st paragraph - Unclear what the intent of this paragraph is in relation to the description of the TSP. Language used here is not consistent with terminology in EM 1110-2-1413. Ultimately, are we saying we're compliant with the EM or not?	The paragraph has been moved to the Design and Construction consideration section and rewritten. The paragraph now reads: "The modifications to existing interior drainage facilities have been limited to bringing the facilities in compliance with Corps criteria for penetrations through levees (upgrading discharge lines, pumps, etc. to raise the drainage over the top of levee). An assessment of the capacity of existing facilities to address the residual flooding from interior runoff *will be accomplished*	Response accepted. Comment closed.

	during the design phase. " (SMS)	
Page 4-2, Table 4-1 - Inconsistent with Table 3-14.	I assume you meant table 3-19. Inconsistencies were corrected between these tables. (DPT)	Response accepted. Comment closed.
Page 4-2, bullet list - Recommend this be moved to after physical description of the TSP. This whole discussion places too much attention on the vegetation issue that does not seem appropriate until after we've described in detail the TSP.	The bullet list has been moved to after the physical description of the TSP. Text focused on vegetation has been reduced. (SMS)	Response accepted. Comment closed.
Page 4-5, Bullet starting with "The erosion measures..." The first sentence is not the correct definition of "structural" used in the Planning lexicon. Secondly, it is unclear why it is part of a bullet that speaks about a SWIF.	Paragraph has been rewritten and the term "structural" has been removed. The paragraph now states: "Compliance with levee safety criteria for vegetation, access and encroachments will be limited, as with the other study reaches, to the construction footprint. The construction footprints of the erosion protection features on the American River are limited to the waterside levee slope or the actual river bank. As shown in Figure 4-8, all other vegetation, access and encroachments issues outside of the construction footprint would be brought into compliance with Levee Safety Policy through the use of a System-Wide Improvement Framework (SWIF) by the local maintaining agency, the American River Flood Control District (ARFCD). " (SMS)	Response accepted. Comment closed.
Page 4-6, American River subsection - The bullet list here is confusing. This sounds as if we have not decided what method we are using for erosion protection. Since at this point in the document, we've tentatively selected a plan, this should not still be an issue. What should be described here are the assumptions we made and what we've included in the TSP, then as part of Design Considerations discuss how we might refine those assumptions.	Concur. The bullet list has been removed from this section. The following paragraph describes the assumptions made and how the assumptions would be refined during design. (SMS)	Response accepted. Comment closed.
Page 4-8, Subsection 4.1.1.1, 1st paragraph - incorrect	The figure 4-8 is correct. There is just not	Response accepted. Comment closed.

figure reference.	reference to figures 4-5, 4-6, and 4-7. Updates were done to clarify this. (DPT)	
Pages 4-8 and 4-9 - No text references for these figures.	The map showing the TSP recommended features has been moved to page 4-2 and a figure reference has been added to the test. Text references for the other figures have also been added. (SMS)	Response accepted. Comment closed.
Page 4-8, last paragraph, last sentence - Previous text in the document indicates we've assumed a variance for vegetation. So it is unclear why we are references a vegetation-free zone in compliance with the ETL here.	The reference to the ETL has been removed. The sentence now reads ..."a small planting berm would be constructed in the rock where feasible to allow for revegetation of the site". (SMS)	Response accepted. Comment closed.
Page 4-19, Subsection 4.1.1.12 - This entire discussion is more appropriate to Chapter 2 and should be moved. Last sentence in paragraph 2 beginning with "It is cumbersome..." should be deleted once subsection is moved since it is an opinion not supported by facts. Text here should be a description of the alterations to the Weir and Bypass recommended as part of the TSP.	The first three paragraphs of this discussion have been moved to Chapter 1 within the section discussing the existing flood management system. The last paragraph has been retained since it is describing the modifications proposed in the TSP. (SMS)	Response accepted. Comment closed.
Page 4-22, Table 4-4 - This table needs additional supporting text to explain how these five factors demonstrate redundancy, robustness, and resiliency. No definition of these three "r's" that I'm aware of uses these factors.	Table title has been revised to more accurately describe what is portrayed in the table. It now states: "Ideal Levee Construction versus the Existing Levees in the study area" (SMS)	Response accepted. Comment closed.
Page 4-23, Section 4.3, Tables 4-4 and 4-5 have not text references to them.	A text reference has been added for these tables. (SMS)	Response accepted. Comment closed.
Page 4-25, Section 4.5 - This section could be improved by using the project reaches in describing OMRR&R responsibilities. As currently organized, it is difficult to assure that all project reaches have a responsible agency. Also revise Section title to OMRR&R.	A table has been added which shows the responsible maintaining agency and the associated study reaches. The section title has been revised to "OPERATIONS, MAINTENANCE, REPAIR, REPLACEMENT AND REHABILITATION (OMRR&R) CONSIDERATIONS". (SMS)	Response accepted. Comment closed.
Page 4-27, Subsection 4.5.1.5, 1st paragraph - Second sentence state SAFCA would be responsible for mitigation monitoring. This is not standard COE practice and is not recommended since COE has the ultimate responsibility	The text has been modified to state that the Corps would be responsible for mitigation monitoring and would provide the annual monitoring report.(SMS)	Response accepted. Comment closed.

for assuring mitigation success and annual reporting vertically on mitigation monitoring.		
Page 4-27, Subsection 4.5.1.6, 1st paragraph, next to last sentence - O&M manuals do not routinely include costs as a criteria. O&M activities are reported and the expectation is the non-Federal sponsor will carry out those activities regardless of cost. A discussion of the assumed O&M activities that were used to generate costs is needed.	The following sentence has been added to the section to describe the O&M activities: "The increased efforts include additional mowing, rodent control, and vegetation management." (SMS)	Response accepted. Comment closed.
Page 4-27, Table 4-6 - This table would be more informative if it also included existing O&M costs. Simply stating an increase does not provide any context.	Existing O&M costs have been added. (SMS)	Response accepted. Comment closed.
Page 4-28, Section 4.7, 1st paragraph after quote - Rewrite sentence starting with "It is imperative..." Tone is inappropriate.	The sentence has been deleted. (SMS)	Response accepted. Comment closed.
Page 4-29, Section 4.7, last paragraph - This paragraph needs substantial rewriting. It reads as if a half dozen random sentences about residual risk were strung together. These introductory paragraphs should set the stage for a discussion of residual risk, first by identifying the amount and nature of the risk, followed by what the TSP proposes to do to address it and ending with a discussion of what other activities within the watershed performed outside of the TSP are also being implemented to address the residual risk.	The section has been revised and organized with subsections to discuss the nature of the risk, TSP actions to address the risk, and additional actions to reduce the residual risk in the study area. (SMS)	Response accepted. Comment closed.
Page 4-35, Subsection 4.7.1.1 - This subsection does not fit within the residual risk section here since as written these subsections disclose "further actions to address residual risk" and this subsection does not offer any actions to address post-flood reoccupation. This information is better used as a description of an aspect of residual risk.	The section has been revised and these subsections have been organized under the heading of "Further Actions to address Residual Risk in the Study Area". The discussion of the post flood reoccupation of Sacramento has been moved up into the subheading of "Nature of Residual Risk in the Study Area". (SMS)	Response accepted. Comment closed.
Page 4-35, Section 4.8 - I find the level of detail in this section to be far in excess of the information needed in a GRR. Most of this information exists in flood management plans and emergency response plans and could be incorporated by reference.	The information in Section 4.8 has been reduced and the flood management plans and emergency response plans have been incorporated by reference. (SMS)	Response accepted. Comment closed.

Page 4-41, Section 4.9 - This section could use a rewrite with an eye towards eliminating repetition. You should also focus the discussion on the effects of only the TSP at this point in the document.	Section has been revised to focus the discussion on the effects of the TSP, rather than the JFP (SMS).	Response accepted. Comment closed.
Page 4-44, Paragraph in front of Table 4-9, last sentence - This sentence does not make any sense within the context of this evaluation. Delete.	Sentence deleted.(SMS)	Response accepted. Comment closed.
Page 4-44, Table 4-9 - Delete Alt 1 reference.	Reference to Alt 1 has been deleted. (SMS)	Response accepted. Comment closed.
Page 4-47, Table 4-9 - Needs text reference and check for consistency with Table 3-24 and EIS. Note minor discrepancies.	Table 4-9 has a text reference.	Response accepted. Comment closed.
Page 4-50, Item 4 - To be more in line with ER 1165-2-26, any discussion of "impacts" or "effects" should clearly indicate if this represents a loss of flood plain values or not. Be specific.	The sentence has been modified to state: "The TSP would have significant adverse impacts on Vegetation and Wildlife, Cultural Resources, Transportation, Recreation and Aesthetic and Visual resources; however, these do not result in the loss of floodplain values." (SMS)	Response accepted. Comment closed.
Page 4-51, Item 6 - I find it troubling that this states that the No-Action Alternative would not restrict growth in the base floodplain without additional discussion. One key aspect of SB-5 is that urban areas cannot develop unless they have made meaningful progress towards a 200-year level of performance for their flood risk features. If the study area can achieve that without a Federal project.	The section has been revised to state that: " The No-Action Alternative would not restrict growth in the base floodplain in the short term. The 400,000 people living and working in the American River North and American River South Basins would remain at risk of flooding. However, the State of California's Senate Bill (SB) 5 stipulates that development in urban areas will be restricted if the localities have not made meaningful progress toward achieving a 200 year level of performance (per State of California standards) by 2025. Therefore, the No-Action Alternative would restrict growth in the base floodplain in the long term".	Response accepted. Comment closed.
Page 4-54, Section 4.14, Table 4-10 - Insert "First" before Cost in title.	First has been added to the table title. (SMS)	Response accepted. Comment closed.
Page 4-56, Table 4-11 - Recommend use of the table	Table has been updated to separate out the	Response accepted. Comment closed.

format from Truckee Meadows since the 5% must be shown separate from the other cash contribution.	5% cash from the remaining cash per the Truckee example. (DPT)	
Page 4-56, A Table showing the economic costs and the B/C ratio at 3.375% and 7% needs to be added. Example is Truckee table 6-7.	The example table from Truckee has been added to Section 4.14 to display the economic costs and the B/C ratios at 3.375% and 7%. (DPT)	Response accepted. Comment closed.
Page 5-1, 1st paragraph - concur with Charles' comments. Don't mention what isn't included.	Cost allocation and crediting were deleted from the text. (DPT)	Response accepted. Comment closed.
Page 5-3, Table remnant. Fix.	Table deleted and Table 5-1 edited. (DPT)	Response accepted. Comment closed.
Page 5-3, last paragraph - Suggest deleting since this seems out of place.	Concur. Deleted. (DPT)	Response accepted. Comment closed.
Page 5-4, Table 5-2 - Just noticed that Table 3-22's annual cost is $74,165 and should be corrected.	Tables have been corrected to show $74,165. (DPT)	Response accepted. Comment closed.
Page 5-5, Table 5-3 - Use Truckee format provided for this table.	Table format provided from Truckee was used for this. (DPT)	Response accepted. Comment closed.
Page 5-6 - Format issue as next two pages are landscape. Page numbers also repeat starting here.	This seems to have been corrected. I think this is an issue with MS Word. (DPT)	Response accepted. Comment closed.
Page 5-5, Table 5-4 - Break out WRRDA 2014 Natomas costs from the 1996/99/2004 authorized projects since they have different cost-share percentages.		Response accepted. Comment closed.
Page 5-1 (5-9), Table 5-6 - This table needs text to explain its purpose.	Text explaining this table has been added. (DPT)	Response accepted. Comment closed.
Page 7-1, 1st paragraph - Concur with Charles' comment. Ensure that format is consistent with recent submissions.	The first paragraph was in Orestimba but not in Natomas. Natomas led off with the second paragraph starting with "I recommend modifying". I have deleted this sentence. (DPT)	Response accepted. Comment closed.
Page 8-1 - Numerous references listed here are not cited in text. Consider a short paragraph explaining that these were used as background sources and not for specific facts.	Paragraph added to beginning of chap 8 stating references not cited in text are provided for overall background perspective. (DPT)	Response accepted. Comment closed.
Page 8-1 - Two sources cited that are not included in this chapter: 1 - Natomas PACR 2010 2 - Levee Safety Program April 2011	The two references were added to the list of references. (DPT)	Response accepted. Comment closed.

American River Common Features PACR
DQC Comments
Reviewer: Jerry Fuentes, RTS

13 February 2015

Comment	Response	Backcheck
Introduction: This paragraph needs to eliminate the discussion of the project purpose to work in conjunction with Folsom Mods. This is not the project purpose.	The discussion of the project purpose has been revised to remove the portion discussing working in conjunction with Folsom Mods. (SMS)	Response accepted. Comment closed.
Section 1.1: Similar to what has been added for a discussion of the GRR for West Sac, a brief summary of the authorized Natomas project should be added and not be mentioned again in the document. Since this is the study location section, I would suggest that these previous/on-going studies be moved to later in the document.	The brief description of the west Sac GRR was added here for orientation within the study location discussion. Natomas briefly discussed here and in Section 16 – History of the Project. (SMS)	Response accepted. Comment closed.
Section 1.3: A description of the authorized project at this point does not require including costs. Suggest that this cost be deleted to avoid consistency issues.	The cost has been removed from this section (SMS).	Response accepted. Comment closed.
Section 2. As with above comment, Appendix G does not require disclosure of authorized costs here. Suggest they be deleted.	The authorized costs have been deleted from this section. (SMS)	Response accepted. Comment closed.
Section 3. Table PAC-1, Item 2, Authorization. Spell out NLIP.	The Natomas Levee Improvement Project (NLIP) has been spelled out in table PAC-1. (SMS)	Response accepted. Comment closed.
Section 4. Paragraph 1, delete reference to Natomas. First paragraph should be deleted and rewritten to summarize Table PAC-3.	Reference to Natomas has been deleted. Paragraph revised to summarize the information in PAC-3. (SMS)	Response accepted. Comment closed.
Section 4, Paragraph 2. Update status of the three segments. Are they in or out of the authorized project?	Evaluation of these 3 segments is underway and it is unknown at this time whether they will be recommended from removal from the project or not. This section has not been modified. (SMS)	Response accepted. Comment closed.
Section 4, Paragraph 3, delete reference to	Reference to Section 104 credit approval has been	Response accepted. Comment closed.

Section 104 credit and replace with Section 221 credit (if applicable).	replaced with Section 221 credit approval. (SMS)	
Table PAC-3, Revise table to eliminate Natomas work authorized by WRRDA 2014.	Table has been revised so that it is consistent with table PAC-1. (SMS)	Response accepted. Comment closed.
Section 6, Paragraph 2. Delete reference to Natomas basin cost-sharing.	Reference to Natomas cost sharing has been deleted. (SMS)	Response accepted. Comment closed.
Section 6, Italic text. Does this have any bearing on LCR's? If not, delete.	The italicized text describing the sponsors' funding mechanisms has been deleted. (SMS)	Response accepted. Comment closed.
Section 8, Sentence 2 - rewrite to delete reference to Natomas.	Sentence has been rewritten to delete Natomas reference. (SMS)	Response accepted. Comment closed.
Section 9, Table PAC-4, Appendix G requires that this table display recommended project, authorized project by Congress, authorized project updated to current price level, and project last presented to Congress. Revise table to correspond to these requirements and add explanatory subparagraphs.	Table has been updated to show WRDA 96/99 features separate from the Natomas recommendations since they were authorized with different cost sharing. The table now shows the WRDA 96/99 authorized project, the project last reported to Congress, the project updated to current price levels, the Natomas PACR authorized costs and the total of WRDA 96/99 and Natomas together. Explanatory subparagraphs have been added. (SMS)	Response accepted. Comment closed.
Section 9, Table PAC-5, Explain how this table relates to PAC-4. This section usually contains only one table.	Table is a necessary next step after table PAC-4 to display the requirements of Appendix G in a sequential manner given the complexity of the overall project. (SMS)	Response accepted. Comment closed.
Section 10, Table PAC-6, Appendix G requires this table display benefits in project document, benefits last reported to Congress, and benefits based on reevaluation. Revise table to correspond to these requirements and summarize changes in narrative.	Table has been revised according to Appendix G requirements. (SMS)	Response accepted. Comment closed.
Section 10, Table PAC-6, Footnote 1 - revise to delete MCACES reference and replace with accurate cost estimate description.	The footnote has been revised to state: "First costs for the GRR Recommended Plan are screening-level cost estimates that will be refined for the final version of this report. Values are in October 2014 prices using 3.375% discount rate, unless otherwise noted." (SMS)	Response accepted. Comment closed.

Section 11, Text is inconsistent with Appendix G requirements. Revise for consistency.	The section has been revised to state: "Table PAC-6 above shows the benefit-to-cost ratio of the Recommended Plan. It also shows a comparison of the benefit-cost ratios for the Recommended Plan and the authorized project updated to current price levels and the current discount rate. The estimated total annual costs and annual benefits are calculated at a discount rate of 3.375 percent, over a 50-year period of economic evaluation.	Response accepted. Comment closed.
Section 13, PAC-7, label consistent with Appendix G requirements.	Table has been modified. WRDA 96/99 work has been separated from Natomas PAC features. (DPT)	Response accepted. Comment closed.
Section 14, This summary is inadequate to meet Appendix G requirements. Unclear why summary effects table was deleted since remaining text does not adequately replace it. No discussion of the status of the NEPA document is included.	This section has been revised to include the environmental effects of the recommended plan and the status of the NEPA document. (SMS)	Response accepted. Comment closed.

ATTACHMENT B

ENVIRONMENTAL/CULTURAL

DISTRICT QUALITY CONTROL CERTIFICATION
AMERICAN RIVER COMMON FEATURES PROJECT
GENERAL REEVALUATION REPORT
ENVIRONMENTAL IMPACT STATEMENT/
ENVIRONMENTAL IMPACT REPORT
SACRAMENTO COUNTY, CALIFORNIA

COMPLETION OF QUALITY CONTROL ACTIVITIES

The District has completed review of the draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the American River Common Features Project General Reevaluation Report for the Draft Report Milestone. Products reviewed include the draft EIS/EIR and appendices. Certification is hereby given that all quality control activities defined in the Project Review Plan appropriate to the level of risk and complexity inherent in the product have been completed. Documentation of the quality control process is enclosed.

GENERAL FINDINGS

Compliance with clearly established principles and procedures has been verified. This includes assumptions, methods, procedures and materials used in analyses; the appropriateness of data used and level of data obtained; and the reasonableness of the results, including whether the product meets consistency with law and existing Corps policy. All appropriate District Quality Control comments have been incorporated into the EIS/EIR. Outstanding comments remain on the draft Clean Water Act Section 404(b)(1) Analysis and the draft biological assessment which will be resolved prior to the final EIS/EIR. The undersigned recommends certification of the quality control process for this product.

Tanis J Toland

Tanis J. Toland
Quality Control Reviewer

2/19/15
Date

QUALITY CONTROL CERTIFICATION

As noted above, all issues and concerns resulting from technical review of the product have been resolved. The project is recommended to proceed to policy review at South Pacific Division.

Alicia E. Kirchner
Acting Chief, Environmental Resources Branch

2.24.15
Date

American River Common Features – EIS/EIR – DQC (Toland) January/February 2015

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
1	cover	Updated report date on cover and throughout document. Also check captions on cover. Some words appear to disappear into the picture.	Completed on 1/28	Comment Closed
2	cover	The cover sheet is missing This is required for an EIS (CEQ 1502.11).	Concur, added the cover sheet on 2/1.	Comment Closed
3	Section ES-9, last bullet	USACE is moving away from the phase (and concept) "flood control" unless it is part of a name. "Flood risk management" is currently the preferred language. Maybe "structural flood risk management structures" or "flood management structures"?	Concur. Updated this bullet to read: "Conversion of private property to flood risk management features."	Comment closed
4	list of appendices	In the files provided for review, there is an Appendix H, Phase 1 Environmental Site Assessment. Please add this appendix to the list of Appendixes in the table of contents.	Completed on 1/27	Comment closed
5	Section 1.4.5	Here or elsewhere in the document, describe very clearly (in plain English) what assumptions were made regarding vegetation for purposes of the NEPA analysis.	This section has been reworked for clarify on 2/2. Rewrote and tried to clarify that the SWIF is not a part of the action alternative.	Open – 2/4/15 * The rewrite of this section greatly improves its clarity. * I still have some concerns about how the variance and SWIF are described and evaluated in the NEPA document. For example the following text indicates that the SWIF is part of the project: "While the SWIF agreement is assumed as part of the project

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
				action, implementation of the SWIF is a non-Federal action; therefore any environmental compliance required would be completed by the LMA as part of their O&M implementation." Is the SWIF really part each of the action alternatives, including the preferred action, or is it actually part of the no action/future without project condition and, therefore, is described in the No Action Alternative? NEPA requires that consideration of a reasonable range of alternatives. This includes alternatives that could be implemented by another entity (CEQ 40 Questions, #2). If, in fact, the SWIF is an integral part of the each of the alternatives, including the preferred alternative (TSP), than it must be evaluated within this EIS/EIR regardless of who implements it. * Under the ESA, will the SWIF be included in the consultation? Comment Closed – 2/5/15

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
6	Section 1.4.5, 4th paragraph	In Chapter 2.0 Alternatives, under "Future without Project" the veg plan in the States CVFPP is called "Levee Vegetation Management Strategy." Consider adding this language and note that this is sometimes referred to as "life cycle management."	Concur. This has been updated as recommended on 2/2.	Comment closed
7	Section 1.6	Per 40 CFR §1508.20, mitigation includes avoiding, minimizing, rectifying, reducing or compensating for impacts. Do you mean that mitigation measures would be implemented to avoid, reduce, and compensate for impacts to the environment?	Updated this sentence to use the term "compensate" instead of "mitigate".	Comment closed
8	Section 3.3.4	Consider using some of the explanation you provided in response to Josh's comments and incorporate it into the section that specifically addresses the Veg variance. Perhaps something like: "A SWIF is an agreement between X&Y that allows a project to defer ETL compliance so that the non-Federal project sponsor can address the compliance issues as a part of their O&M actions. The SWIF is not part of the action and is not analyzed or incorporated into the analyses presented in this draft EIS. This information is provided to help the reader understand the overall context."	Updated Section 1.4.5 for clarity regarding the SWIF/variance agreements on 2/2.	Comment Closed

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
9	Section 3.6.2, Methodology	Consider incorporating assumptions regarding vegetation (ETL and SWIF) into this methods section and also into the earlier section focused on the Vegetation ETL. What assumptions were used in the analysis? Did the impact analysis assume that a veg variance would be approved and, therefore, all veg on the lower part of the waterside levee slope and the 15' waterside veg free zone would remain unless removal was required to construct new flood risk management structures? Is this construction impact vs long term O&M impact quantified? Same suggestion for the SWIF.	Updated this section to include more discussion about vegetation compliance assumptions on 2/2. Rewrote and tried to clarify that the SWIF is not a part of the action alternative.	Open – 2/4/15 Much clearer. This language is somewhat different from what is used in section 1.4.5. Here you state: "The ARCF GRR project description (Section 2.0) assumes that the variance and SWIF agreements are both in place to address the requirements of ETL 1110-2-583." Are the variance and SWIF assumed to be part of the project description or are they assumed to be part of the No Action Alternative/future without project condition? Comment Closed – 2/5/15
10	Section 3.6.3, 3rd paragraph	Need to clarify that the variance would need to be approved.	Recommended changes were applied 1/31. This paragraph was moved to Section 1.4.5 and was updated to further discuss the variance request/approval process.	Open 2/5/15 Comment Closed – 2/5/15
11	Section 3.6.4	Based upon this sentence, it looks like the impact analysis assumed that the project would be approved for a vegetation variance and, therefore, did not analyze potential impacts that would be associated with implementation of the vegetation free zones required by the ETL. Recommend stating this, in the earlier section on the Vegetation ETL. Include the rationale for making this assumption.	Clarified the language here, and included the rationale for assuming that a variance and SWIF are reasonable in Section 1.4.5. Added a reference to Section 1.4.5 in this discussion.	Comment closed

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
12	Section 3.6.6, American River, 3rd paragraph	ER 1105-2-100 requires cost effectiveness and incremental cost analysis mitigation planning and justification.	Prior to the Final Report and in addition to ESA requirements, the recommended general habitat mitigation costs will be based on the feasibility-level design and a CE/ICA using an approved/certified habitat quality model.	Comment closed
13	Section 3.8.1, Existing Conditions	Add the most current date consistent with the lists in the Appendix.	Concur. This has been updated to reflect the new lists compiled in January 2015.	Comment closed
14	Section 3.8.1, valley elderberry longhorn beetle, paragraph 2	USFWS withdrew their proposed rule to remove the VELB from the Endangered Species list on September 17, 2014, Federal Register Vol 79, No 180:	Concur. The paragraph discussing the potential delisting was deleted.	Comment closed
15	Section 3.8.4, valley elderberry longhorn beetle, paragraph 1	Since the project has not be authorized or funded, all NEPA states are, by convention, are expressed in conditional language (i.e., would instead of will).	Concur. Updated this paragraph.	Comment closed
16	Section 3.8.4, valley elderberry longhorn beetle, paragraph 3	Do you have a citation for this? If so, please include it here.	There is no citation. Updated the text to read "several decades" rather than 25 years.	Comment closed
17	Section 3.8.6, valley elderberry longhorn beetle, paragraph 3	Recommend using narrative descriptions rather than mathematical symbols in the NEPA document. This would make the information available to a wider audience.	Completed on 1/27	Comment closed

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
18	Section 4.1, paragraph 2	What about cumulative affects related to conversion of open space and agricultural lands to urban and industrial uses?	There is no conversion of open space/agricultural lands to urban and industrial uses associated with this project. There are three change in land use situations: 1) Magpie Creek, where a parcel is being acquired for a "flood basin". This parcel is being acquired as a flood easement, but there are no measures being implemented there – the land is open space that currently floods, and it will remain the same. 2) Bypass expansion. The current land use is agricultural (rice fields). Negotiations with the landowners has not occurred yet, but there is the possibility that the rice fields could remain in production inside of the new bypass levee. If not, then the rice fields will become open space/wetland/flood plain habitat. 3) Takings in the pocket where homes are being turned into levee/flood management structures. From a land use perspective this is minimal effect, on the edge of the community.	Comment closed
19	Section 4.1.1, Methodology	40 CFR §1508.7 states that: "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."	Updated to include this specific language.	Comment closed

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
20	Section 4.1.1, Basis of Significance	Recommend rewriting this sentence to improve clarity. Which Federal and State mandates and are these different from "specified criteria" used to "evaluate project specific impacts"?	Reworked this to clarify on 2/3.	Comment closed
21	Section 4.1.1, Geographic Scope	Unclear	Rewrote: The related projects that are considered may also vary under each environmental resource section depending on the type of environmental effects that may result from these projects.	Comment closed
22	Section 4.1.2	You may wish to incorporate this rationale into section 4.1.1.	Removed the last two sentences and moved up to Section 4.1.1.	Comment closed
23	Section 4.1.2, Bay Delta Conservation Plan	As of 16 January 2015, a supplemental Public Draft EIS/EIR will be circulated in 2015. Three is currently no schedule for the final EIS/EIR.	Updated 2/1	Comment closed
24	Section 4.2.3	And dams and their operation (you discuss Folsom in this section. Impacts associated with dams and their operation for flood risk management and water supply? Blockage of upstream spawning habitat. Amount, timing and quality (temperature) of releases.	Reworked the sentence indicated to focus less on levee projects, and more on the full range of projects. Folsom Dam projects & operations are discussed currently in this analysis. ARCF does not contribute to a cumulative effect on blockage of upstream spawning habitat.	Comment closed
25	Section 4.2.4, 3rd paragraph	Recommend you state, for each resource being evaluated, whether the proposed project would contribute to a cumulatively significant impact.	Concur. Ensured that each resource has a determination on 1/27.	Comment closed
26	Section 5.1, Clean Water Act	TOC and this section identify an Appendix containing the 404(b)(1) analysis. The appendix is not part of this review document.	Per our discussion on 1/27, the 404(b)(1) is still in progress and will be provided to you for review upon its completion.	Open – 2/4/15 Comment Closed – 2/5/15

#	Location	Comment	Response	Back-check (Toland) 2/4/15 & 2/5/15
27	Section 5.1, Clean Water Act, 4th paragraph	Does the PDT anticipate seeking a Section 404(r) Exemption (ER 1105-2-100) for this project? If so, the requirements outlined in ER 1105-2-100 need to be met.	The PDT does not anticipate seeking a Section 404(r) exemption.	Comment closed
28	Section 5.1, Fish and Wildlife Coordination Act	Recommend including the USFWS' draft recommendations and the Corps response to each of the recommendations in Chapter 6. I am not aware of a specific requirement for this, but it has been common practice in SPK-ERB for many years and helps to highlight FWCA compliance considerations for reviewers and decision-makers.	Will complete this for the final report milestone.	Comment closed
29	Section 5.1, EO 11988	Lower San Joaquin, Chapter 3, may reflect the most current thinking on how we handle the EO. It is different from the way we have customarily approached the analysis. Recommend you discuss with your Josh and your plan form lead just to be sure all parties are clear about how the ARCF project is approaching the EO. If AR CF is using a different approach than LSJ, we better have a solid rationale for the difference.	LSJ and ARCF have very different EO 11988 issues since the ARCF study area is largely built out and there is no significant new development proposed within the study area. The discussion in this section is consistent with how this EO is addressed in the GRR/policy document. No change has been made at this time.	Comment closed
30	Section 6.1.2	If you haven't addressed the final steps in the NEPA process (final EIS, 30 day final agency review, ROD and who signs, Congressional decisions), consider including here.	Concur. Added this discussion on 2/3.	Comment closed
31	Section 8.0	Title and Experience missing for Jessie.	Completed on 1/27	Comment Closed

DISTRICT QUALITY CONTROL CERTIFICATION AMERICAN RIVER COMMON FEATURES GENERAL REEVALUATION REPORT, SACRAMENTO COUNTY, CALIFORNIA

COMPLETION OF QUALITY CONTROL ACTIVITIES

The District has completed review of the draft EIS/EIR Cultural Resources sections for the American River Common Features General Reevaluation Report for the Tentatively Selected Plan (TSP) milestone conference. Products reviewed include the Cultural Resources Existing Conditions, Prehistoric, Ethnographic, and Historic Setting, Records and Literature Search, Archaeological Sensitivity Assessment, Alternatives Effects Analysis, Regulatory Setting and Compliance, and Cultural Resources Appendix. Certification is hereby given that all quality control activities defined in the Project Review Plan appropriate to the level of risk and complexity inherent in the product have been completed. Documentation of the quality control process is enclosed.

GENERAL FINDINGS

Compliance with clearly established principles and procedures, utilizing clearly justified and valid assumptions, has been verified. This includes assumptions, methods, procedures and materials used in analyses; the appropriateness of data used and level of data obtained; and the reasonableness of the results, including whether the product meets consistency with law and existing Corps policy. All appropriate DQC comments have been incorporated into this project. The undersigned recommends certification of the quality control process for this product.

Jane Rinck
Quality Control Reviewer

Date 1/30/14.

QUALITY CONTROL CERTIFICATION

As noted above, all issues and concerns resulting from technical review of the product have been resolved. The project is recommended to proceed to policy review by SPD.

E. Scott Clark
Acting Chief, Environmental Resources Branch

Date 30 Jan 2014

American River Common Features
DQC Review of Cultural Resources
Richard Perry
CESPK-PD-RC
October 11, 2013

All comments are suggestions which may be questioned, disputed, or even disregarded.

1. Page 133, Environmental Setting : this section should probably start with a more appropriate heading, e.g. **3.9.1 Cultural Resources**. In my Truckee Meadow EIS , I follow with Affected Environment – your page 141 two paragraphs (see comment 6), then Regulatory setting. The Regulatory setting should be more developed so that the uninformed reader understands why we are doing this. [See example below] Of course your sections should follow the standards established in the rest of the EIS.

Response: The sections for Cultural Resources are structured in accordance with the standards and formatting of the overall EIS. The comment is noted, however since the information on the regulatory setting is included later in the Cultural Resources Environmental Setting and in the regulatory specifics (Compliance with Applicable Laws, Policies, and Plans) regarding the NHPA starting on page 264, no changes to the current structure of the Environmental Setting section has been made to the EIS in regard to this comment, though additional language has been added to the laws compliance section as suggested. Added reference to ARFA in Environmental Setting and laws sections.

Backcheck:

2. Pages 134-135, In the Prehistoric and Ethnographic setting section, you have Nisenan ethnographic information in the middle of two prehistoric sections. Move the three final paragraphs to beginning of the section.

Response: Section revised as suggested.

Backcheck:

3. Page 135, paragraph 5: define or replace balanophagy

Response: Word defined and sentence now reads: "dependence on acorns and other stored food resources"

Backcheck:

4. Page 137, paragraph 2: Far Western should be Far Western Anthropological Research Group, Far Western thereafter. AECOMM should first be noted as AECOMM Technology Corporation.

Response: Changed as suggested.

Backcheck:

5. Page 138, paragraph 1: List the five sites in a table by site number and what kind of sites there were, and what the mitigation was.

Response: Paragraph edited to more accurately reflect the seven eligible sites, table added within text.

Backcheck:

6. Page 141, paragraphs 1 and 2 under APE should be in the Regulatory setting section.

Response: These paragraphs are needed as part of the discussion within this section to set up the process for completing the Sensitivity Assessment and PA and what area the project covers. The paragraphs have also been integrated into the "Compliance with Applicable Laws, Policies, and Plans" section later in the document.

Backcheck:

7. Page 146, final paragraph: the following sentence is awkward, "This produced three separate maps that each estimate archaeological sensitivity based on one environmental attribute". Instead I recommend saying "three separate maps which individually estimate…"

Response: Change made as suggested.

Backcheck:

8. Page 144, replace Past with Previous

Response: Change made as suggested.

Backcheck:

9. Page 153, paragraph 2: Because there would be no Federal undertaking under the No Action Alternative, no further action is required by the Corps. Delete ~~under the No Action Alternative.~~

Response: Change made as suggested.

Backcheck:

ATTACHMENT C

ENGINEERING – CIVIL

QUALITY CONTROL CERTIFICATE

Civil Design Section A, Engineering Division

PROJECT NAME: AMERICAN RIVER WATERSHED COMMON FEATURES PROJECT

PRODUCT: ENGINEERING APPENDIX FOR THE AMERICAN RIVER WATERSHED COMMON FEATURES PROJECT

Actual Completion Date: 11-Sep-13

PROJECT MANAGER: DAN TIBBITTS

Background:

District Quality Control was performed for the Engineering Appendix for the AMERICAN RIVER WATERSHED COMMON FEATURES PROJECT GRR. The review was of the report text for TSP Milestone DRAFT document.

The DQC review was documented in DrChecks and a report is attached showing the comments/responses.

CIVIL TECHNICAL LEAD

I have ensured that the above products were prepared in accordance with standard quality control practices. I have also incorporated or resolved all issues identified during District Quality Control (DQC) review.

Title: Civil Engineer Thomas M. Goebel, PE		1/29/14
Print name	Signature	Date

REVIEWERS

I have reviewed the products noted above and find them to be in accordance with project requirements, standards of the profession, and USACE policies and standards.

Title: Civil Engineer Markus Boedtker, PE		1/29/14
Print name	Signature	Date

RESOURCE PROVIDER

I have reviewed and resolved all critical and technical issues. I agree that project requirements, standards of the profession, and USACE policies and standards have been met.

Title: Civil Design Section A Section Chief Peter Valentine, PE		1.29.14
Print name	Signature	Date

Snapshot Report: Comment Category
Project: ARCF - General Reevaluation Report (GRR), TSP & Attachments, American River Common Features (ARCF), California (P2 #149827) **Review**: SPK-ED-DC DQC Engineering Appendix - Initial Review May 2013 (*00026*)
(sorted by Category, Value)

Design Discipline

Category Value	Comment			Evaluation				Backcheck		
	Total	Withdrawn	Pending	Concur	Check	Info	NonConcur	Pending	Closed	Open
Civil (CIV)	22	0	0	19	0	2	1	0	22	0
Total:	22									

Document Type

Category Value	Comment			Evaluation				Backcheck		
	Total	Withdrawn	Pending	Concur	Check	Info	NonConcur	Pending	Closed	Open
Total:	0									

No designer problems have been identified to date.

(*) *Denotes that review contains critical comments.*

Report Complete

Public / SBU / FOUO

Comment Report: All Comments
Project: ARCF - General Reevaluation Report (GRR), TSP & Attachments, American River Common Features (ARCF), California (P2 #149827)
Review: SPK-ED-DC DQC Engineering Appendix - Initial Review May 2013
Displaying 22 comments for the criteria specified in this report.

Id	Discipline	Section/Figure	Page Number	Line Number
5211884	Civil	n/a	Page 1	n/a

Comment Classification: **For Official Use Only (FOUO)**

In Paragrah 1.2 on Page 1, change "Natomas East Main Drain" to "Natomas East Main Drainage Canal (NEMDC)".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Text has been changed. Revised report will be provided.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 10 2013
Current Comment Status: **Comment Closed**

5211893	Civil	n/a	Page 2	n/a

Comment Classification: **For Official Use Only (FOUO)**

In the third paragraph on Page 2, change "NEDMC" to "NEMDC", and change "west" to "east". In the fifth paragraph, change "left" to "right". In Paragraph 1.4, add "Sacramento Area Flood Control Agency" before "SAFCA".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Text has been changed. Revised report will be provided.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Open Comment**
In the fifth paragraph, change "left" to "right" for the west bank of the PGCC.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 10 2013

2-0 Evaluation **Concurred**
Text has been changed. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 11 2013

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5211898	Civil	Figure 1-1 and Plate 3	n/a	n/a

Comment Classification: **For Official Use Only (FOUO)**

In Figure 1-1 and Plate 3, change the delineator between Reaches A and B to be further north.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Figure 1-1 has been changed. Will work with GIS section to make changes to Plate 3.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 10 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 10 2013
Current Comment Status: **Comment Closed**

5211902	Civil	n/a	Page 4	n/a

Comment Classification: **For Official Use Only (FOUO)**

In Paragraph 2.1 on Page 4, change "2" to "3". In Paragraph 2.3.1, change to "Hydraulic Design Section". In Paragraph 2.4.1, add "report are included in Attachment B - Geotechnical Report" to end of first paragraph.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
All changes have been made. Revised report will be provided.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 10 2013
Current Comment Status: **Comment Closed**

5211917	Civil	n/a	Page 5	n/a

Comment Classification: **For Official Use Only (FOUO)**

In Paragraph 2.4.3, change the last sentence of the first paragraph to state "...completed in the event a tree falls resulting in scouring of the root ball area." In the second paragraph, I disagree that the rootball width would only be the diameter of the trunk. I think the rootball will be at least twice the diameter of the trunk.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Fixed the first part. Please see revised report.

Regarding the root ball diameter, I checked with Mike Kynett and he confirmed this statement is accurate. He has had his report DQC'd and ATR'd and is confident in the statement.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 09 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 10 2013
Current Comment Status: **Comment Closed**

5211936	Civil	n/a	Page 8	n/a

Comment Classification: **For Official Use Only (FOUO)**

In the second paragraph, spell out "NFS". Replace "XXXX" with appropriate figure numbers in Paragraph 2.5.7.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
NFS has been spelled out but XXXX was removed-we are not going to show detailed figures for the RE footprints.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 10 2013
Current Comment Status: **Comment Closed**

5211951	Civil	n/a	Page 10	n/a

Comment Classification: **For Official Use Only (FOUO)**

In the third paragraph, check to see if the rock sizing is actually included in this report. I read the Hydraulic Appendix, and it is not included in there (and this is the most likely place it would be included).

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **For Information Only**

The PDT is preparing a separate appendix that will contain all aspects of erosion protection. When completed, I will provide for review.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 09 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Jan 29 2014

Current Comment Status: **Comment Closed**

5211956	Civil	n/a	Page 11	n/a

Comment Classification: **For Official Use Only (FOUO)**

In first paragraph, change "XX" to "1". In Table 1, spell out "EDR". Add missing text after "Lead in soil,". Add "East" between "Natomas" and "Main".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

Revised Jun 03 2013.

1-0 Evaluation **Concurred**

Checked original document and "lead in soil," is in the report. I removed the comma.

I removed reference to "EDR". It's an acronym for "Environmental Data Resources" and not necessary for the Engineering Appendix.

Other changes made. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 10 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013

Current Comment Status: **Comment Closed**

5212003	Civil	n/a	Page 14	n/a

Comment Classification: **For Official Use Only (FOUO)**

In the second paragraph, is the sponsor agreeing that there should be no O&M Cost for the floodwalls? In the fourth paragraph, change "Sac Bank" to "Sacramento River Bank Protection Project". In the last paragraph, it is unclear why the plant establishment is not extended to 5 years now. Also, are the costs for the plantings also included?

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**

The LMA's (MA-9 and ARFCD) were consulted on additional costs for OMRR&R and agreed the additional floodwall would be a minimal (negligible) impact on costs.

Sac Bank changed.

Discussion on plant establishment has been removed. It's not necessary for the Appendix.

Please see revised appendix.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013

Current Comment Status: **Comment Closed**

5212005	Civil	n/a	Page 15	n/a

Comment Classification: **For Official Use Only (FOUO)**

In Paragraph 2.10, change last sentence to "... for the alternatives."

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**

Section number has changed this paragraph to 2.9.1 and correction has been made. Revised report will be provided.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013

Current Comment Status: **Comment Closed**

5212012	Civil	n/a	Page 16	n/a

Comment Classification: **For Official Use Only (FOUO)**

In second paragraph in Paragraph 3.1, delete second sentence (repeat of first).

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Correction made. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5212023	Civil	n/a	Page 18	n/a

Comment Classification: **For Official Use Only (FOUO)**

In the second paragraph of Paragraph 3.4, add that the seepage and stability remediation for the reach between the NEMDC North and the Arden-Garden Connector Bridge will be constructed by the WRDA 99 project in 2014.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Text added. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5212026	Civil	n/a	Page 19	n/a

Comment Classification: **For Official Use Only (FOUO)**

In the second paragraph on Page 19, change "varies" to "various". In the third paragraph, move "waterside" to follow "3H:1V", and add "landside" after "2H:1V".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**

This paragraph is now on page 20. The corrections have been made. Revised report will be provided.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013

Current Comment Status: **Comment Closed**

5212028	Civil	n/a	Page 21	n/a

Comment Classification: **For Official Use Only (FOUO)**

In the second paragraph of Paragraph 4.1, change "anymore" to two words, and add "government" after "federal".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**

Revised paragraph to the following:

The no-action alternative does not include any additional features for this project. As such, there is no cost estimate or additional description provided in this Appendix.

I don't see any point in dwelling on the impact of no action.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013

Current Comment Status: **Comment Closed**

5212060	Civil	n/a	Page 22	n/a

Comment Classification: **For Official Use Only (FOUO)**

Figure 2 shows the rock protection only to the existing waterside bench, whereas the cross-sections on Plates 1 and 2 show the rock protection all the way up to the levee crown. Please reconcile.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**

Only figures within report will be included in final appendix (no plates showing details). Added both details as figures and revised the text slightly to (hopefully) clarify when they're used. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5212066 Civil n/a Page 25 n/a

Comment Classification: **For Official Use Only (FOUO)**

On Figure 4, include the new and existing cutoff walls in the section.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Non-concurred**
We have left off the existing cutoff walls as they are not discussed in detail in our report and may add confusion. The existing cutoff wall also has no bearing on design or construction of proposed project.

The proposed cutoff is left off Figure 5 since it is not always present where height fixes are required.

Figure 4 (now 5) title has been changed to "...Levee Raise Typical Section". Figure 6 was added that is actually the Cutoff Wall Typical Section.

We originally had them both together but realized there are areas where they exist independently.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 10 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5212070 Civil n/a Page 26 n/a

Comment Classification: **For Official Use Only (FOUO)**

On Figure 5, include that there are existing railroad tracks on top of the crown, which need to be removed and replaced during construction.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **For Information Only**

Upon further consideration of your comment, we realize we didn't include costs for the relocation of the railroad with the preliminary estimates.

We concur they should be added and costs properly added for the relocation.

It is acceptable to not include costs for the preliminary design/costs since the costs would be relatively small (to overall project costs) and would impact both alternatives similarly.

We will add this detailed information to the feasibility design and cost estimate (for the ADM milestone).

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 10 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013

Current Comment Status: **Comment Closed**

5212079 Civil n/a Page 30 n/a

Comment Classification: **For Official Use Only (FOUO)**

In the first paragraph, change "varies" to "various". In the second paragraph, has there been a decision whether the preferred alternative is floodwall or levee raise for Magpie Creek?

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**

Text changed (now first paragraph p. 31). The features for Magpie are consistent with 2003 Corps Magpie Creek project. A levee raise is used.

I removed the text related to previous (SAFCA) studies and added text related to our designed features.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013

Current Comment Status: **Comment Closed**

5212085 Civil n/a Page 33 n/a

Comment Classification: **For Official Use Only (FOUO)**

Change Paragraph "4.2" to "4.3".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Correction made. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5212091	Civil	n/a	Pages 34 and 35	n/a

Comment Classification: **For Official Use Only (FOUO)**

Delete references to Truckee Meadows project, and replace with ARCF GRR.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Change made. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5212097	Civil	n/a	Pages 37	n/a

Comment Classification: **For Official Use Only (FOUO)**

In Paragraph 6.2.3, replace "XXX" with "Plates 1 through 3".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
This section has been revised by cost engineering. The "XXX" no longer exists. Please see revised report.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 06 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

5212104	Civil	n/a	Plates 1-3	n/a

Comment Classification: **For Official Use Only (FOUO)**

Add "Plate X" to Plates 1 through 3 as appropriate. On Plate 3, delete Reaches A and I as requiring remediation.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jun 03 2013

1-0 Evaluation **Concurred**
Will be working with GIS section ASAP to complete these changes. Will provide as soon as available.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Sep 10 2013

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Sep 11 2013
Current Comment Status: **Comment Closed**

ATTACHMENT C-1

ENGINEERING – HYDROLOGY

WATER MANAGEMENT SECTION
CERTIFICATION FOR AGENCY TECHNICAL REVIEW

American River Common Features Project General Reevaluation Report
Placer, Sacramento, Sutter Counties, California
Synthetic Hydrology Technical Documentation, Sacramento District
September 2008, Revised January 2009

GENERAL FINDINGS

Compliance with clearly established policy, principles, and procedures, utilizing clearly justified and valid assumptions, has been verified for the subject project. This includes assumptions; methods, procedures and materials used in the analyses; the appropriateness of data used and level of data obtained; and the reasonableness of the results, including whether the product meets the customers' needs consistent with law and existing Corps criteria and policy.

I certify that an agency technical review of the project indicated above has been completed and all technical issues have been identified and resolved. I recommend certification that the quality control process has been completed.

In accordance with CESPD R 11 10-1-8, South Pacific Division Quality Management Plan, May 2000, this letter certifies that the without-project hydrology is appropriate as the basis for use in the hydraulic analysis for the American River Common Features Project General Reevaluation.

Laurine L. White — 26 Jan 2009
Laurine L. White
Hydrologist, SPK
Date

James Chieh — 1-26-2009
James Chieh
Independent Technical Reviewer
Date

John M High — 1-26-2009
John M. High
Chief, Water Management Section, SPK
Date

HYDROLOGY SECTION
CERTIFICATION FOR AGENCY TECHNICAL REVIEW

American River Common Features Project General Reevaluation Report
Appendix B, Dry and Arcade Creeks Flow Frequency Curves
And Synthetic 8-Flood Series Hydrographs
Upstream of Steelhead Creek, Sacramento District
November 2009, Revised January 2010

GENERAL FINDINGS

Compliance with clearly established policy, principles, and procedures, utilizing clearly justified and valid assumptions, has been verified for the subject project. This includes assumptions; methods, procedures and materials used in the analyses; the appropriateness of data used and level of data obtained; and the reasonableness of the results, including whether the product meets the customers' needs consistent with law and existing Corps criteria and policy.

I certify that an agency technical review of the project indicated above has been completed and all technical issues have been identified and resolved. I recommend certification that the quality control process has been completed.

In accordance with CESPD R 11 10-1-8, South Pacific Division Quality Management Plan, May 2000, this letter certifies that the without-project hydrology is appropriate as the basis for use in the hydraulic analysis for the American River Common Features Project General Reevaluation.

Laurine L. White — 19 January 2010

Laurine L. White
Hydrologist, SPK

James Chieh — 20 January 2010

James Chieh
Independent Technical Reviewer

John M. High — 19 JANUARY 2010

John M. High
Chief, Hydrology Section, SPK

ATTACHMENT C-2

ENGINEERING – HYDRAULICS

QUALITY CONTROL CERTIFICATE

Hydraulic Design/Analysis Section, Engineering Division

PROJECT NAME: AMERICAN RIVER COMMON FEATURES (ARCF) GENERAL RE-EVALUATION STUDY
PRODUCT: HYDRAULIC APPENDIX TO SUPPORT FINAL ARRAY OF ALTERNATIVE FOR ACRF STUDY
Actual Completion Date: 16-Aug-13

PROJECT MANAGER: DAN TIBBITTS

Background: [Include project description, technical products, and review methodology]

District Quality Control was performed for the American River Common Features General Re-evaluation Study on the Hydraulic appendix to support the final array of alternatives for the feasibility study.

The purpose of this document is to present the summary of hydraulic analyses conducted to support the American River Common Features General Re-evaluation Report (ARCF GRR) Study. This is an executive report of what has been traditionally know as a hydraulic appendix. A collection of technical memorandums (see table below) containing the detailed information typically found in a full version of the hydraulic appendix have been assembled as an office report for reference here at the District. This executive report has been prepared to meet the intention of the new Planning Modernization that USACE has undertaken.

The ARCF study area includes generally the entire Sacramento metropolitan region. The project area being considered for flood damage reduction can be divided up into three basins – Natomas, American River North, and American River South.

Both Flo2D and HECRAS models were used for this effort.

Models and Technical Memorandums Supporting the ARCF Hydraulic Appendix
Hydraulic Models
HECRAS 1-D Hydraulic Model
FLO2D 2-D Hydraulic Model
Technical Memorandums
Sacramento Basin HEC-RAS Phase I Model Development
Sacramento Basin HEC-RAS Phase II Model Development
Sutter Basin HEC-RAS Model Conversion
Datum Conversion
Downstream Boundary Conditions
Gages
Hydrologic Inputs (.dss files)
Highwater Marks
FDA Inputs
FLO-2D Floodplain Mapping Documentation
Levee Breach Sensitivity
Climate Change
Systems Risk and Uncertainty
Interior Drainage
Upstream Alternative Analysis
Calibration

HYDRAULIC LEAD

I have ensured that the above products were prepared in accordance with standard quality control practices. I have also incorporated or resolved all issues identified during District Quality Control (DQC) review.

Title: Jesse Schlunegger	Jesse Schlunegger	8-16-2013
Print name	Signature	Date

REVIEWERS

I have reviewed the products noted above and find them to be in accordance with project requirements, standards of the profession, and USACE policies and standards.

DQC Reviewer: Lea Adams	Title: Hydraulic Analysis Section Chief and Senior Hydraulic Engineer	
	Digitally signed by ADAMS.LEA.G.1293647972 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.LEA.G.1293647972	8/19/13
Print name	Signature	Date

RESOURCE PROVIDER

I have reviewed and resolved all critical and technical issues. I agree that all project requirements, standards of the profession, and USACE policies and standards have been met.

Section Chief: Lea Adams	Digitally signed by ADAMS.LEA.G.1293647972 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ADAMS.LEA.G.1293647972	8/19/13
Print name	Signature	Date

American River Watershed Common Features General Re-evaluation Report Study

SPK HYDRAULIC ANALYSIS SECTION
DISTRICT QUALITY CONTROL REVIEW

DRAFT HYDRAULIC APPENDIX
DATED FEBRUARY 25, 2013

Reviewer: Lea Adams, P.E. SPK Hydraulic Analysis Section
Review Date: 25 February 2013
Response Date: 19 March 2013
Backcheck Date: 22 March 2013
Response Date: 8 May 2013
Backcheck Date: 12 May 2013

The following describes SPK District Quality Control (DQC) performed for the report noted above.

Responder Comments
Blue – Comment is ready for Backcheck
Dark Blue – 2nd Response to Comment.
Red – Comment needs Discussion or more work to resolve

No.	Date	Notes
1.	Comment	Table 1-1, Line 2, Deliverable Column: The phrasing indicates more of an action or assumption than a deliverable. Is the deliverable the three final alternatives? And is "reduction and combination of many features" an assumption that was used to create those final alternatives?
	Response	Text in the table was clarified. Much of the text was moved from the 1st column to the 2nd, with the deliverable now being called the "Evaluation of final three alternatives (HECRAS).
	Back-check	Comment closed.
2.	Comment	Section 2.2, para. 4: The last sentence in this paragraph states that the economic evaluation was based on comparison of alternatives to the future without-project condition, but the third bullet above states that hydraulic impacts were based on the 1986 condition. Why are these different? Need to add some clarification in the text.
	Response	Text has been clarified along with a specific reference added.
	Back-check	Comment closed.
3.	Comment	Section 3.1, para. 2: Second to last sentence states that the project RAS model covers the same extents as the UNET model, with exception of two areas. Please clarify whether these two

		areas were *added* or *removed* from the RAS model.
	Response	Text was added to clarify process.
	Back-check	Comment closed.
4.	Comment	Plate 57 – The PDF file titled "Plate_57_ARCF…" is actually numbered Plate 56. Suggest checking all plates to make sure they are numbered correctly.
	Response	Agreed, this plate will be changed and all the plates will be checked.
	Back-check	Comment closed.
5.	Comment	Section 3.2 – Please add a reference to a specific section rather than referencing "as discussed earlier".
	Response	This sentence was removed as the content was covered already in the paragraph.
	Back-check	Comment closed.
6.	Comment	Section 3.3.1 – Please add a sentence or two describing how the average reach stage uncertainty was determined.
	Response	Text added with additional description along with references.
	Back-check	Comment closed.
7.	Comment	Section 3.3.2 – I don't follow the logic of calibrating to the 1997 event but not validating to it because of levee breaches. Different events should be used to calibrate and validate model results – levee breaches are irrelevant. Secondly, the text implies that the 2006 event was used to both calibrate and validate the model. Is this the case, or was the 2006 event only used for validation?
	Response	Text added to clarify calibration and validation.
	Back-check	Distinction between calibration and validation still isn't clear – please add text to clarify.
	Response	Updates made after additional coordination, sections were combined and text refined.
	Back-check	Comment closed.
8.	Comment	Section 3.3.2 – Please note whether there were any significant physical changes to the system between 1997 and 2006, and whether these were considered for the validation effort.
	Response	Text added with differences in physical changes between 1997 and 2006 events.
	Back-check	Comment closed.
9.	Comment	Section 3.4, para. 1 – Please note why the baseline to determine if a levee needs to be raised was set at the 200-yr plus 3 feet.

	Response	Text added with additional description along with references.
	Back-check	Comment closed.
10.	Comment	Section 3.4, para. 2 – How is the first sentence of this paragraph relevant to the remainder of the paragraph?
	Response	The text that was added based on previous comment (9), connects the first sentence to the paragraph.
	Back-check	Needs a transition sentence to make connection more clear.
	Response	Transition sentence added, and the paragraph was broken up into two paragraphs along with refinement.
	Back-check	Comment closed.
11.	Comment	Section 4.1 – This section needs to be edited to follow a more logical flow. Example from Para. 1: Does the reference to more information on upstream storage features in TM 18 refer to upstream *transitory* storage? Or was this a separate measure considered as part of the with-project alternatives? Example from Para. 2: Fix in place is first mentioned here, but in para. 1, the document noted that the alternatives generally fell into four categories, of which FIP isn't one.
	Response	This section has been updated to allow for a more logical flow, along with references to other parts of the feasibility report.
	Back-check	Need to make distinction between measures to reduce consequences vs measures to reduce probability of flooding, then focus discussion on the probability side of the equation.
	Response	Text has been refined further after coordination.
	Back-check	Comment closed.
12.	Comment	Section 4.2, para. 1 – The Alt 1 label is 'Fix Levees in Place', but the second sentence states that the alternative also includes adjacent levees. This appears to be contradicted in sentence 5, which states that Alt 1 proposes fix in place levee remediation. Need to describe features in Alt 1 consistently.
	Response	Reference to adjacent levees was removed, except when referring to what was done as part of the Natomas PAC. Text has been refined further after coordination.
	Back-check	Comment closed.
13.	Comment	Section 4.2, para. 1 - The text states that the NPACR established a wide range of levee improvements, while the ARCF GRR only considered height deficiencies. Need to show connection between these two efforts. Does the ARCF GRR only evaluate height deficiencies *because* the NPACR addressed everything else?

	Response	Agreed, text added to clarify relationship of two reports.
	Back-check	Comment closed.
14.	Comment	Section 4.2, para. 3 – Don't see the "the water surface elevations for the three final alternatives… and the 1986 baseline for both the 10-year and the 200-year events" on Plates 14-25. The plates also appear to only go through 24. Also, which 'three final alternatives' does the text refer to and why are they referred to in this section (Alt 1)?
	Response	Changed Plate Reference to correct set of plates. As part of updates from comment 13 above, also explained final alternatives in section 4.1.
	Back-check	Plate reference comment closed. Remainder of section needs work – reverse organization of 1st para. from detailed to big picture; need consistent description of fix-in-place – does it include levee raising or not, does it include landside fixes or not?
	Response	Paragraphs have been re-arranged to help with the flow of information.
	Back-check	Comment closed.
15.	Comment	Section 4.2, para. 4, last sentence – Please define 'This' more explicitly. Levee raising? Erosion repair?
	Response	'This' = 'Erosion'. Text has been updated.
	Back-check	Comment closed.
16.	Comment	Table 4-1 – Not sure what the Height column refers to – the amount of height the levee must be raised, or the current height of the levee? Also not sure what the summation of the Height column means.
	Response	Will need to check in with you on this. I changed the Column Title as both sets of information refer to length of levee. One is total length and the other is length of levee needing repair.
	Back-check	Column titles now make sense. Comment closed.
17.	Comment	Section 4.2.1 – Please provide some indication of where Magpie Creek is in the project area, either via the text or preferably via a graphic.
	Response	Reduced detail of Magpie Creek to a small paragraph and added a Reference.
	Back-check	How does Alt 1 relate to Magpie Creek?
	Response	Improvement to Magpie is part of Alt 1, but lack the definition of features. More text was added to describe the connection and explain why it is specifically called out.

	Back-check	Comment closed.
18.	Comment	Section 4.3, para. 2 – Was the weir *width* varied between 500-3000 feet, or was the weir width *expanded* by 500-3000 feet? Please confirm and edit text if necessary.
	Response	Agreed, text edits made to clarify that the weir was expanded.
	Back-check	Comment closed.
19.	Comment	Section 4.4 – Was the Sacramento Bypass/Weir widened by 1500 feet for Alt 3 also, or was a different expanded width used? Please state explicitly in text.
	Response	Text was added to explicitly state what assumption was used.
	Back-check	Comment closed.
20.	Comment	Section 5.2, para. 1 – The terminology 'close enough' is unclear – close enough to what? Suggest reworking this sentence to improve clarity.
	Response	Conclusions were revised based on latest version of TM.
	Back-check	Comment closed.
21.	Comment	Table 5-1 – This table is a bit confusing. Isn't Table 5-2 an expanded version of Table 5-1? If so, can Table 5-1 be deleted? Also, add a sentence defining what 'X' is in Table 5-2.
	Response	Table 5-1 was deleted and Table 5-2(now just 5-1) had changes made to clarify.
	Back-check	Comment closed.
22.	Comment	Section 5.3 – This section is labeled 'Floodplain Sensitivity' but primarily discusses breach hydrograph sensitivity. Suggest reworking to focus on the effects of varying breach hydrograph parameters on the resultant floodplains, and why adjusted without-project floodplains can be used for certain with-project frequencies. Might also consider placing this section ahead of Section 5.2 because this analysis was done first.
	Response	The sensitivity in section 5.2 was different than section 5.3. The detail of why the floodplains can be substituted are now included in Section 5.2 as part of the edits based on Comment 21. Title of section was renamed.
	Back-check	Good to separate the two subjects. More clarification still needed on how the without-project floodplains were used as surrogates for the with-project floodplains.
	Response	This section was moved ahead of the with-project floodplains section.
	Back-check	Comment closed.

23.	Comment	Section 6, para. 2 – First sentences refers to Reference 8, but the documents in the Reference section aren't numbered. Please either reference by name, title or whatever is appropriate, or number the references. Ditto for References 5 and 14 later in the paragraph.
	Response	References added by name and date, so that they can be easily found in the References List.
	Back-check	Comment closed.
24.	Comment	Section 6.2 – Add clarification that peak stage data for all index points *for the 10- through 500-year events* was derived… since the next sentence states that 1- and 2-year event stage data was derived using a different process.
	Response	Text added.
	Back-check	Comment closed.
25.	Comment	Section 6.3.1 – Either reference a Tech Memo that has the details of how the hydraulic uncertainty was calculated or add that detail to this section.
	Response	Tech Memo Reference Added.
	Back-check	Comment closed.
26.	Comment	Section 6.3.1 – Please note why a different period of record was used for ARS E.
	Response	Values were taken from HEC Systems Risk Analysis, a possible answer was provided in the text.
	Back-check	Comment closed.
27.	Comment	Section 6.4 – Please note why the levee failure runs were done only using the with-project condition, and please state explicitly what the other two conditions are.
	Response	Corrections made, this section should reference the without-project condition.
	Back-check	Comment closed.
28.	Comment	Tables 6-3 through 6-7 – These tables raise more questions than they answer. For example, why do stages go up but flows go down between the without-project and future without-project conditions? Also, this is a lot of data that may be better presented in an appendix and discussed more generally in the body of the text. Suggest either relocating this info to an appendix or TM, or adding more text explaining the results.
	Response	Tables have been moved to Plates at the back of the main report. Text will be added discussing the results more generally.

	Back-check	Comment closed.
29.	Comment	Section 6.4.1 – Add reference to TM where this analysis is documented.
	Response	Reference added in this paragraph and in the overall list of references.
	Back-check	Comment closed.
30.	Comment	Table 6-8 – Why aren't performance statistics for existing without-project conditions included in this table?
	Response	Will need to discuss, only the Future-Without Project Condition was used to compare alternatives against. The paragraph before the table was edited to reflect this.
	Back-check	As discussed, please note why FWOP is the base condition.
	Response	Table 6-8(changed to 6-3 now) text added in paragraph preceding table to explain the conditions further.
	Back-check	Comment closed.
31.	Comment	Section 6.5, para. 3 – The last sentence of this para. states that "current existing conditions serve as the baseline" for evaluating alternatives, while Section 2.2 notes that 1986 conditions are the baseline for hydraulic impacts and the future without-project conditions are the baseline for evaluation of alternatives. These seem potentially contradictory – please clarify.
	Response	This sentence was removed. As noted in the comment the baseline was explained in Section 2.2.
	Back-check	Comment closed.
32.	Comment	Section 6.7 – Add 1-2 sentences describing the failure methodology assumption. It is noted that this is the most significant assumption, but it isn't clear exactly what was assumed.
	Response	Section 3.5 was expanded to include the key levee break assumptions and not just the breach width. Section 6.7 was then updated to include references to this section.
	Back-check	Comment closed.
33.	Comment	Section 6.7 – The info in this section is closely related to the info in Section 6.5. Suggest either moving this info into Section 6.5 or moving up to Section 6.6 so that the connection is clear.
	Response	Section 6.7 was moved to become Section 6.6.
	Back-check	Comment closed.
34.	Comment	Section 6.8.1, para. 2 – Define "this analysis" more explicitly. ARCF GRR analysis? Or something else?

	Response	Recommended Terminology was added along with several revisions to the paragraphs for clarity.
	Back-check	Comment closed.
35.	Comment	Section 6.8 – Much of the info in this section is nearly identical to that presented in Section 6.5, in terms of approach and performance metrics. The difference must be that Section 6.8 is addressing *system-wide* impacts. Suggest making this more clear in the text by using 'system-wide' terminology or equivalent more frequently.
	Response	Recommended Terminology was added along with several revisions to the paragraphs for clarity.
	Back-check	Comment closed.
36.	Comment	Section 7.1, para. 1 – This sentence is unclear in the context of a selected alternative and remaining residual risk: "Many of the large rivers in the study area have features in place to reduce the risk of flooding from those sources." Are the 'features in place' the same as the selected alternative, and does the 'risk of flooding' actually refer to the residual risk of flooding?
	Response	Text added to this paragraph to clarify.
	Back-check	Comment closed.
37.	Comment	Section 7.1, para. 2 – The connection between flow through the Sankey Gap and residual flooding in the Natomas Basin is not entirely clear. The current text states that water ponds on the northeastern edge of the basin – is this inside or outside the basin? And does the water move in or out of the basin through the Sankey Gap? Need clarification in the text.
	Response	Clarification text added, will also add some information to the plate to better show where Sankey Gap is.
	Back-check	Still needs a transition sentence and revisions for clarity.
	Response	Section 7.1 was revised.
	Back-check	Comment closed.
38.	Comment	Section 7.1 – It appears that only the 500-year floodplains were used to evaluate residual risk. Is there residual risk for more frequent flood events? Or put another way, why was the 500-year event selected? Also, does the residual risk vary much between the three alternatives?
	Response	Text added to clarify and explain what was done and why.
	Back-check	Comment closed.

38.	Comment	Section 7.1 – It appears that only the 500-year floodplains were used to evaluate residual risk. Is there residual risk for more frequent flood events? Or put another way, why was the 500-year event selected? Also, does the residual risk vary much between the three alternatives?
	Response	This appears to be a duplicate comment.
	Back-check	Correct – N/A.
39.	Comment	Section 7.2 – Suggest reorganizing this section more clearly around the current alternatives and specifically citing the risk transfer policies that are applicable to each alternative. Delete quote and paraphrase instead if needed to support our approach; add MFR to references if it's not already there.
	Response	Paragraph reworded and quote removed, and references added.
	Back-check	Comment closed.
40.	Comment	Section 7.3 – Suggest switching the order of paragraphs 2 and 3, as the hydraulics and floodplains are generated first, followed by the economic analysis.
	Response	Paragraphs switched.
	Back-check	Comment closed.
41.	Comment	Section 7.5, last para. – Please clarify text in the last sentence that states "this profile". Which profile?
	Response	Text and reference added to clarify.
	Back-check	Comment closed.
42.	Comment	Section 7.6, para. 3 – Please note a reference for the 'climate change study'. Was this the work done for Sutter, or something else?
	Response	Academic Paper is referenced here and added to overall list of references.
	Back-check	Comment closed.
43.	Comment	Section 7.6, para. 1 – Sea level rise is referenced here, but discussed in more detail in a separate section. Suggest either 1) noting that it is discussed in a later section, or 2) removing this reference and emphasizing that hydrologic changes due to climate change were evaluated in this section.
	Response	This reference was removed.
	Back-check	Comment closed.

44.	Comment	Table 7-1 – Since Tables 7-2 and 7-3 explicitly reference changes in regulated flows, are the values in Table 7-1 unregulated flows? If so, please note.
	Response	Text added for clarification.
	Back-check	Not quite consistent.
	Response	Paragraphs before and after Table 7-1 were edited.
	Back-check	Comment closed.
45.	Comment	Section 7-6, para. 4 – Are the 3 to 3.5 foot levee raises at Verona in response to expected climate change additional levee raises beyond what is currently defined for the GRR?
	Response	Text added to clarify.
	Back-check	Comment closed.
44.	Comment	Section 7-6, para. 4 – Is the comprehensive study referenced in this paragraph a climate change study? If not, need to expand description to make its relevancy to this section clear.
	Response	Text was updated to clarify, reference to comprehensive study was removed.
	Back-check	Comment closed.
45.	Comment	Section 7-7, para. 1 – Please expand 'the system' to be more specific.
	Response	Text added to specify system definition.
	Back-check	Comment closed.
46.	Comment	Section 7-7 – Please note why sea level rise matters for this project; presumably because it affects stages in the project area, but this should be explicitly state because it may not be obvious, given how far away Sacramento is from the ocean.
	Response	Text added to explain relevancy.
	Back-check	Comment closed.
47.	Comment	Overall – Need to use a consistent spelling of gage. It is spelled both 'gage' and 'gauge' throughout the document.
	Response	Search and replace was done to keep 'gage' as the consistent spelling.
	Back-check	Comment closed.
48.	Comment	Section 7.7 – Is there a tech memo that describes our analysis of stages at the San Francisco gage in detail? If so, it should be

		referenced here.
	Response	Reference has been added. This reference may also be a Technical Memorandum so the name may change but it will be referenced to the same document.
	Back-check	Comment closed.
49.	Comment	Section 7.7 – We state that we followed the EC and developed values for low, intermediate and high sea level rise rates. Only one rate is discussed in detail in the document, however, and even though it was the mean rate, it was assumed to be the low rate. More explanation is needed here, including discussion of how the intermediate and high rates were selected.
	Response	More information was added to the report to explain the different sea level rise rates.
	Back-check	Answers most of my questions. However, why was the long-term average chosen for the low case if it represents the mean?
	Response	Based on the Sea level rise EC, the low sea level rise is based on the historical average. The intermediate and high values are projections for increased sea level rise occurring in the future.
	Back-check	Comment closed.
50.	Comment	Figure 7-2 – This figure references subsidence in addition to sea level rise. Since subsidence was not discussed in this section, it is unclear why it is included in this figure.
	Response	A section on subsidence has been added to the document.
	Back-check	Section 7.7.5 refers to subsidence in the Delta. Unclear how subsidence in the Delta relates to the study area.
	Response	After further coordination, the subsidence section was removed as was the conclusion section of the Delta report. The conclusions for sea level rise are now in the sensitivity of hydraulic model results section as this is where the results of the Delta sea level rise report was applied to the study.
	Back-check	Comment closed.
51.	Comment	Section 7-7/Figure 7-2 – Need a transition sentence to the next section. Right now, Section 7-7 ends without a discussion of results or implications for study area and seems incomplete. The graphic is too small to read a numeric value for the increase in WSEL due to sea level rise.
	Response	Conclusions and transition sentence were added.
	Back-check	Conclusion section needs to be revised to be more clear.
	Response	Text revisions were made and transitions and revision based on Comment 50 should also now address this comment.
	Back-check	Comment closed.

52.	Comment	Section 7.7.2 – Three sea level rise scenarios were previously identified, but it is unclear which or how many of these scenarios were used in the sensitivity analysis described in this section.
	Response	Text was added to explain the different scenarios.
	Back-check	Comment closed.
53.	Comment	Section 7.7.2, para. 2 – Why was the timing of the stage hydrographs shifted as well as the stages themselves?
	Response	Timing reference was removed from the Hydraulic Appendix.
	Back-check	Please confirm whether only the stages of the downstream hydrographs were shifted.
	Response	The Technical Memo 14b (to be a Reference soon) analyzed both stages and timing separately. For the purposes of ARCF hydraulic appendix, only the results from the change in stage were used.
	Back-check	Comment closed.
54.	Comment	Section 7.7.2, para. 2 – Identify *where* there were relatively little changes in water surface profiles.
	Response	Text added to clarify where changes were and for what frequency event.
	Back-check	Comment closed.
55.	Comment	Section 7.8, para. 1 – The text states that risks of flooding from smaller, non-levee streams are 'not being addressed' as part of this study. This isn't strictly true, as the risks are being considered as part of the economic analysis. Is it more accurate to state that no measures to reduce flooding from those features are being considered as part of the alternatives?
	Response	Agreed, text update to clarify this point.
	Back-check	Comment closed.
56.	Comment	Section 7.9, last para. – Add 1-2 sentences describing where the info in Table 7-6 came from. An LST study completed in X, or an analysis done specifically for the ARCF GRR? Is the source data summarized in a TM, or somewhere else? Add reference if applicable.
	Response	Multiple References added throughout this section and a sentence was added clarifying the source of this data.
	Back-check	Comment closed.
57.	Comment	Section 8.1 – Erosion and sedimentation are separate issues. This

		section is labeled Erosion Overview – is it actually an overview of both subjects? The section discusses sedimentation almost exclusively. Need to expand discussion of erosion to similar level as sedimentation or reduce the discussion of sedimentation, or some combination of both. Perhaps the sedimentation discussion should be moved to Section 8.4.
	Response	Sedimentation Section has been added and information has been moved.
	Back-check	Recommend moving sediment section before the section on AR channel stability. This is because the AR channel stability issue is 1) a specific issue, while bank erosion and sediment transport are general, 2) it is related to both bank erosion and sediment transport, and 3) the follow-on section about bank erosion measures on the AR makes more sense.
	Response	Sediment section has been moved.
	Back-check	Comment closed.
58.	Comment	Section 8.1, para. 4 – The text states that the Sac Bank sediment study won't be done for quite awhile, but it is actually already done. Need to update text to reflect this information.
	Response	Text has been updated, likely too much information.
	Back-check	Agreed – need to trim down to the basics – background on study and main conclusions.
	Response	Text revisions made with most changes coming from recommended DQC edits.
	Back-check	Comment closed.
59.	Comment	Section 8.2 – Are there any sedimentation assumptions? Or only erosion assumptions?
	Response	As part of the response to comment 57 and 58, a sediment section has been created and updated with information from the Sac Bank Sediment Study.
	Back-check	Comment closed.
60.	Comment	Section 8.2 – For this section, should the term erosion be replaced by bank erosion to be more clear?
	Response	Section has been updated with term 'bank erosion'
	Back-check	Comment closed.
61.	Comment	Section 8.3 – 8.8 – Recommend reorganizing information in Sections 8.3 through 8.8 to account for three categories of information: subject (e.g. bank erosion, channel erosion, etc.), study reach (e.g. American River, Sacramento River, etc.) and existing conditions vs with-project conditions.

	Response	Sections have been reorganized.
	Back-check	Comment closed.
62.	Comment	Sections 8.3.1 and 8.3.2 – Can probably eliminate these sections and Figure 8-1 and simply state that all bank erosion info comes from the annual Sac Bank inventory.
	Response	Sections and figure have been removed.
	Back-check	Updated remaining figure numbers, comment closed.
63.	Comment	Section 8.3.3 – Suggest making discussion of bank erosion specific to the project area (change river mile references and delete info regarding areas u/s and d/s of the project) and add sentence explaining why the Sacramento River reach is broken into two sections.
	Response	This section has been updated with suggested comments.
	Back-check	Comment closed.
64.	Comment	Section 8.4, para. 1 – First sentence is extremely vague. Make more specific by identifying what significant efforts have been completed, and what existing information was provided to Civil Design and Geotech.
	Response	Text has been clarified.
	Back-check	Comment closed.
65.	Comment	Section 8.4.1, para. 2 – Recommend reducing the level of detail in the description of the launchable rock trenches. A lot more detail is provided here than is typical throughout the appendix, and appears inconsistent.
	Response	Section information has been reduced.
	Back-check	Comment closed.
66.	Comment	Section 8.4.1, para. 3 – This section appears to make contradictory statements about the effect of bank protection on stages. The first part states that bank protection was modeled to cause a 1 foot rise, while the second part states that bank protection plus a rock trench had very little impact on channel capacity. Needs clarification.
	Response	Text was clarified.
	Back-check	Comment closed.
67.	Comment	Section 8.7 – Why is the boat wake erosion on the DWSC

		mentioned here, if it is not part of the project area?
	Response	Reference to DWSC has been removed.
	Back-check	Comment closed.

ATTACHMENT C-3

ENGINEERING – GEOTECHNICAL

DISTRICT QUALITY CONTROL CERTIFICATE for GEOTECHNICAL PRODUCTS

PROJECT AND DOCUMENT INFORMATION

Project Name: ARCF GRR

Document: Geotechnical Appendix and Office Report

Project Manager: Dan Tibbitts

Document Completion Date: January, 2013 Document Author: Michael Kynett, P.E.

Reviewer: Anthony Deus, P.E. Senior Reviewer: Mary Perlea, P.E.

The above reviewer will perform the Quality Control Review in accordance with SOP EDG-02: "Technical Product Review Policy and Procedures" developed for the Engineering Quality System. The senior reviewer will provide a review of major assumptions, analytical approaches, significant calculations, recommendations and conclusions.

REVIEW CERTIFICATION

PREPARER – I have discussed the above document and review requirements with the DQC Reviewer(s) and believe that this review is completed and that the document will meet the requirements of the project.

Preparer's Signature: KYNETT.MICHAEL.1385598684 Digitally signed by KYNETT.MICHAEL.1385598684 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=KYNETT.MICHAEL.1385598684 Date: 2013.02.12 10:16:35 -08'00' Date: _____

REVIEWER – I have reviewed the assigned Item(s)/Section(s) noted for the above document and believe them to be in accordance with the project requirements, standards of the profession, and Corps of Engineers policies and standards.

Reviewer's Signature: DEUS.ANTHONY.J.1385598730 Digitally signed by DEUS.ANTHONY.J.1385598730 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DEUS.ANTHONY.J.1385598730 Date: 2013.02.12 10:23:11 -08'00' Date: _____

SENIOR REVIEWER – I have reviewed and resolved all critical and technical issues. I agree that the item(s)/Section(s) noted for the above document are in accordance with project requirements, standards of the profession, and Corps of Engineers policies and standards.

Senior Reviewer's Signature: PERLEA.MARY.P.1230236204 Digitally signed by PERLEA.MARY.P.1230236204 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=PERLEA.MARY.P.1230236204 Date: 2013.02.12 13:52:45 -08'00' Date: _____

No.	Page No.	Comment	Response
1	xii	Is part of the Yolo Bypass included only because you have that weir structure on the Sacramento River? Otherwise why do you include Yolo Bypass?	The Yolo Bypass is included because it is a critical component to both the Sacramento Bypass Weir expansion and the I Street Diversion Structure. The study has expanded to look at features outside of the existing flood protection system that may benefit the study area.
2	Xiii	What about the windows? Do you want to discuss them here?	Windows are a component to the WRDA 96/99 project, the with project assumption is that the WRDA 96/99 project is completed. A discussion of the windows sites is a detail associated with the WRDA 96/99 project and not relevant to the ARCF GRR.
3	Xiii	No blanket?	The geology of the MCDC area is not riverine (riverbank formation) but modesto formation associated with the foothills. The subsurface conditions consist of low permeability dense/stiff silty sand and sandy silt. Essentially there are not the typical blanket/aquifer layers associated with riverine geology.
4	xv	I am not sure we want to show what has been constructed as part of NLIP. NLIP is approved for credit after the Natomas NPACR is authorized, we consider the NLIP improvements as non-existent and have them included as preferred plan in our proposal, so I would not say anything regarding the already improvements in place recently done by NLIP. However you can mention that there is additional information available from NLIP studies only.	Correct, the references to NLIP and constructed features associated with NLIP have been removed from the report text. Reference to the implementation of the NPACR as part of the without project conditions for the ARCF GRR remain.
5	xv	Delete this completely, we disregard the NLIP construction at this stage. However you may indicate the levee improvement such as cut-off wall and others was included in NPACR, and the Chiefs report approved,	See response to previous comment.

No.	Page No.	Comment	Response
		but do not say constructed.	
6	Xvi	Are you sure that this is for 200 year flood? The levees are designed for 200 year +3 feet of freeboard, so if 1 foot is lost than the freeboard is only 2 feet.	The seismic criteria came directly from Vlad's draft ETL on seismic analyses of levees, I can only present the criteria as it has been written in the draft ETL.
7	xvi	I would not write this, it is less stringent than the SOP which we actually apply being in the SPK	Agreed that it is less stringent, but in this section of the report I am presenting the various criteria associated with the federal levee section from the national to local level.
8	Xvii	Actually there is a typical cross section that is 1V:3H waterside, 1V:2H landside and 20 feet wide crest. Exceptions may be at ramps, pump stations and other encroachments where the levee varies from the typical cross section, but you cannot say there is no typical cross section,.	There might be some confusion here, the text does not say that there is no typical levee section of the existing levee but that there is variability in the levee section and the critical section was chosen. Further, the typical existing levee section varies for each channel.
9	Xvii	Say something regarding the Datum used (NAVD88) also regarding the horizontal datum.	Reference to datum has been included.
10	Xvii	Do you really need to show all these details on HH? These may confuse only the reviewers. What if you simply said the data was obtained from HH studies, list the years and this is all.	I believe it is warranted, the H&H changed so many times that it was confusing for us to track what version we used on what analyses and it is important to document the process and why.
11	xvii	Usually we extended the model to the centerline of the river, this is a requirements we always used, and was also imposed to the URS models for ULE. The models used bathymetric information from ULE survey	Correct, this is what we did as well. The text has been updated.
12	xviii	Did we not use wedge analyses when a thin clay layer would indicate that this would be appropriate?	No, for feasibility we used circular searches to find the critical failure surface. We acknowledge that a noncircular failure surface maybe critical in some locations but that would not have a significant

No.	Page No.	Comment	Response
			effect to the results and is a PED level refinement.
13	xviii	Seepage or combined berms were not analyzed at all? I believe we had some in Natomas at least.	Berms were not analyzed, berms were screened prior to analyses using maximum sections for cost and real estate analyses. The berms in Natomas were analyzed under NPACR and only levee raise was analyzed in Natomas under the ARCF GRR.
14	xix	Was this included in the acronyms?	Yes.
15	xix	Was this included in the acronyms?	Yes.
16	xx	I suggest spelling it out, you do not write the report in acronyms only.	Text revised.
17	xx	I suggest spelling it out, you do not write the report in acronyms only.	Text revised.
18	xx	Again, I am not sure we want to include NLIP improvements since the ANLIP is not yet credited and the "without project" conditions assumes NLIP not being constructed,	Text revised as per previous comment.
19	xx	What about tributaries such as Arcade Creek, NEMDC, Dry Creek?	Correct, deficiencies remain on those channels. The point I was making was that the majority of deficiencies and the most serious ones remain on the Sacramento River.
20	xx	There are no other deficiencies here? I was sure we have some seepage and slope stability issues also besides freeboard. Am also , generally, may we ask in the official report for 3 feet of freeboard or we need to talk the new language?	Yes, there are other deficiencies remaining. This sentence is just pointing out that there are overtopping deficiencies in addition to geotechnical deficiencies such as seepage, slope stability, and erosion. The text has been updated to be more clear.
21	xxi	Rephrase it, the sentence does not sound right.	Sentence does appear to convey the message of where deficiencies remain in ARN.
22	Xii	It is not clear if these were proposed and constructed already or are not constructed but there is no need for any improvement. I	This paragraph does appear to convey that I have evaluated the recommendations from previous studies as geotechnical acceptable for inclusion in

No.	Page No.	Comment	Response
		would rather say these were constructed not were proposed.	the ARCF GRR. Some text was revised.
23	xii	Was it not discussed to lower the weir also?	Yes, but it was screened early. This would be covered by H&H.
24	xxiii	Considerations or constrains? I believe there are constrains since it is not recommended.	The considerations were design level recommendations that would need to be implemented during further study if the alternative were recommended as the tsp. They are not constraints that eliminated the alternative as viable.
25	xiii	I suggest spelling out the first time, particularly in the Executive summary –	Text revised.
26	xiii	This entire paragraph is somehow confused. I do not understand why the additional 60,000 cfs discharged in the Yolo Bypass would increase the capacity in the Deep Water Sheep Chanel. Actually what you probable want to say is that the additional discharge in the Yolo Bypass would require additional work on the levees on both sides of the bypass by relocation, setback, raising and improvements such as seepage and slope stability mitigations to preserve the 6 feet of freeboard as required for a Bypass levee and to improve seepage and stability for a higher water elevation. The water will flow through the Bypass not through the DWSC, so practically it has no impact on the DWSC.	At this point the measures used to mitigate for hydraulic impacts associated with the alternative have not been fully defined by planning, civil, and pm. I have chosen to present the list of possible measures and the geotechnical components so that the PDT can choose which ones they need in the future without revisions to the geotech report. The paragraph referenced presents a summary of the requirements to mitigate hydraulic impacts through improvements to the affected levees in the bypass. The previous paragraph grave recommendations for the geotechnical components to increased capacity in the bypass.
27	xxv	There is no discussion on the borrow material below, it is in the main report only, but not in the executive summary.	Correct, it seemed appropriate to only discuss the needs and how we would obtain the material in the summary. Not the material requirements.
28	8	Do you have all these reports in the references?	Yes.

No.	Page No.	Comment	Response
29	9	Were the improvements only on American River or included some on Sacramento River also? (i.e. improvement on Sac River for the Pump Station 1.	Yes there were some Sacramento River improvements which were discussed with the other Sacramento river improvements.
30	35	Fix the table to fit on the page width (change fonts eventually) (on all tables eventually)	Table formatting revised.
31	38	Don't forget, NLIP has not been constructed , it is not without project conditions. Rephrase it.	Text revised.
32	39	This is NLIP, not yet constructed,	Text revised.
33	51	You may want to discuss that analyses were performed to determine the levee would respect the seepage and stability requirements in case of a vegetation variance will be requested during the PED	Agreed, this is discussed in a separate section of the report.
34	51	This is not clear, you may need additional description. Anyway, I did not understand what you mean.	Text revised.
35	51	A planting berm cannot serve as access road for vehicular access!	Text revised.
36	51	Are the following paragraphs mitigation measures? I don't think so, these are analyzed alternatives. In this paragraph 8 you have mitigation measures only. You may have eventually a separate paragraph regarding studied alternatives.	As presented these are measures. The Sacramento Weir and Bypass widening is a measure to address overtopping of the Sacramento River and on its own is not an alternative. The I Street Diversion Structure is a measure to address seepage, stability, and erosion on the Sacramento River.
37	51	See the comment above. These are not mitigation measures but alternatives.	See previous response.
38	58	Did you not use an anisotropy 1 for poorly graded sands?	No, all the material parameter guidance at the beginning of our analyses provided a range between 4 and 10 for sands. Since then the ULE

No.	Page No.	Comment	Response
			study has recommended 1 for clean sands. We could not revise our parameters at that late date and maintain schedule. I have performed a sensitivity study of this and the difference is relatively small. The Kh is vastly more important than Kv for sands.
39	65	Check the numbers. This is after 11.4.5.	Text revised.
40	66	This segment does not meet criteria. You do not have with project analyses results	I believe the wrong results were presented here, the figure has been updated.
41	66	Stability does not meet criteria. You do not have any mitigation measure and with project analyses results?	I believe the wrong results were presented here, the figure has been updated.
42	68	You may indicate this is a new levee designed and constructed to meet recent requirements	I would prefer not to state that. The report presents the construction history of the segment in a previous section. It may not be totally accurate to say that it was designed and constructed to modern guidance as it probably wouldn't meet SOP-003 requirements of the requirements of a 408 review conducted today.
43	68	No with project for stability analysis?	No, the levee meets seepage and stability criteria for top of levee and design water surface elevations.
44	72	It looks like with project barely meets criteria. I suggest to add a table showing the gradients and FS with and without project as a summary.	Correct, this is discussed in text. I would prefer not to add a table.
45	85	May you please check the sentence, it does not sound right	That should have been a report reference, the text has been revised.
46	89	You need to discuss the white paper accepted by the HQ and explain the reasons for non-compliance: the fact that we do not do any work on the landside slope and levee so we do not cut trees there. You cannot	Correct, the text was revised. However, the white paper never went anywhere, I referenced meetings held with HQ that were documented with meeting minutes instead.

No.	Page No.	Comment	Response
		just say not compliant with no explanation why.	
47	89	Actually the construction on the Sac River is from the landside toe to the river but not on the landside entire 15 feet from the toe. I suggest to indicate a 10 foot wide access road will be constructed along the landside toe , the remaining 5 feet for vegetation free zone will be the responsibility of the Sponsor. Leave it there, do not say when and how. Show it also like that on the drawing. Also trace a horizontal line from the landside toe to show the corresponding toe of the levee on the waterside slope, to show that trees are above the toe	As per our conversation, the 15 feet vegetation free zone would be acquired for the project. The exact details of how the vfz versus the access road were not important for geotech. We decided to simply state for the VVR that a 15 foot vegetation free zone would be acquired as part of the project.
48	92	We need to discuss the stability, I am not sure I agree with it. You need to remove a piece of the levee supposed to be gone due to the tree fall and have a steeper slope, than do a stability analysis for rapid drawdown and one for intermediate river level. I do not really agree or understand what you did so far. Seepage analysis and slope stability of the landside slope is not needed since you have a cut-off wall.	It appears that figure 14-3 was obscured for some reason in the document. As shown in that figure and described in text, the analyses did remove the tree fall scour as described in your comment. Landside seepage and stability was performed to confirm that the tree fall scour did not adversely affect the performance of the seepage and stability improvements.
49	92	I think you need a paragraph regarding the O&M corridor for inspection and maintenance, also show the sketch from Sarah. You can relate these two together if you want but need to discuss it for all areas, including American River.	The O&M corridor will be covered in the planning report as per our meeting with April and Virginia. The O&M corridor is not a geotechnical component and is unrelated to the ability to obtain a vegetation variance.
50	93	NLIP is not yet considered as without project conditions.	Text revised.

No.	Page No.	Comment	Response
51	93	Say something on the O&M corridor	See previous comment.
52	94	Check numbering	Text revised.
53	96	Is it geotextile or Tensar for reinforcement? Need to specify.	Andy Johnson has design/construction experience in New Orleans with geotextile reinforcement and performed this analysis for us. Geotextile was his preference.
54	96	Fig. 15-4 shows a levee with a cut-off wall, I do not see the cross section with the geoptextile or tensar. May you check again please? Also this figure needs wore work. What is the benching width below the dashed line. We need to discuss it a little.	Correct, the wrong figure was included. An updated figure has been included.
55	99	Use SB for traditional open trench method	I am not recommending one over the other, that is PED. WRDA 96/99 used SCB, it is possible we would again.
56	100	The minimum 1:2 slope is not only for stability but for O&M also (walkable, wowing). You need to indicate a special ground cover is recommended that will not require mowing, if the slope is steeper than 1:2/	That is an O&M/Planning issue. Geotechnical, the geotextile allows for maintaining the existing footprint and slope.
57	100	Do you really need to relocate or replace the open ditch with culverts if you have a cut-off wall?	Yes.
58	101	I do not recall any floodwall for levee raise. You need to show a cross section with the adjacent levee that will be raised to 200 year level of protection also.	Raises were not included in the NPACR, the ARCF GRR did a comparison between an embankment raise and a floodwall raise.
59	103	This is also an improvement in place, so is a continuation of the Par. 15.	The Magpie Creek area does include levees but also several other features. The previous section included solely recommendations for levees within the existing flood control system. The Magpie Creek levees and additional features are

No.	Page No.	Comment	Response
			not part of the existing system and therefore have been included in a separate section.
60	105	Consider this as Alternatives for increasing the level of protection but not for levee improvements. Suggest to consider it as a separate paragraph.	Again, this is a separate measure associated with levees outside the existing system and is therefore a separate section.
61	106	Should be Part 17	Again, this is a separate measure associated with levees outside the existing system and is therefore a separate section.
62	111	Was this coordinated with Vlad? Why is it different than the entire CF GRR study? It has to be the same seismicity, it is within the basin anyway. Who made this paragraph?	The seismic characterization was done in accordance with Vlad's guidance. The analyses is not different that the entire ARCF GRR study performed by George Hu. The diversion structure was deemed by be a significant structure with critical seismic design considerations and therefore a location specific seismic characterization was performed.
63	124	Indicate there is no improvement for this reach, therefore the same curve is with and without project conditions	Text revised.
64	125	Where is the curve for with project conditions? Do you have any improvement here? It looks like it needs improvement for seepage	No with project analyses was performed. First, this section was not utilized for economic analyses. Secondly, the deterministic analyses met criteria. The BTA was very sensitive to the input parameters and slightly more conservative than the FEM analyses. Instead a judgment call was made to recommend cutoff wall extents and depth based on coordination with DWR/AMEC on the ULE results using information that was not available to us at the time of analyses.
65	127	Why is this the same curve as with project condition? It does not look there is a need for an improvement. You indicate that a cut-off wall is recommended, this means	I believe the wrong results were presented here, the figure has been updated.

No.	Page No.	Comment	Response
		seepage may be an issue.	
66	129	You need somehow to explain why you do not have any improvements for stability particularly that the Prf is above 15% (which requires mitigations. Actually you may indicate that the high Prf is for water at the crest of the levee, for 3 feet below (design level) it is 0.	Agreed, text revised.
67	133	No erosion protection on this reach? If so, add a reduced curve	Apparently there is, the curve has been revised.
68	136	What do you want to say here?	Text revised.
69	139	Check the two sets. The stability without project condition is flat 0 and with project condition you have a risk up to 10%	I believe the wrong results were presented here, the figure has been updated.
70	139	You need to explain the R&U analysis for the Natomas existing conditions was provided in the NPACR. What you have here is strictly the R&U considering the approved NPACR, only for the additional levee raise. Otherwise it is not clear	Text was already included that described this.
71	139	What about reaches A and B	The report was updated with all the Natomas Curves
72	139	Check the pages, it shows Page 137 of 134?	Formatting changed.
73	149	I am not sure we include anymore the list of approved quarries in the specifications, so I believe you do not have to add it in the report either. Actually you do not add this list in the geotechnical report for the design phase either.	True, for consistency I prefer to keep it in. We provided soil borrow locations so rock locations seem appropriate.
74		Consider the NLIP project not being constructed, not part of the "without	Agreed, comment incorporated.

No.	Page No.	Comment	Response
		project" conditions, but consider NPACR approved for improvements to the exiting level of protection. I tried to chase down all references to the already constructed NLIP but I may miss some of them.	
75		I would recommend calling the probabilistic analyses Risk Base Analysis. It is strange you have it at the end, however it is explicable because you have included the with project curves. Normally it should be following the deterministic analysis, this actually was the reason for improvements.	While the existing/rescinded USACE guidance (EM/ETL) do reference the analyses as "Risk Based" the comments I have received in past ATR reviews have been technically correct that it is not risk based. The geotechnical analyses we perform is technically correct as probabilistic analyses that is used in hazard analyses. Risk analyses is technically not performed.
76		R&U curves: I recommend reducing the horizontal scale for each segment within the top to toe levee height to make the figures more readable.	I understand the figures are a little hard to read but, the R&U spreadsheet I developed has code that auto creates the x and y axis based on a standard scale for all points regardless of the levee height. That way all of the slopes of the lines in the graphs are equal representations. Reformatting would be significant effort and would no longer provide a standard scale for relative comparison between index points.
77		You should discuss the LSAC rating also as part of the Risk Based Analysis. The HQ is interested to have the rating done before the feasibility report. Showing that you have it done and it is already categorized by LSOG it will help the HQ for a better understanding and for an approval with fewer comments. The geotechnical engineering of this report was actually included in the LSAC. You may just summarize it and indicate the rating for each system. Tony may help you a lot, he did a great job for the LSAC.	Agree, comment incorporated. A section has been added at the end of the R&U section.

No.	Page No.	Comment	Response
78		Include a paragraph on access road along the levee on the landside, it is completely missing. Add as an enclosure the memo we sent to the HQ asking for the American River landside slope, vegetation issue and ROW and discuss why we don't touch American River landside vegetation and access.	This is a planning consideration, not a geotechnical one.
79		Separate the geotechnical fix in place levee improvement as an analyzed alternative (with subchapter for each basin) and the other 2 (widening the Sac Bypass and diversion structure) present them as separate alternatives not as geotechnical mitigation.	HQ has not given approval of the final array of alternatives. Therefore the alternative descriptions may change. I have chosen to describe alternatives and their geotechnical components so that planning can arrange them as necessary and in accordance with my technical recommendations. The widened Sacramento Weir and Bypass are not geotechnical mitigation, they are hydraulic improvements for increased system performance. I provided the geotechnical measures associated with this feature. The Diversion structure is a measure that addresses seepage, stability, erosion, and overtopping and requires its own set of geotechnical recommendations not associated with the existing flood control system.

ATTACHMENT C-4

ENGINEERING – COST

QUALITY CONTROL CERTIFICATE FOR COST ENGINEERING PRODUCTS

Project Name: American River Common Features
Project Manager: Daniel Tibbitts

Technical Products: Cost Engineering Data for Alternatives (Updated Parametric Cost Estimates, ACRAs, PCSs and Cost Engineering Section of Civil Engineering Appendix)

Actual Completion Date: December 1, 2014

PREPARERS – Robert Vrchoticky, CESPK-ED-SC - I have prepared the above the products in accordance with Quality Management Plan.

Preparers: VRCHOTICKY.ROBERT.DEAN.JR.1231223440

Digitally signed by VRCHOTICKY.ROBERT.DEAN.JR.1231223440
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=VRCHOTICKY.ROBERT.DEAN.JR.1231223440
Date: 2014.12.03 14:07:22 -08'00'

REVIEWERS – Tri Duong, CESPK-ED-SC - I provided DQC review the of the Cost Engineering data and find it to be in accordance with the Quality Assurance Plan meeting project requirements, standards of the profession and Corps of Engineers policies and standards for Alternatives comparison.

QC Reviewers: DUONG.TRI.H.1291666015

Digitally signed by DUONG.TRI.H.1291666015
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DUONG.TRI.H.1291666015
Date: 2014.12.02 09:55:33 -08'00'

Resource Providers – I have reviewed and resolved all critical and technical issues. I agree that all project requirements and standards of the profession and Corps of Engineers policies and standards have been met.

Section Chief: FROST.JEREMIAH.A.1020795839

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FROST.JEREMIAH.A.1020795839
Date: 2014.12.03 14:28:44 -08'00'

Branch Chief: BUZAK.JAN.NMN.1236551632

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Date: 2015.02.19 09:37:03 -08'00'

P2#	149827
PROJECT:	ARCF_GRR_TSP Milestone
PM:	Dan Tibbitts
TITLE:	Technical Products: Cost Engineering Data for Alternatives (Updated Parametric Cost Estimates, ACRAs, PCSs and Cost Engineering Section of Civil Engineering Appendix)
PDT COST ENGR.	Bob Vrchoticky
COST REVIEWER	Tri Duong
DATE OF REVIEW	2014-11-26
DATE OF EVALUATION	2014-12-01
DATE OF BACKCHECK	2014-12-02

	Folder	RE Costs
	File	Comparison of Am RiverforBob_Nov242014-cntgy_summed_up.xlsx
1	**Comment**	When I open this file it gives a "Circular Refererence Warning" pop-up window warning of a possible excel formula error. Please check if this warning affect the RE costs estimate.
	Evaluation	Concur - Checked this with RE PDT member and DQC reviewer. They have looked over the spreadsheet and anssured me the numbers provided are correct.
	Backcheck	Comment closed
	Folders	_Cost_Engr_files --> _PC_spreadsheet & PCS
	Files	20141121_PC_02_&_11_accounts_based_on_MII_Generic_&_UC_by_Others_rev.xlsx
1	**Comment**	For understanding, please explain how the 18 account costs (preservation & data recovery) are estimated. For a given Reach, there are two general formulas with hard code numbers that I am unable to reference.
	Evaluation	Concur – Costs of 1.5% of the total project costs for mitigation of Cultural Resources (cost shared) and 0.5% of the Federal Cost share for Data Recovery (100% federal cost) are sufficient. The Cost Engineering section of the Civil Engineering Appendix has been revised to reflect this.
	Backcheck	Changes noted. Comment closed.
2	**Comment**	For understanding, from the individual Reach tab, the SWPP cost is estimate at 5% of construction cost + TC. However, at some Reach the SWPP cost appears to be a hard code numbers I am unable to make reference. There seem to be inconsistency as some Reach appears to used the correct formula.

	Evaluation	Concur - The methodology is unchanged from the previous submittal. SWPP costs for ARS & ARN were obtained from Environmental Chemistry. Those are the hard code numbers. 5% was used for Relocations and the widening of the Sacramento Bypass.
	Backcheck	Comments closed.
3	**Comment**	For understanding, please explain what are "ENV" cost column that is between the "TC" and "M/D" columns. Is it same as "SWPP" cost?
	Evaluation	Concur - Yes, the ENV cost is the SWPP costs
	Backcheck	FIO - Moving forward, highly recommends using the same nomenclature to avoid clarification comments. Comments closed.
	Folders	_Cost_Engr_files --> ACRA & PCS
	Files	2013-01_ARCF_Alt1_ACRA_20141125.xlsm ARCF-PCS-Alt1_20141125.xlsx
1	**Comment**	Observation - The Real Estate total cost matches correctly b/t the ACRA & PCS.
	Evaluation	FIO
	Backcheck	
	Folders	_Cost_Engr_files --> ACRA & _PC_spreadsheet
	Files	2013-01_ARCF_Alt1_ACRA_20141125.xlsm 20141121_PC_02_&_11_accounts_based_on_MII_Generic_&_UC_by_Others_rev.
1	**Comment**	Incorrect data transfer of cost. The PC spreadsheet, in the "SUM_for_CRA_Alt1" tab got +$43M for "EW2" and the ACRA got +$41M for the "Earthwork (Imported Borrow)". Since the title/feature of work descriptions are different, I am inferring that "EW2 = "Earthwork (Imported Borrow)".
	Evaluation	Concur - ACRA and PCS has been revised.
	Backcheck	Changes noted. Comment closed.
		GENERALS
1	**Comment**	For understanding purpose, unlike the Real Estate costs prepared by Laurie Parker which included a contingency (%); the Environmental (a.k.a Mitigation) costs prepared by Liz Holland did not include a contingency (%). The ACRA, which did not account/address for the 06 Environmental/Mitigation costs in the Risk Analysis. However, the contingency percentage (21.78%) derieved from the ACRA was applied to the 06 account in the TPCS. Does this mean that 100% of environmental mitigation cost will be credits purchase through mitigation banks?

	Evaluation	Concur - Costs for Environmental Mitigation were provided by Environmental Planning and are part of the 'Remaining Construction Items'. Discussions with the PDT member for Environmental Planning would indicate a 20-25% contingency as satisfactory. Since the contingency per the ACRA is in this range, it is considered adequate for alternatives comparison.
	Backcheck	Since the Technical PDT member responsible for the Env. Mitigation cost estimate and the PDT Team is satisfied with outcome on the ACRA contingency percentage, the contingency applied to the mitigation cost is adequate for alternative comparison. Moving forward (to estimate(s) for the TSP/LPP), I highly recommend not classifying the Environmental Mitigation under the "Remaining Construction Items" because this category should be used for minor cost. Categorizing it under the 06 - Fish & Wildlife Facilities may be more approapriate. Comment Closed.
2	**Comment**	In the"_PC_spreadsheet", under "ARS-A" tab and for many other Reaches , I noticed that the items under cost category "PL" (or PLANTING) are resemblance of the work for the Sacramento River Bank Protection Project. From my understanding, the costs for "coir fabric, plugs, pole cuttings, container plants, beaver fence, irrigation, plant maintenance (3 years) and Planting Prep" under catergory "PL" are considered on-site Mitgation features, which generally coded under the 06 Account of the CWWBS. Please confirm whether this is the case for ARCF? Also, please verify that the "PL" costs, which are currently coded under the 11 accounts cost are "in additions" to the Environmental requirements/costs prepared by Liz Holland (to make sure we don't mitigate twice).
	Evaluation	Concur - This was discussed with the Environmental Planning PDT member. Per these discussion, we believe the costs described (coir fabric, plugs, etc) ARE NOT mitigation features. No costs for Bank Protection were included in the costs provided by Environmental Planning. There is no 'double counting' of Environmental Costs/Requirements.
	Backcheck	It appears confirmation has been made and double counting is not the case. Comment closed.
3	**Comment**	Please update cost appendix to reflect assumptions and progress.
	Evaluation	Concur - The Cost Engineering section of the Civil Engineering Appendix has been
	Backcheck	Changes noted. Comment Closed.
4	**Comment**	ALL the comments above were noted from reviewing at the files for Alternative 1. Assuming the same methods/approach were used to prepare estimates for both Alternatives, please verify that changes are also made to Alternative 2.
	Evaluation	Concur - ACRA and PCS has been revised for Alternative 2 also.
	Backcheck	Comment Closed.

ATTACHMENT C-5

ENGINEERING – EROSION

USACE District Quality Control / Quality Assurance

Project: American River Watershed Common Features, General Re-Evaluation Report (ARCF GRR)
Submittal: Attachment E, Erosion Protection Report
Section: Hydraulic Design Section (CESPK-ED-HD)

Hydraulic Design Documentation and Products reviewed:

1. Document, American River Watershed Common Features, General Re-Evaluation Report, Erosion Protection Report, Draft Version, Dated January 23, 2014

File Location:
\\amethyst\civcad_2\AmerRiv\CommonFeaturesGRR\Hydraulics\Erosion\ErosionSummary_ForGRR\DQC_Review\Certification\

Limitations of Review:
The review is limited to the document which is a summary of existing documents, analysis, models, and data. The review does not include review of the referenced documents, analysis, models, or data. The review of these was conducted separately.

(1) Designers: We have prepared the above products in accordance with the Quality Control Plans meeting project requirements, standards of the profession and US Army Corps of Engineers policy, essential engineering guidelines and standards. All comments resulting from DQC review have been entered into DrChecks and resolved.

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Todd Rivas, P.E., Senior Hydraulic Engineer, CESPK-ED-HD — 2/11/2014 Date

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Scott Stonestreet, P.E., Senior Hydraulic Engineer, CESPK-ED-HD — 2/11/2014 Date

(2) DQC Reviewer: I have reviewed the above products and find them to be in accordance with the Quality Control Plans. This includes review of assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. All comments have been entered into DrChecks and resolved to my satisfaction.

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Ethan Thompson, P.E., Senior Hydraulic Engineer, CESPK-ED-HD — 2/11/2014 Date

(3) QA Reviewer: I have performed Quality Assurance review of the above products and confirm that all critical and technical issues resulting from DQC/QA review have been addressed. All DQC comments and responses are loaded into DR Checks under Project ID: *"149827 GRR"*, Project Name: "ARCF - General Reevaluation Report (GRR), TSP & Attachments, American River Common Features (ARCF)," Review Name: *"DQC Erosion Attachment"*.

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Jesse Schlunegger, P.E., Acting Chief, Hydraulic Analysis Section, CESPK-ED-HA — 2/11/2014 Date

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Greg Kukas, P.E., Chief, Hydrology and Hydraulic Branch, CESPK-ED-H — 2/11/2014 Date

Comment Report: All Comments
Project: ARCF - General Reevaluation Report (GRR), TSP & Attachments, American River Common Features (ARCF), California (P2 #149827)
Review: DQC Erosion Attachment (23-29 Jan 2014)
Displaying 96 comments for the criteria specified in this report.

Id	Discipline	Section/Figure	Page Number	Line Number
5501895	Civil	n/a	Page 22	n/a

Comment Classification: **For Official Use Only (FOUO)**

Page 22, 3rd paragraph, second to last sentence, change "regarding" to "regrading".

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
Thanks. Text has been changed to "re-grading".

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5501899	Civil	n/a	Page 58	n/a

Comment Classification: **For Official Use Only (FOUO)**

Page 58, paragraph 6.2, it should be recommended that the most recent Sac Bank designs should be used as the template for the bank protection design, due to this being the most recently coordinated design that does not require additional mitigation, other than the instream woody material, willow pole cuttings, and soil-filled quarry stone with various native plants and trees planted on the entire slope.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
The current design concept was developed with PDT input including geotechnical design and environmental planning. It has been analyzed and described within the EIS and any additional mitigation has been assessed (and costs added).

It is agreed that this design should be analyzed further in PED to determine if there's a more effective design but the current design should provide adequate costs for alternative selection.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5501904 Civil Figure 6-1 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Figure 6-1 should be changed to the most recent Sac Bank design showing in-stream woody material, soil-filled quarry stone, and native trees and shrub plantings along the entire slope. This design is the only one that does not require additional mitigation outside of the bank protection work.

Submitted By: Markus Boedtker ((916) 557-6637). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
The current design was developed with input from the PDT including geotechnical design and environmental planning. This design has been determined to be adequate to develop costs for alternative selection. For feasibility design, the PDT will need to either refine or revisit the design to determine if it is effective in setting costs for PED. Additional design effort or cost and schedule risk analysis will be performed to ensure costs are adequate for PED.

In PED, the final design will be determined based on additional analysis and coordination with environmental planning, geotechnical design, levee safety, and others.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Markus Boedtker ((916) 557-6637) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502007 Civil n/a General Comment n/a

Comment Classification: **For Official Use Only (FOUO)**

This report is actually confusing. The report is the erosion attachment of the Common Features GRR and therefore it should evaluate the erosion and the necessary erosion protection for all channels considered in the American River Basins (north and south). It should describe in the same manner all channels such as Sacramento River north and south of the American River, American River, Natomas Cross Canal, NEMDC, Arcade and Dry Creek, eventually Pleasant Grove Creek if considered necessary. The erosion on the American River was detailed studied at the request of an expert elicitation team. Therefore there were additional subsurface investigations performed in the

riverbanks and riverbed to evaluate the erosion conditions of the soils. The results of this additional study should be included as a separate enclosure to this report and only the conclusion of the study and the proposed remediation actions should be described in the main erosion appendix. As the report is structured it goes back and front from detailed analyses and descriptions (for American Rover) to poor or lack of description, or even wrong description, of the conditions of the other channel.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

Intro section text has been revised to clarify how erosion was handled on each reach for the study. Some reaches were handled as part of the Natomas PAC, and other small reaches were assumed to need minimal additional erosion analysis that will be deferred to PED.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502023 Civil 1.3 BAckground n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Since this is the erosion report for the entire project area this figure should show also the Natomas Cross Canal and the levees on the Arcade and Dry Creek and the other tributaries discussed in the text. If these tributaries have no impact it should not even be mentioned in the text (i.e. Feather River is also a tributary and is not included). Also each channel name should be shown on the figure not only the American River and Sacramento River. This report will go to ATR outside the district which don't really know where these channels are located.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

Intro section text has been revised to clarify how erosion was handled on each reach for the study. Some reaches were handled as part of the Natomas PAC, and other small reaches were assumed to need minimal additional erosion analysis that will be deffered to PED.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5502024 Civil 1.3 & 1.4 Background n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The background description of the Natomas Cross Canal, NEMDC, Arcade and Dry Creeks should also be included

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

Intro section text has been revised to clarify how erosion was handled on each reach for the study. Some reaches were handled as part of the Natomas PAC, and other small reaches were assumed to need minimal additional erosion analysis that will be deffered to PED.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502026 Civil 1.3 Background n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The study done by AYRES in 20032 is complex and should be also used and listed in the references.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **For Information Only**

I am not aware of an Ayres report dated 2002; however, section 1.7.1.4 of the erosion report summarizes the 2-D analysis Ayres conducted which computed 2-D velocities and shears for a range of large steady-state discharges (Lower American River, Erosion Susceptibility Analysis for Infrequent Flood Events" dated July 2004 by Ayres Associates). Furthermore examples of the results from this investigation are presented in Section 4.2.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502029 Civil 1.3 Background n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

This is the erosion report for the entire American River Basin which includes the north and south basins with the tributaries and also Sacramento River. The report should clearly justify why the additional investigation was performed only in the American River riverbad and not also on Sacramento River, particularly that there is a known extremely deep (about 80 feet) scour in the Sacramento River close to the confluence with the American River.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
The erosion report is for the American River Common Features GRR. Text has been added to clarify how erosion conditions were addressed for each of the reaches in the study. The Sacramento River below the confluence does have an assessment of the erosion conditions in this report.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502086 Civil 1.4 Background n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The title Middle Reach – Verona to Sacramento, it does not really make sense. Is this the City of Sacramento or only on Natomas? It should be described probably as Verona to American River confluence. Same to the next reach of the Sacramento it should be described as Confluence with the American River to Freeport eventually. Just River Miles are not sufficient to describe the reach. Show these reaches also on Figure 1-2

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
This text has been revised to remove the "middle" terminology and include more description of the reach.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502091 Civil 1.4 Background n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

As a general comment, the report is mostly an HH report but also it is related to levees. Therefore, it would be nice to have also the levee unit and levee mile shown in parentheses, since this is the unit shown on the O&M manuals

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

I concur that it would be "nice" to include a lot of the detailed mapping and other supporting information in th erosion report. However, inclusion of this information could require a lot of effort (which isn't readily available) and as stated in the comment, it is already available in the O&M manuals should this information be required. I am not sure how providing this detailed information would add to the discussions present in the document. The levee units and/or levee stationing is not referenced anywhere within the document.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502150 Civil 1.4 Background n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Sacramento River South. There is a scour hole (stable in the last years) about 80 feet deep in the Sacramento River south of the American River. Even if the location of the channel did not move the last 150 years there are scours that should be considered and riverbank and levee erosions during high flood events that should be considered.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

Clarified that even though the channel has not changed location much in 150 years, that local scour and erosion issues can still develop. Here is the language:

"The location of the channel has been relatively stable for the past 150 years although local scour and erosion can still be an issue."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502151 Civil 1.4 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The description of the two reaches is wrong. The riverbanks are more used by the public on the Sacramento River north reach where there are houses and restaurants constructed on the waterside of the levees plus numerous docs. Both levees on the middle and south reaches are constructed of sand. What is typical on the middle reach closer to the American River is the fill placed on the riverbank against the levee and the numerous structures (residence and commercials) constructed on the fill. The south reach has no structures on the waterside of the levee but heavy vegetation, boat docks and indeed boating activity. Show a picture on the middle reach with boats and houses on it since this is the typical there. Indicate also the south reach has rock protection on the majority of the reach but there are places where the rock is missing.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Check and Resolve**

This section can be re-worded. Below is how this was done. The main changes are noting the waterside structures in the middle reach, noting that the middle reach is also constructed in the same manner as the south reach, and clarifying the general public foot access along the south reach contributes to levee and bank erosion while the waterside private residences of the middle reach limits the public access along the levee and banks.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

2-0 Evaluation **Check and Resolve**

I believe the word "middle" was either removed or clarified and discussed in the revised text. This revised text should be available soon (maybe by close of business today).

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

Backcheck not conducted

Current Comment Status: **Comment Closed**

5502154 Civil 1.4 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Background description of the other channels (NCC, NEMDC, Arcade and Dry Creek) is missing. A brief description of these channels should be included, at least to justify why there is no analyses done and no protection recommended.missing

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **For Information Only**
Please refer to Section 1.3, paragraph 3, exclusion of these tributaries from this report (including the rational for doing so) is discussed therein.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502156 Civil Figure 1-4 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Add (or replace this one)a picture of the Middle Sacramento River showing the fill on the waterside and the constructions on the fill.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
Replaced with aerial photo showing the waterside fill with houses on top of the fill.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5502160 Civil Par. 1.5.1 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Was the discharge in 1986 130,000 or 134,000 cfs?

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **For Information Only**
Verified with Marcia Bond that the peak release from Folsom Dam was 130,000 cfs from report put together immediately after the event. Verified this by looking at actual gage records, too. Other gages downstream may have recorded higher discharges due to additional inflows and this may be where some people think of the peak flow in the LAR as 134,000 cfs. But the peak discharge from Folsom Dam was 130,000 cfs.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502161 Civil Par. 1.5.1 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

I believe significant erosions occurred also after the 2006 flood event.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
Added language to clarify:

"In addition, erosion also occurred during a flood event in 2006."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502167 Civil Par. 1.5.2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

It is important to describe more the bypass system and when it was constructed. This study will be reviewed by ATR and others outside the district and it is important for them to understand the bypass system and how it works.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **For Information Only**
The erosion report focuses on the segments of the lower American River and the Sacramento River in the study area. The report is an attachment to the Engineering Appendix which supports the GRR documentation. Those reports should provide an adequate description of the overall flood control system without the erosion report having to duplicate that information.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502172 Civil Par. 1.5.2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The subparagraph describing how the levees were constructed is wrong. Levees on the Sacramento River north and south of the American River, considered as part of this study were all constructed in the same manner, of dredged material from the river, and therefore these levees have the same consistency of fine uniform sand extremely erodible. The difference is the fill placed on the riverside berm north of the American River where all these buildings were constructed.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

The paragraph was written to only describe the construction of the Sacramento River levees south of the American River confluence. The comment describes the method used in construction of the Sacramento River levee north of the American River. The text has been revised to describe the construction of the Sacramento River levees both norht and south of the American River confluence. The levees on the Sacramento River in Natomas were constructed with trainer dikes using excavated material from the center of the levee by dragline. The core was then filled using hydraulic dredges placing fine sand. There is no information which shows this was the case on the Sacramento River leves south of the American River. Instead the best information availble indicates the levees were constructed with clamshell dredges placing material on the channel bank to enlarge the original levee constructed in the mid 1800's.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5502182 Civil Fig. 1-8 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The Figure 1-8 represents flood fighting of seepage and slope instability of the levee and has nothing in common with erosion. Remove and replace it with an erosion picture but not with a seepage and slope stability issues picture

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

Photo deleted. The intent was to show levee performance during a flood on the Sacramento River regardless of failure mode and this photo was available. However, it can be confusing to have a seepage/slope stability photo in a document focusing on erosion and therefore is deleted.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502195 Civil Par. 1.5.2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The conclusion of the paragraph contradicts the paragraph 1.4 -Background, that indicated that the erosion on the Sacramento River is mostly due to waves created by boating and public activity

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Check and Resolve**
Section 1.4 concludes by stating:

"The causes of erosion in this reach are boat wake, wind-wave, mass failure, fluvial processes, and public use."

Section 1.5.2 states by stating:

"Since the completion of the Sacramento River Flood Control Project, significant floods have caused considerable erosion related damage to the levee system."

Erosion during floods occurs by fluvial process and it therefore appears to be consistent with section 1.4 where fluvial processes is mentioned as one of the erosion mechanisms.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

2-0 Evaluation **Check and Resolve**
Fluvial processes (section 1.4) = erosion by floods (section 1.5.2. So I believe they are consistent. Is there some specific language that you want changed?

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014
Backcheck not conducted
Current Comment Status: **Comment Closed**

5502206 Civil Par. 1.6 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Even if there were no significant erosion observed at locations with concrete rubble on the slope, concrete rubble is not recommended for slope protection. It may hide undetected rodent holes or erosions underneath the concrete, there is no bedding or filter material between the rubble and the levee and also there is no correct rock size distribution. The only restriction in the past was that there should not be any R-bars sticking out of the rubble for safety of boating and other public activity.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **For Information Only**

Agree. The erosion report is only reporting observations of conditions from monitoring and is not endorsing use of concrete rubble.

Text changed to clarify:

"These sites reportedly have concrete rubble (does not meet USCAC standards) on the bank and at the toe that is in poor condition; no significant changes in condition have been observed between annual inspections."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5502211	Civil	Par. 1.6	n/a	n/a

Comment Classification: **For Official Use Only (FOUO)**

The title should not be DWR but CVFPB

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

Thank you. The text will be corrected.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502619	Civil	Par. 1.7.1.1	n/a	n/a

Comment Classification: **For Official Use Only (FOUO)**

Somehow erosion of the riverbed and riverbanks has been mixed with seepage and stability. I agree erosion has an impact on seepage or piping and on the stability and this may need to be more detailed discusses (such as shortening the seepage path, undermining the levee foundation leading to slope failure and so on). But as it is explained and related to scouring and exposure of bridge footing it does not make sense.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Check and Resolve**

Paragraph 1.7.1.1 is a summary of a relatively comprehensive geomorphic analysis. It includes mutliple different observations and recommendations. One observation is that degradation could undermine levee foundations. Another observation is that seepage and piping may be more of an issue than erosion. However, it does not link the seepage and piping to scouring and exposure of bridge footings.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

2-0 Evaluation **Check and Resolve**

The following was deleted per recommendation by Mike:

"The report concludes that bank erosion is less of a problem as compared to seepage or piping although the report cites specific locations where erosion protection is needed."

The only place where the term "seepage" is now used in this section is:

"It is important to note that at the time this report was written, many of the seepage and stability mitigation features had not been constructed along the LAR."

This last sentence is important to keep so that the reader is aware of the time context of the statements and recommendations made by the report.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

Backcheck not conducted

Current Comment Status: **Comment Closed**

5502621 Civil Par. 1.7.1.4 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

What was the reason of the selection of the flow of 145,000 cfs?

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

This section of the document is a summary of work already performed. At one time, this flow was one of the design flows for additional work at Folsom (the enlarged outlets that were then changed to a Spillway).

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502622 Civil Par. 1.7.1. n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Why is Ayres study done in 2002 for USACE not included. It has important information on shear stresses and velocities associated with different discharges.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **For Information Only**

I am not aware of an Ayres report dated 2002; however, section 1.7.1.4 of the erosion report summarizes the 2-D analysis Ayres conducted which computed 2-D velocities and shears for a range of large steady-state discharges (Lower American River, Erosion Susceptibility Analysis for Infrequent Flood Events" dated July 2004 by Ayres Associates). Furthermore examples of the results from this investigation are presented in Section 4.2.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502624 Civil Par. 1.7.1..5 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

What is the frequency associated with 160,000 cfs and why was this the analyzed discharge?

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**

This section of the document is a summary of work already performed. The flow of 160,000 cfs was chosen because that is the design flow of the Joint Federal Project Spillway. The flow of 160,000 cfs is approximately a 200-yr outflow from Folsom and this frequency will be re-evaluated by the Folsom Water Control Manual Update.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5502661 Civil Par. 1.8.1 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Indicate what bench and levee, rich or left bank. Also indicate between what RM the investigation was done.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Check and Resolve**

The erosion attachment was intended as a summary of the erosion study performed as part of the ARCF GRR and as such several details of the study have not been included in the text of the report. We chose not to include a table of explorations as this was considered not a summary item but instead data included in one of the many reference reports.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5502663 Civil Par. 1.8.2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Were the JET tests performed on samples collected from the riverbed or river banks?

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

Revised Jan 28 2014.

1-0 Evaluation **Concurred**
The erosion rate tests were performed on samples from both banks and from the riverbed.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502677 Civil Par. 2. n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Concrete cobbles should be considered as inadequate for slope protection. The voids in the cobbles may be used for rodent animals also there is no bedding material between the cobbles and the levee embankment or riverbank and the erodible fine material may migrate into the voids in the cobble. Also these cobbles may hide defects in the levee slopes such as internal erosions, slope failures, rodent holes and other

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **For Information Only**
Agree. This document is reporting observed conditions from the field and is not advocating or even suggesting that concrete rubble is appropriate for slope protection.

Added a clarifying sentence at the end of the first paragrah in section 2:

"As shown in Figure 6-3, the tentatively selected plan is to replace the historic revetment (e.g. cobble) with modern revetment to protect the banks from anticipated future flows."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502680 Civil Par. 2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Par. 2. All the repairs shown on the figures 2-2 to 2-7 show riprap placed 1-2 feet above the water line, when the water was at a pretty low elevation. Is the riprap covered by brush and grass or it is only on a short height of the slope? Is this riprap considered adequate?

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

Revised Jan 28 2014.

1-0 Evaluation **For Information Only**
A channel stability analysis (Ayres Associates, 2010) was used to determine areas requiring revetment with the assumption that all areas without modern revetment will be protected. Modern protection was determined by areas defined as rock riprap with overall condition of good or very good.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5502689 Civil Par. 3.1 & 3.2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Are the par. 3.1 and 3.2 not related only to the American River? If so say that in the title.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 28 2014

1-0 Evaluation **Concurred**
Titles for these two sections have been modified as follows:

3.1 Geologic and Geomorphic Mapping and Analyses of the Lower American River

3.2 3-Dimensional Stratigraphic Model of the Lower American River

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503129 Civil Par. 4,3 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The threshold analyses is currently ongoing but there are results are not yet available. This project si going on for more than 5 years. If something is not yet ready to be published I believe t would be better not to mention it at all. The report should be complete at this phase not with gaps.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

Section 4.3 has been deleted as suggested. However, this is used as an example of ongoing work to be completed in the future to address observations and recommendations from the expert panels (section 1.7.2.3, last sentence has been added so it now reads: "The District envisions that, as appropriate, the remaining work efforts will be addressed in future studies. For example, there is currently an ongoing channel widening threshold analysis to support changing operations at Folsom Dam."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503155 Civil Par. 5.1, Fig. 5-1 & 5-2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Were the studies by NHC in 2009 and 2012 not done as a contract with USACE? In this case,. Why the channel degradation in Fig, 5-1 and 5-2 are in meters?

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**

Figure 5-1 and 5-2 originally started in another (non-USACE and non-NHC related) document that was in meters. NHC plotted new data on top of this borrowed figure for illustration purposes and did not atttempt to find the original data supporting the original work effort and convert it to feet for NHC's report to USACE. However, it still provides good information and the effort and cost to convert these figures to feet far exceed the benefits and it may not be possible. However, it is important that the reader understand these figures are in meters and this as been added to the caption as:

"The elevations are given in meters in NGVD 1929 vertical datum and not in feet."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503183 Civil Par. 5.4.1 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

It should be mentioned that the erosion component of the fragility curve is part of the judgment curve and was not estimated based on any analyses but on the experience of an expert elicitation panel, considering the location of the index points, the conditions of the foundation and levee material, water velocity at that specific location, and on past history.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

The discussion in Section 5.4.1, para. 1 will be expanded to include this information. The proposed modification now reads:

"...Furthermore, the engineering judgment component consists of considerations for vegetation, animal burrows, encroachments, utilities, and erosion. It should be noted that the erosion component was not estimated based on any analyses, but on the experience of an expert elicitation panel, considering the location of the index points, the conditions of the foundation and levee material, the water velocity at that specific location, and on past history."

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503201 Civil Fig. 5-12 to 5-14 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Fig. 5-12 to 5-14 are not representative for the erosion report. The high risk of poor performance of the levee without the project is not due to erosion but mostly due to seepage or stability, erosion being a small part of the curve. The reduction in risk is not after erosion measures are considered but after seepage and stability deficiencies are mitigated. The figures should be replaced with the Judgment curves at the same locations , with or without project, to demonstrate the impact of the erosion control measures and the impact of the erosion on the poor performance of the levee.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

The report text has been updated to show the judgment with- and without-project curves as figures. The report text has been updated to explain the differences between the with- and without-project curves, the changes to the erosion portion of the curve, the residual risk captured in the with-project judgment curve, that the American River curves capture the existing cutoff walls, and that the Sacramento River combined curve has seepage and slope stability components as well.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503225 Civil Par. 5.4.1 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

How par. 5.4.1 is written, it lead to the conclusion that cumulative probability of poor performance greater than 50% without project is reduced due to erosion measures to less than 20 percent. This is not correct, the majority of reduction of the probability of poor performance is done by the seepage and mitigation measures, and partially only by erosion protection measures. This is the reason I insist to replace the geotechnicalperformance curves with the judgment curves (Figures 5-12 to 45-14) before and after project which indicates the reduction of probability of poor performance by erosion control measures.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
The report text has been updated to show the judgment with- and without-project curves as figures. The report text has been updated to explain the differences between the with- and without-project curves, the changes to the erosion portion of the curve, the residual risk captured in the with-project judgment curve, that the American River curves capture the existing cutoff walls, and that the Sacramento River combined curve has seepage and slope stability components as well.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

2-0 Evaluation **Check and Resolve**
Report should be available by close of business today.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014
Backcheck not conducted
Current Comment Status: **Comment Closed**

5503226 Civil Par. 5.4.2 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Same comment as for Par. 5.4.1 - American River

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

The report text has been updated to show the judgment with- and without-project curves as figures. The report text has been updated to explain the differences between the with- and without-project curves, the changes to the erosion portion of the curve, the residual risk captured in the with-project judgment curve, that the American River curves capture the existing cutoff walls, and that the Sacramento River combined curve has seepage and slope stability components as well.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5503259 Civil Par. Fig 6-1 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

The cross section should indicate what is the material placed within the launchable rock. If this is a launchable rook the mass of rock should move in case of undermining of the slope or riverbed. However, I assume there is a mass of soil within that rock, so the rock will be replaced by that material in case of undermining and the purpose of this launchable rock is lost, unless the entire mass is rock Also, the rock size distribution is dictated by the velocity in the channel. However, this launchable rock is not designed based on any velocity, it is "one size fits all" rock and may be easily washed away by high velocities. Also I am not sure the launchable rock respects the required specification for rock quality.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

Revised Jan 29 2014.

1-0 Evaluation **Concurred**

The material within the launchable rock portion of the design will be 100% rock. There is no soil within the rock mass that launches. The launchable section is buried to lower the amount that needs to launch and above that section soil is allowed. The rock size was determined on average velocities and verified with recent designs. The launchable rock (specification) is not as critical as volume of rock in determining costs. The design should provide an adequate volume of rock for alternative selection with actual site specific design occurring in PED.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503280 Civil Par. 6.3. n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

I suggest revising the title of the paragraph removing the word "Trench". This is not a trench but a mass of rock placed on the riverbank. There is no trench excavated in the riverbank of riverbed.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Non-concurred**

In this case, the launchable section will be placed in an excavated trench along the waterside levee toe. The detail in the erosion protection report is not as clear as the details in the engineering appendix. See attached detail. The Bank Protection method has a launchable component that is on the riverbank.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014
(Attachment: engineering_appendix_exerpt.docx)

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503383 Civil Par 7.1.3 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

It should mention that the raise of discharge due to Folsom Dam modification leading to higher velocities in American River will have no impact on the propose slope protection. The proposed slope protection was not designed based on the velocity or depth of water, it is a launchable rock with no particularly designed rock size based on velocity and it is placed on the levee to the top of the levee. I assume it is to the top of the levee, however I did not see any recommendation regarding the top of slope protection on Sacramento or American River.

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

We added the following to paragraph 6.1 "The erosion protection was designed to convey the 0.5% ACE (200-year) future condition as described in Chapter 4."

The rock size was determined on average velocities and verified with recent designs. See response to comment 5503390 for discussion on whether design extends to top of levee.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503390 Civil Par 7.1.3 n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

General Comment: I understood the proposed protection is either launchable rock of launchable rock trench. However, I did not see any information if the protection on American River is on the riverbank only or it extends on the slope also, and I did not see any information on the height of the slope protection on the levee (if it is extended on the levee also0. One of the issue of the existing slope protection is that height may not be adequate, therefore on some places where the protection exists it needs to be raised either to the top of the levee or to the design water elevation. Also I did not see any conclusion of the extensive erosion investigation on American River on the riverbed erosion and the proposed mitigation (probable the launchable rock trench, but it is not specifically indicated).

Submitted By: Mary Perlea (916-557-7185). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
The erosion protection is either Bank Protection or Launchable Rock Trench. The Bank Protection protects the existing bank away from the levee toe. This toe protection is intended to protect the levee away from the levee and, typically, velocities at the levee are low enough that slope protection isn't required to the crown.

The Launchable Rock Trench will deploy when the existing berm is eroded away. The river will be allowed to meander and, therefore, the velocities along the levees may be high enough to require protection. The end result is a fully-protected slope to the crown.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Mary Perlea (916-557-7185) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503634 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.1, paragraph 1. Is the rationale for the proposed erosion protection based on a quantification of the risk associated with erosion? Justification for project features normally has to go through such an analysis and that should be discussed further here.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Text added to clarify and confirm that a risk analysis was done for the feasibility study.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503635 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.2, paragraph 2. The Natomas PAC did consider erosion, specifically for the Sacramento River north of the American River and the east side tributaries (NEMDC, Natomas Cross Canal, etc). This may not be clear in the PAC documentation, but it should be referenced and discussed. Does this new erosion appendix supersede anything discussed in the Natomas PAC for erosion?

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Intro section text has been revised to clarify how erosion was handled on each reach for the study. Some reaches were handled as part of the Natomas PAC, and other small reaches were assumed to need minimal additional erosion analysis that will be deferred to PED.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503636 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.3, paragraph 1. When talking about the system, it is not clear if you are referring specifically to the American River. If so, suggest referring to as the American River levees or American River levee system. It mentions the 1955 event required an emergency flood fight – was that for the American River levees? Please also see paragraph 4 of Section 1.5.1 for similar comment on "system".

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

I was hoping that the section title "Background – Lower American River (LAR) Overview" would help to tell the reader that this section was focusing on the Lower American River. With that said, the subject paragraph (Section 1.3, 1st para.) has been modified to the following:

"The American River levees were originally intended to convey a release from Folsom Dam of 115,000 cubic feet per second (cfs). During several events since the construction of Folsom Dam, flows have equaled or exceeded the design capacity and caused significant erosion distress. All four significant flood events since the completion of the Federal flood control system in the mid 1950s (1955, 1966, 1986, and 1997) caused considerable damage to the American River levee system due to erosion. The 1986 event had an imminent threat of levee failure. And, all four events required extensive repair after the event so the American River levee system could perform for the next major event. The objective release from Folsom Dam is currently under review as part of the Folsom Dam Reoperations Study and the Joint Federal Project is currently constructing improvements to the dam for a release of 160,000 cfs. Based on past performance and recent investigations, erosion is a serious threat to the American River levees that must be addressed."

Tibbitts let me know that flood fights were along the Feather in 1955 so that sentence has been deleted from the subject para. Additionally, the paragraph (Section 1.5.13, 4th para.) has been modified to the following:

"Sacramento experienced significant flood events again in 1964, 1986, and 1997. The 1964 flood event was the first time the complete American River levee system was tested with a flow of 115,000 cfs. The 1964 flood event showed considerable stress on the levee system for a flow of 115,000 cfs. An emergency flood-fight along the left bank of the American River near H Street was required to pass the flood event."

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

This looks good, thanks.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503639 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.3, paragraph 4. To help tell the story, it would be good to discuss the purpose for convening the expert panel in 2010 - mainly due to questions and uncertainties regarding previous design recommendations and the environmental sensitivity of doing extensive erosion work on the American River including grade control.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Thanks for the suggestion. The subject paragraph has been modified to:

"Following the 2010 report a panel of experts in engineering fields associated with erosion was convened by West Consultants for the USACE due to questions and uncertainties regarding previous design recommendations and the environmental sensitivity of doing extensive erosion work on the American River including grade control. The panel was tasked to consider the adequacy of studies conducted to..."

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503640 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.3, footnote 2. The text appears to be cutoff.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **For Information Only**
No; this short statement was made to differentiate that all of the references to river miles are based on the USGS index and not the Comp Study index.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503642 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

6. Section 1.3, paragraphs 5&6. Paragraph 6 seems to be repeating what is already said in paragraph 5. For clarity, please combine.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Considering that para. 5 told the story of additional data collection and investigations in a past-tense form and para. 6 told the story more from a point of view what was expected of the investigations, I went with just deleting para. 6 since all of the critical information is present in para. 5 and then the past vs. present issue goes away.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503643 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.4, paragraph 2. Using the term "middle" reach is confusing for purposes of this discussion. It also mentions multiple diversion structures, but only the Sac Weir is located along this reach.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Text has been revised removing the "middle" terminology. The reference to multiple diversions has been replaced with a description of the Sac Weir only.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503644 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Figure 1-4 and Figure 1-5 should include in the title the river mile or range of river miles they are supposed to represent.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Concur, figure titles has been been revised.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503646 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.5.1, paragraph 5. Peak flow for 1986 was 134,000 cfs.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **For Information Only**

Please cite reference for the 134,000 cfs. Please don't include Tibbitts' September 2012 report on the Nov/Dec 2011 Advisory Panel – Dan hasn't been able to cite his source of the 134,000 value. I have spent some time investigating this item and cannot find any documentation that the peak flow (or peak release from Folsom) was anything but 130,000 cfs for the 1986 event. Corps' discharge records for Folsom Dam show a maximum release of 130,000 cfs. Please refer to the attachment which includes excerpts from the Folsom Dam & Lake water control manual (Dec. 1987) and from the Short Period Computation Sheet used during the flood event to track inflow, lake volume, and outflow by WATMAN.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014
(Attachment: Pages_from_Folsom1987CompleteManual3.pdf)

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503648 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Figure 1-7. Add text noting peak flow of 115k to Jan 1997 hydrograph.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

Will do.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5503650 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.7.1.4, paragraph 1. Other flows beyond 145,000 cfs were part of the study including 160,000 cfs. This should also be briefly discussed. 145,000 cfs was important because it was the flow used for levee certification.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added the following clarifying language to the end of the section:

"Other discharges such as 160,000 cfs were also included in this document."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503652 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.7.2. For better flow of the document, recommend removing 1.7.2.2 - 1.7.2.4 discussions on hydraulics and sediment transport and moving them up in the hierarchy – so they stand out a bit more. In brief, sections could be set up as follows (Sections 1.8 and 1.9 remain the same):
a. 1.7.2.1 2010 Panel
b. 1.7.2.2 2011 Panel
c. 1.7.2.3 2012 Panel
d. 1.10 Hydraulic and Sedimentation Studies
e. 1.10.1 Sedimentation Studies Completed Tasks
f. 1.10.2 Sedimentation Studies Tasks in Progress
g. 1.11 Levee Screening Tool

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Changes made as indicated.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503653 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.7.2.3, paragraph 1. Ayres analysis for bankline migration indicates 1957 to 1998 and then states NHC confirmed Ayres analysis with 1998 to 2010 study. These are different time periods, so not sure how it can be confirmatory. Are the years correct or does there need to be some additional discussion?

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Changed subject sentence for clarity to:

"NHC confirmed Ayres findings of no significant recent bankline migration by using aerial photos combined with survey data from 1998 to 2010 to develop more accurate banklines. NHC noted that significant differences shown in the previous Ayres analysis were the result of Ayres incorrectly identifying the top of bank from aerial images without the aid of relatively accurate topographic data."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503654 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.7.2.4, paragraph 1. Is it correct saying USACE has not performed a review? It would seem if we are including results, that some level of review of the information has occurred– it does say results seem reasonable. It would certainly seem appropriate to indicate results are draft and have not undergone the full review process. Please also reference the appropriate section for geotechnical studies so it is clear what the source of the new information for the bed and banks is.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Changed the first paragraph to:

"This information is based on draft results that have not been fully reviewed by USACE and should be viewed with caution as they are subject to change."

Also, added the reference to the geotechnical information, section 1.9.2.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503657 Hydraulics n/a n/a n/a
Comment Classification: **For Official Use Only (FOUO)**

Section 1.7.2.4, paragraph 1. The results are called into question based on the hydrologic inputs and notes they should not be used for estimating long term trends, though the results do seem to be discussed later on in the report. It is not clear why they couldn't be used as a source for long term prediction of trends, despite uncertainties.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**
The explanation can be found in the paragraph:

"Other studies have found that trends from a single flood event may be opposite of the long-term trend and therefore these results should not be used for estimating long-term aggradation/degradation trends."

This is a summary of the following. NHC conducted HEC-6T sediment modelling for the Sac Bank project that included long-term hydrology (1997 - 2008)from actual gage data as well as only specific events (e.g. 1/50 ACE, 1/100 ACE). A comparison of the results for the same reach (Lower American River to Freeport) shows that the reach is degradational during a specific event but aggradational over the long-term. The implication is that using single event hydrology (e.g. the 1/100 ACE event) or a series of single event hydrology (e.g. 1/100 ACE event followed by a 1/200 ACE event) may provide evidence for the opposite trend (degradation) than if a wider range of flows (e.g. 1997 - 2008 "continuous" hydrology) is used for the same reach. So while specific event modeling is likely more conservative for design and cost of erosion counter-measures for this reach, it may not be helpful if long-term trends are needed for other purposes, such as for determining if future sedimentation will bury spawning gravel. Despite this limitation, the results do represent the latest geologic understanding and may still be informative and perhaps conservative relative to feasibility level designs and costs. There is a lot of uncertainty associated with all sediment models as noted in the comment. However, the Sac Bank Sediment Study shows that using event specific hydrology vs. long-term hydrology for the exact same model can lead the model to show opposite trends. Therefore the relative differences may lead to incorrect conclusions even though both models are subject to considerable inaccurracies.

If necessary, this longer explanation can be provided. However, I feel it disrupts the flow of the document and does not contribute significantly to the overall conclusions.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
This is good discussion and would be appropriate to add as a footnote so it doesn't disrupte the flow of the document.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Text was revised to add the discussion. This new proposed text is:

"The calibrated model was run for multiple synthetic hydrologic scenarios designed to mimic short-term and long-term morphological conditions. This does not include a full set of hydrographs over decades of future conditions but uses a series of individual events to approximate short-term and long-term conditions. This hydrologic approach to the sediment modeling is useful for relative comparison purposes and should not be used to estimate actual future conditions. Other studies have found that trends from a single flood event may be opposite of the long-term trend and therefore these results should not be used for estimating long-term aggradation/degradation trends.

NHC conducted HEC-6T sediment modeling for the Sacramento and Lower American rivers (NHC 2012) that included long-term hydrology (1997 - 2008)from actual gage data as well as only specific events (e.g. 1/50 ACE, 1/100 ACE). A comparison of the results for the same reach (Sacramento River from the Lower American River confluence to Freeport) shows that the reach is degradational during a specific flood event but aggradational over the long-term. The implication is that using single event hydrology (e.g. the 1/100 ACE event) or a series of single event hydrology (e.g. 1/100 ACE event followed by a 1/200 ACE event) may provide evidence for the opposite trend (degradation) than if a wider range of flows (e.g. 1997 - 2008 "continuous" hydrology) is used for the same reach. So while specific event modeling is likely more conservative for design and cost of erosion counter-measures for this reach, it may not be helpful if long-term trends are needed for other purposes, such as for determining if future sedimentation will bury spawning gravel.

Despite this limitation, the results do represent the latest geologic understanding and may still be informative and perhaps conservative relative to feasibility level designs and costs. There is a lot of uncertainty associated with all sediment models as noted in the comment. However, the Sac Bank Sediment Study shows that using event specific hydrology vs. long-term hydrology for the exact same model can lead the model to show opposite trends. Therefore the relative differences may lead to incorrect conclusions even though both models are subject to considerable inaccurracies.

The results from this study (NHC 2013) include:...."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503658 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.7.2.6, paragraph 2. There should be more detail in terms of what was done and what wasn't done to address each of the conclusions and recommendations from the various panels including the why and the why not. While geotechnical, geologic, and geomorphic studies were referenced in Section 1.8, follow-on hydraulic and sedimentation studies were not. It would be good to draw a clear connection from the recommendation to the actual follow-on work or study. It would be especially important to note recommendations that were not addressed in some fashion and the reasoning for not doing so. While budget and schedule are important, there should also be some technical reasoning perhaps from a risk standpoint that played into it.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**

For the most part most of the items mentioned have been followed through with the exceptions noted below. The exceptions noted have been added to the text as follows in the parentheses. These include the following 2 bulleted items:

• Existing modern bank protection sites need to be analyzed to assure they can withstand a flow of 160,000 cfs. (Note: This recommendation has not been followed to date. The feasibility study assumes that recent erosion protection was designed and constructed adequately to withstand this discharge without the need for additional analysis beyond what was conducted for the design. It has not been verified that each site was designed for 160,000 cfs.)

• Because of the large extent of bankline/levee requiring armoring, a site prioritization method needs to be developed so that the sites being the most urgent will be addressed first when construction begins. (Note: This recommendation to develop this site prioritization method has not been completed at this time and will need to be developed in the future.)

In addition, language has been added at the end to highlight that some of the recommendations mentioned that were followed through are provided in parentheses:

"Some of the recommendations were not addressed due to budget and schedule considerations. Some of these recommendations that were not completed are noted above in parentheses. The District envisions that, as appropriate, the remaining work efforts will be addressed in future studies."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**

The 2nd to last bullet in 1.7.2.2, for note in () change to "The mehtod was not considered practical for use in the stability study and was not conducted". You probably should consult with Mike K, to make sure that is correct.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**

I am checking with Mike now. I have modified the language as indicated:

"• Characterization of materials is primarily being completed by the EFA and JET testing. Other methods to characterize engineering properties of geologic materials should be utilized. An example of one would be the NRCS soil/rock erosion model. Additionally, lab test results needs to be correlated to behavior in the field. (Status: The method was not considered practical for use in the stability study and therefore was not conducted)"

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Open Comment**

I am ok with the proposed modified language pending review by Mike.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

3-0 Evaluation **Concurred**

Confirmed that Mike is OK with the proposed language.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 10 2014

3-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 10 2014

Current Comment Status: **Comment Closed**

5503660 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 1.8.4, paragraph 3. Results were to identify locations requiring further study and investigation. Are those areas identified in this report? This should be addressed in some manner so it doesn't leave it as a question.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**

The study referenced in the comment was developed as a standalone document that described the surficial geology to varying levels of detail dependent on the location within the general study area. This mapping was developed using the best existing data. Where the quality of the data was improved it was incorporated into the study, but also highlighted where data gaps still existed. At one point additional investigation contracts were in process but that study was differed to PED. The erosion attachment assumes a certain level of detail in the data and resulting conclusions which comprised the study and admittedly assumes more detailed required for PED and construction. I believe several parts of the report address the idea of further study during PED, but a specific account of where further study is needed would essentially be a description of the PED scope which is likely too detailed and comprehensive for this report.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503661 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 3.1, paragraph 7. The report in general seems to be saying erosion of the hard outcrops is not an issue, though it does state here several mechanisms of how they erode. Time scale likely is a key consideration in terms of how long it takes for these processes to occur and should be discussed briefly here.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**
The geotechnical and geologic study did vastly improve the knowledge of the properties and location of what was originally thought to be an erosionally resistant clay layer. The study referenced in the comment did find that due to the location and properties of the material, the risk posed to the flood control structure due to erosion of the so called ERU was likely low. Based on the new understanding of the material, it also proposed general failure mechanism of the ERU. However, those mechanisms were not studied. Any inference of the time required for the ERU to undergo its likely erosion process would require substantial additional data collection and analyses, based on the previous conclusion regarding consequence of failure of the ERU, that study would not be relevant to the flood control structure.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Open Comment**
Please add this explanation as a footnote in the document.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Added the following explanation to section 7.1.2 in coordination with Mike (copied and pasted from Mike as he suggested):

" Field observations suggested that erosion of the exposed erosionally resistant sediment occurs over time at both the granular- and outcrop-scale. However, the mechanisms and time scale associated with that erosion are not well understood and were not studied. Due to the location and properties of the material, the risk posed to the flood control structure from erosion of the erosion resistant sediment were estimated to be low and no further study of its erosion mechanisms or time scale were performed."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 10 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 10 2014
Current Comment Status: **Comment Closed**

5503663 Hydraulics n/a n/a n/a
Comment Classification: **For Official Use Only (FOUO)**

Section 3.2, paragraph 4. Along with describing the various stratigraphic features, the relative erodibility of these units should be discussed and how this information was used in the overall study.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
The subject section of the report gave a general summary of the process used to develop the layers of the model. These layers were developed by grouping material based on similar properties, which included erodibility as well as several other properties. This is described in as much detail as is relevant for this report in paragraph 3 of Section 3.2. As much of the erosion rate testing was in progress and also not nearly comprehensive enough to assign to each layer, the relative erodibility is evident by the material types and their mechanical properties described in the report.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Section 4.2 discusses the erodibility of materials lining the American River channel considering predicted velocities and shear stresses. This is an important link, that answers the comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503666 Hydraulics n/a n/a n/a
Comment Classification: **For Official Use Only (FOUO)**

Section 3.2, paragraph 5. Not sure Bouldery and cobbley are official terms. Please confirm.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Confirmed

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503668 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 4.1, paragraph 1. The Folsom mini-raise should be referred to as 3.5 ft raise. This should be corrected throughout report.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Will do.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503671 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 4.1, paragraph 1. Indicates it will be able to discharge 160k, but isn't that part of what the study is trying to figure out or justify? The reality is the JFP and Dam Raise projects, based on the 2007 PACR simply assumed downstream capacity was 160k without recognizing the current downstream limitations.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Concur, text has been revised to describe the "intent" of this what the project will accomplish not necessarily providing a technical opinion.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **For Information Only**

The GRR is not a design level document but is primarily concerned with conservatively estimating project costs, benefits, and environmental impacts. Additional analysis will need to occur during implementation to verify the assumption that existing rock (either mdoern revetment or cobblestones) are designed for 160,000 cfs. If the rock is designed and constructed in accordance with standard engineering practice and USACE guidelines, it should reasonably be expected to provide adequate erosion protection. However, continued maintenance is needed and may include installing additional bank protection as necessary. In addition, the bank protection needs to be monitored during and after flood events. Duration is not necessarily part of the riprap design criteria. However, this should be considered during design of the riprap along with the consequences when selecting an appropriate factor of safety. Site selection and prioritization will also need to occur during implementation.This information should be included in the cost schedule risk analysis and the risk register. Additional languag was added to address this in sections 4 and 7.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 10 2014

2-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 10 2014

Current Comment Status: **Comment Closed**

5503673 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Table 4-1. These values were derived for the Common Features Study, but may have changed, specifically as part of the Water Control Manual update. This caveat should be added here in the text.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

Concur, caveat has been added to text.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5503675 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 4.1, paragraph 4. Flow duration was identified as a source of uncertainty and could certainly be critical with the potential for large flows at longer durations under the new operation scenarios. How was this captured in the risk informed decision making, i.e. development of fragility curves?

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

In developing the levee performance curves the best available data was used, including flood hydrographs which gave flow and duration information. This information was used in the estimation of the levee performance for each loading shown in the judgment curve. Of course, with increasing stage came increased loading on the levee (velocity and shear stress) as well as increased duration for which erosion flows would be seen on the levee slope.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503676 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1, paragraph 5. It notes that "this information with estimated relative sea level rise and other pertinent information should be used to inform risk based decisions". Which risk based decisions is it to inform? The feasibility study?

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **For Information Only**

This can be used to inform feasibility level or design level risk based decision. For example, if scour counter-measures represent a significant component to the feasibility cost, adding the cost in would be conservative and may reduce risk by improving assurance that critical bridges used for evacuations are passable. It can also be used for design based decisions such as computing scour depths for design of erosion protection.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**

Comment response also indicates can be useful for design purposes, if true, indicate that as well at the end of paragraph 5.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Added additional sentence at the end so that it reads:

"This information together with estimated relative sea level rise and other pertinent information should be used to inform risk based decisions. This includes both feasibility and design level decisions."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503678 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1, paragraph 6. Please be more explicit on describing "model differences".

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
This section has been revised for clarity and to call out the differences explicitly as indicated below (differences are now bulletted):

"The future trend noted in Figure 5 5 does not include more recent data on erosion resistance formation beneath the American River that could limit future vertical erosion. A more recent update of the model includes this new geotechnical information and draft results are shown below in Figure 5 9. The model used in figure 5-9 includes the updated geotechnical information but has other differences with the model used in Figure 5 5. The significant differences between the models used for Figure 5 5 and Figure 5 9 are:

• Figure 5 9 model includes the updated geotechnical information while Figure 5 5 model does not

• Figure 5 9 model is based on synthetic event hydrology while Figure 5-5 model is based on actual historical hydrology
• Figure 5 9 model is "fixed" at the downstream boundary by a rating curve while the Figure 5 5 model is allowed to adjust dynamically based on changes to the Sacramento River (i.e. Figure 5 9 is not "linked" to the Sacramento River HEC-6T model while Figure 5 5 is).

Therefore Figure 5 9 cannot be compared directly with Figure 5 5. The amount of scour seems to be much less than previously predicted which may be partially explained by model differences noted above. Despite these differences, by referencing Table 5 1 which lists the average expected channel erosion by reach for the Lower American

River for 50 to 100 years of simulation, it can be concluded that it is possible the channel may erode nearly fully to the erosion resistant material between RM 6.5 and 10 (as shown in Figure 5 9). It is also possible that the bed may erode to or nearly to the erosion resistant surface for portions of the reach above RM 15 (above where the current federal levees end). Especially since the depth of active erosion likely exceeds that observed or predicted by the models. This makes protecting the levee toe critical for flood risk reduction and future degradation upstream of the levees may have detrimental impacts on environmental and recreational interests in this reach."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503680 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1, paragraph 6. The non-continuous hydrographs were expected to represent the main opportunities for scour/aggradation. Please explain.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**
The non-contious hydrograph may show the main opportunities for scour/aggradation. However, it appears that the model may not be entirely representative of actual conditions because the downstream end is "fixed" by the downstream rating curve rather than being dynamically linked to the Sacramento River HEC-6T model. This "fixed" boundary may propogate upstream and affect the final solution. In addition, as indicated in another comment and in the report (section 5.1, paragraph 5), using individual events may be conservative for a design and feasibility cost perspective as it is likely to show more scour than long-term hydrology. This is likely OK for the feasibility study but the results should not be used to portray long-term trends for environmental considerations. Only for representing flood events.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503683 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1.1, paragraph 1. Please define "lower half of the study reach" more explicitly.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Revised language to clarify:

For the Sacramento River, simulated degradation or aggradation generally increase from 1 to 5 ft, with a prevailing aggrading trend in the lower half of the study reach (less than 1 ft in the lower portion – which is the lower ½ of the reach from Colusa to Freeport).

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5503686 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1.1, paragraph 2. Explain the basis for decreasing other flows so total annual runoff does not change. Why does the total annual runoff remain the same?

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **For Information Only**
For climate change, predicting whether this area will become wetter or drier is not simple. Based on conversations with hydrologists, the overall annaul rainfall over the long-term may not change significantly. Given the uncertainty involved, assuming that the overall amount of rainfall remains unchanged is reasonable for a sensitivity analysis. However, climate change is often thought by experts to exagerate heavy precipitation and exagerate low rainfall. Therefore by increasing some of the highest flows and decreasing some of the lowest flows is expected to be a reasonable assumption for modeling the sensitivity of the sediment model to climate change. It is not expected that it is modeling climate change exactly, but is modeling one of an infinite number of possibilities to get a sense for the model sensetivity to climate change.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503687 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1.1, paragraph 3. Hydrology developed for the HEC-6T for the American River was supposed to represent future operating conditions with Folsom projects in place and so that should be noted. However, with that said, there certainly will still be uncertainty in future hydrologic conditions as noted.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added a clarifying sentence:

"The HEC-6T model developed by the ARCF GRR (e.g. Figure 5 9) used hydrology that is thought to be representative of changes to operations at Folsom Dam."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

5503688 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1.1, paragraph 4. Please note source of HEC-6T results – I assume they come from the latest NHC modeling, but wasn't sure.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added language clarifying the results are from the HEC-6T model developed for the Sac Bank project:

"In general, however, degradation predicted by the model for the lower American River (the HEC-6T model developed for the Sac Bank Project, see Figure 5 5) agrees with the stage-discharge records obtained for the American River gage at Fair Oaks which shows ongoing channel degradation."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

1-2 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503690 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.1.2. If studies during PED yield results showing the need for grade control, how will this be taken under consideration seeing that the decision now is not to include it as part of the plan and only as OMRR&R? This could create a difficult situation down the road with the need to include, but without authorization to do so. Later in the document (Section 5.2.4), it indicates consequences with including in the plan are greater than not including. This should be explained further.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**
If grade control is needed in the future but not included as part of this feasiblity study originally, it is assumed the appropriate USACE planning and/or permitting process and necessary Congressional action will need to be followed. For example, perhaps a LRR and a new EIS/EA will be needed and new authorization may be needed. See planning for more detailed explanation.

The explanation for why not including grade control is the lower risk feature is currently explained. In summary the thought is that:

1) It is inconclusive if grade control will be needed (even by experts) and whether it is needed or not is well witin the uncertainty of any technological tools used to analyze the situation.
2) The need for grade control is likely to occur oover a longer period of time that can be monitored and remedial actions put in place and not during a single flood event. This "ductile" failure mode lowers the risk (similar to a ductile failure that can be observed in advance of failure and fixed in a structure lowers the risk more than having brittle failure that occurs suddenly without warning).
3) By including grade control, it guarentees financial expenditure likely on the order of $50 million) and associated detrimintal environmental impacts to address a percieved need when the need is debatable.

A monitoring approach will allow for determining if the need develops and take appropriate action in a timely manner only if needed and is considered lower risk than spending $50 million dollars and impacting the environment on something that likely is not needed.

Please advise on what if anyting needs to be added to explain further.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
The revised discussion is good. Only change - in first paragraph spell out OMRRR and in second paragraph use abbreviation only.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Agreed and completed as suggested so the OMRRR is spelled out in 1st paragraph and abbreviated subsequently.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503692 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.2.1, paragraph 5. Please define "Common Feature GRR project vicinity".

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Modified sentence to clarify that only the Sacramento River within the ARCF GRR project is included in this statement:

"Therefore the Channel Evolution Model indicates lateral erosion and channel widening for both the Lower American River and Sacramento River within the Common Features GRR project."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503694 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.2.3, paragraph 1. It notes work conducted along selected reaches. I assume that includes the American River. If so, please add, "including the American River".

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added:

"The work was conducted along 300 miles (483 km) of Sacramento River main stem and selected reaches, including the Lower American River."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503697 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.2.3. Only a few of the sites are within the study area and the basis for selection is not apparent. Some additional discussion would be helpful.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**
The basis for selection of the sites can be determined by reading the original USDA report for the Sacramento River Bank Protection Project. This is referenced and the reader can look here for how the Sacramento River Bank Protection Study set up this study and why they selected the sites. This is intended to be a summary document and not provide all the details, only the pertinent information (e.g. focus on the conclusions with references to other documents for more details). Paragraph 4 notes that the number of sites and location of the sites is not ideal for the ARCF study but still provides valuable insights to overall erosion trends for the study area and is in agreement with other findings:

"Of the 50 intensive sites analyzed, seven are within the Common Features GRR study area along the Sacramento River and three are located in the Common Features GRR study area along the Lower American River. While this may be appropriate for large scale studies like the Sacramento River Bank Protection Project, it is likely not a large enough sample for more narrowly focused feasibility studies such as the Common Features GRR. Also, no sites were located in the area constricted by levees between RM 5 and 10 on the Lower American River. In addition, the hydrology used for estimating erosion 48 years into the future generally had higher flow rates than long-term averages and therefore may over predict long-term sediment loading and bank retreat. However, the study still provides valuable insight into erosion in the Common Features GRR project. The estimated percent of total sediment derived from the banks agrees remarkably well with the results from a historic channel shift analysis (NHC 2012). This study by the USDA confirms the results of the Channel Evolution Model and the observations from annual erosion surveys and air photo analysis."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503698 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.2.4, paragraph 3. Work required to protect infrastructure is not currently in the plan but no reasoning is provided for not including it, especially since it has been identified as a potential issue.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added additional language:

"For both the Lower American River and the Sacramento River, infrastructure encroaching in the floodway, such as bridges and pipelines, need to be adequately protected from reasonably anticipated scour during design and construction. This effort is not included in the tentatively selected plan. It is assumed this effort will occur during future analysis and design efforts and likely needs to be coordinated with multiple agencies and infrastructure owners. Civil Design has also determined that the additional cost of the scour and erosion counter measures for the infrastructure is not significant compared to the overall cost of the erosion protection currently included in the tentatively selected plan and is well within the associated cost contingency.:

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503702 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.3.1, paragraph 2. Please confirm results of wind-wave analysis by NHC. 46 miles of levees at high risk seems high. Is that high risk from failure due to wind-wave action or high risk of erosion happening? This should be briefly discussed.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**
Section 5.3.1, paragraph 1 states:

"Each site was assigned the highest risk computed for the site for either levee face erosion or overtopping for any wind direction at the site."

Therefore the high risk is from wave erosion or overtopping from waves for any wind direction.

Please see original report on wind-wave for additional information as this is only reporting the values in this original report on the wind-wave analysis and a determination on whether the values are apporpriate or not can only be made during a technical review of the wind-wave analysis. This is beyond the intent of this summary document.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503703 Hydraulics n/a n/a n/a
Comment Classification: **For Official Use Only (FOUO)**

Section 5.3.1, paragraph 2. It is not clear if high risk areas are included in the current plan of the GRR. Also there may be overlap with what was included in the Natomas PAC.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Text has been revised to better describe the risk.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
Change the last sentence of paragraph 2 of 5.3.1 to read, "The study included reaches that are part of the Natomas PAC".

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Agreed and completed as suggested.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503706 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.3.3, paragraph 1. I would not think that relying upon the waiver process for ETL 1110-2-1571 would be a reasonable approach in the feasibility study. This may be a planning question.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Concur, this is a high risk. However, the feasibilility study believes they have concurrence on this path from higher level reviews and policy makers.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503708 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.3.3. Further work is to happen during the refinement of the tentatively selected plan – when would that happen, is there really time for that? Comment also applies to Section 5.3.5 on scour analysis.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Text has been revised. This work will likely be done during PED.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
Strike, "of the study" at the end of section 5.3.3.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Agreed and completed as suggested.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503710 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.4.1, paragraph 1. To my knowledge, levee performance curves were developed prior to gathering of additional geotechnical, geophysical, geomorphic data and further HEC-6T modeling. What, if anything, has been done to validate previous levee failure curves with new information? In addition, duration of flows have been identified as a key component in potential of erosion and has not been accounted for.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
The levee performance curves were developed in 2011 as required by the contemporary schedule. The judgment curves (erosion as a component) were developed using an expert elicitation in June 2009, as is the case for all the ARCF GRR judgment curves. The validity of erosion component of the performance curves was brought up at the expert panel meetings and at PDT meetings. It was found that the estimated levee performance captured by the curves was reasonable based on the available data and expertise. In consultation with PM and the PDT the decision was made to not pursue developing more rigorous analytical methods to refine the erosion portion of the curve.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Open Comment**
The response to comment is an important point of discussion and should be included in the documentation somewhere under Section 5.4.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Added the following as a new paragraph after the 2nd paragraph of section 5.4.1 on page 58 in coordination with Mike (copied and pasted paragraph Mike edited that contains Mikes edits):

"The levee performance curves were finalized in 2011 with the judgment curves (erosion as a component) that were developed using an expert elicitation in June 2009. The validity of the erosion component of the performance curves was discussed at the expert panel and project team meetings. It was found that the estimated levee performance captured by the curves was reasonable based on the available data and

expertise. In consultation with the project team the decision was made not to develop more rigorous analytical methods to refine the erosion portion of the curve."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 10 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 10 2014
Current Comment Status: **Comment Closed**

5503713 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.4.1, paragraph 2. The fragility curves should show or it should otherwise be stated that the major component of the residual risk is erosion.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
This comment should be addressed by the document editor, the levee performance curves were included in the report by the editor and I too commented on the need to break out the component curves or only show the judgment curve and its components.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503714 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 5.4.2, paragraph 2. Please reference the appropriate NHC study discussed here.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added refernce to NHC 2012:

"The results of this effort by NHC (NHC 2012) are shown in Table 5 2 for the portion of the Sacramento River in the ARCF project footprint."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503715 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 6.1, paragraph 2. Please be more specific on "future studies". Design during PED?

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **For Information Only**
Originally, we used the terminology "during PED Studies". However, we were instructed, by Graff, to change the terminology to "future studies" since the project is already in PED.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014
Current Comment Status: **Comment Closed**

5503716 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 6.2, paragraph 4. It is hard to follow what is being said here. Please clarify.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Removed last sentence. Basically it's saying that the design cross section (geometry) yielded sufficient rock for launching (so it should be conservative). The cross section also yielded enough environmental mitigation features to offset requirements (so no additional mitigation required).

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503718 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Table 6-1. No information is provided on the assumed rock size. As discussed with the civil designers, rock sizing and gradation were preliminary estimates mainly for purposes of cost estimates. No further detailed design has taken place. This should be noted as part of Section 6.2, paragraph 3.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

Added the following text to section 6.2:

Rock gradations were deemed less important for determining costs for this design level. The geometry of the design yielded sufficient volumes of rock to meet anticipated launchable rock requirements and sufficient mitigation features to offset environmental impacts. The launchable rock volume requirements were determined based on average velocities for above-mentioned typical sections. Site-specific design for erosion protection sites will occur in PED.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

Current Comment Status: **Comment Closed**

5503719 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 6.4, paragraph 2. It references Figure 6.3, noting no erosion protection features along the left levee of the Sac River north of the American. The figure only shows a small portion of that levee upstream of the American and so really doesn't illustrate no erosion fixes in that reach.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

The text will be modified to:
"Figure 6-3 depict s the footprints of the proposed erosion protection for both the Lower American and Sacramento Rivers. There are no proposed erosion protection features located along the left levee of the Sacramento River upstream of the American River confluence. The..."

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Open Comment**
The frist sentence of 6.4 is repeated twice. Later on in 6.4, "PED" should be changed to "site specific design".

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Changed as requested.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503720 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Table 6-2. I was under the impression all un-reveted locations would receive treatment. What ultimately was the basis for including or not including protection? This needs to be clearly discussed.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added to end of section 6.4 (after last paragraph):

A channel stability analysis (Ayres Associates, 2010) was used to determine areas requiring revetment with the assumption that all areas without modern bank protection will be protected. Modern protection was determined by areas defined as rock riprap with overall condition of good or very good. Additionally, there are some areas of high ground and areas with significant existing berm where protection is not required as shown in Figure 6.3.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
The Ayres report did not by itself recommend bank protection at all areas without modern bank protection. My understanding was other information was used, such as the 2004 Ayres report that looked at velocities and shear stresses for flows up to 160k. Newer studies should also be referenced to help support the conclusions reached, assuming this can be done.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**

We have discussed this issue with James Elsberry to get a better understanding of how Civil Design selected the locations of where bank protection was proposed and not proposed. H&H probably should have had a more involved role in the process. Nonetheless, the text of Section 6.4 will be modified as follows:

"6.4 Erosion Protection Footprints

Along the American River, the rationale used to determine where bank protection was required for the feasibility study involved consideration of several factors. The most important factors included: 1) the velocity computed by Ayres' 2-dimensional hydraulic modeling (Ayres 2004) for a discharge of 160,000 cfs, 2) the erodibility of the material near the levee prism, and 3) the past performance of the levee segment with respect to erosion. Figure 6-3 depicts the footprints of the proposed erosion protection for both the Lower American and Sacramento Rivers.

Using the above criteria, bank protection was determined to not be required along two segments of the right bank of the American River. The upstream segment, extending between the upstream end of the levee (~RM 14.4) and RM 10.4 and the downstream segment extending between a point near Cal Expo (RM 5.5) and the confluence with the Sacramento River (RM 0). In addition to following the above criteria, a portion of the upstream segment contains a 4000 foot-long reach wherein the channel includes a wide right overbank consisting of high ground (i.e., the location of a sewage treatment plant) in which the water surface elevation for a discharge of 160,000 cfs does not get near the levee and the levee essentially exists as a "freeboard" levee."

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 10 2014

2-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 10 2014

Current Comment Status: **Comment Closed**

5503722 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 7.1.2, paragraph 4. This is critical information and should be emphasized in the 3D stratigraphic discussion of the various layers.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Check and Resolve**

Section 3.2 of the report includes a detailed description of the geotechnical characteristics of the post-1850 alluvium as well as sample figures which show the location of the unit. As this unit was identified by engineering and geologic interpretation, few exploratory borings were drilled where this unit is present. These materials are the result of hydraulic mining erosion of soil and alluvium in the Sierra

Nevada and downstream deposition of this eroded material within the American River channel. The purpose of the 3-d model was not to make a judgment on the performance of the system but to graphically show the subsurface. Therefore the interference on the performance of this layer is correct in Section 7.1.2 but was appropriately not included in section 3.2.

Submitted By: Michael Kynett (916 557 7898) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503723 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 7.1.3, paragraph 1. Recognizing the issue of erosion on the American River, they likely would operate differently. To make it fully functional and to realize the flood damage reduction benefits intended for the project, the erosion work is needed. Some additional discussion should be provided.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
The subject paragraph has been modified to:

"Once the JFP auxiliary spillway is constructed and functioning, new operations criteria are planned which would result in larger flood flows being conveyed through the American River with greater frequency compared to past conditions. These higher flood flows would exert additional pressure on the banklines and levees resulting in greater erosion, sediment transport, and potentially changes to the planform of the low-flow channel. Nonetheless, it is important to note that without inclusion of the proposed erosion protection features; the flood damage reduction benefits intended for the project cannot be fully realized since the lower American River channel will not be able to safely convey the new larger discharges."

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
Add to the end of paragraph 1 of 7.1.3, "and flow restrictions from Folsom would likely be put in place.".

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
Agreed and comleted as suggested.

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503726 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 7.1.4, paragraph 2. It indicates un-revetted portions are at risk, but what about revetted portions without modern bank protection? Though the statement indicates un-revetted portions should be protected, not all un-revetted locations are being recommended for fixes.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Changed to read "most un-revetted portions of the ...."

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
In paragraphs 2 of 7.1.4, instead of referencing "un-revetted" portions as needing protection, it really should be saying portions without modern bank protection.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
1) A basic assumption of the feasibility study was that all of the historic revetment sites (i.e., cobble sites) would be replaced with modern bank protection. Therefore, there are no revetted portions without modern bank protection in the current plan.

2) The text has been modified to replace the terminology of "un-revetted portions" with "portions without modern bank protection" as follows:

"The available information indicates that many of the levee segments without modern bank protection are at risk of erosion related failures along the Sacramento River and Lower American River in the Common Features project study area. The levees therefore need to be protected..."

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 10 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 10 2014
Current Comment Status: **Comment Closed**

5503727 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 7.2. Some discussion should be added about how additional study would help prioritize the erosion work, noting that because of all the extensive work needed it would likely not take place all at once, but over a number of years.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Text has been added to include this additional task.

Submitted By: Jesse Schlunegger (916-557-6777) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Open Comment**
The text was added to the end of 7.3, and I think really should be added to the end of paragraph 4 of 7.2. The important point to make is one of the purposes of the need for additional study is to prioritize sites.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014

2-0 Evaluation **Concurred**
The last sentence of paragraph 4 of 7.2 was modified as follows (section 7.3 is not modified):

"These sites must be assessed in future studies to confirm that these sites are stable, prevent erosion for discharges up to and including 160,000 cfs, and to prioritize sites to be constructed over a period of years."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 07 2014

2-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503728 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 7.2, paragraph 3. It indicates that there is a need for bed protection to be assessed during final design, but this isn't consistent with what is stated Section 5.1.2.

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added clarifying language in section 5.1.2:

"Grade control is not anticipated to be necessary but the need for this should be monitored as part of routine operation of the constructed project."

To be consistent clear and , the language in section 5.1.2 was changed from:

"The need for bed protection at key locations will need to be assessed and included, as required, in the final design during the future studies."

To this:

"The need for bed protection at key locations will need to be monitored in the future as part of operating the project."

Submitted By: Todd Rivas (916-557-7523) Submitted On: Feb 06 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503729 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Section 7.2, paragraph 4. Please reference repair sites being discussed for assessment in future studies – modern or cobble sites or both?

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**
Added to end of section 6.4 (after last paragraph):

"A channel stability analysis (Ayres Associates, 2010) was used to determine areas requiring revetment with the assumption that all areas without modern bank protection will be protected. Modern protection was determined by areas defined as rock riprap with overall condition of good or very good. Additionally, there are some areas of high ground and areas with significant existing berm where protection is not required as shown in Figure 6.3."

Sites shown in figure 6-3 and described in section 7.2 are modern bank protection sites.

Submitted By: Thomas Goebel (916-557-7175) Submitted On: Feb 05 2014

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 07 2014
Current Comment Status: **Comment Closed**

5503734 Hydraulics n/a n/a n/a

Comment Classification: **For Official Use Only (FOUO)**

Additional editorial comments – See attached document.

(Attachment: Erosion_Attachment_01232014_SS.docx)

Submitted By: Ethan Thompson (916-557-7142). Submitted On: Jan 29 2014

1-0 Evaluation **Concurred**

Thanks. The report has included almost all of the recommended modifications.

Submitted By: Scott Stonestreet ((916) 557-7719) Submitted On: Feb 04 2014

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Ethan Thompson (916-557-7142) Submitted On: Feb 06 2014

Current Comment Status: **Comment Closed**

ATTACHMENT D

REAL ESTATE

QUALITY CONTROL CERTIFICATE
Real Estate Division, Acquisition and Management Branch

PROJECT NAME: AMERICAN RIVER COMMON FEATURES GRR
PRODUCT: REAL ESTATE APPENDIX FOR PUBLIC REVIEW MILESTONE
ACTUAL COMPLETION DATE: FEBRUARY 2015

PROJECT MANAGER: DAN TIBBITTS

The Real Estate Appendix is intended to inform the reader of the major Real Estate factors which were considered in the investigation and influenced decisions documented in the main report. It also presents a summary of the real estate costs, inventory, and analysis and assumptions associated with the lands, easements, right of way, relocations and disposal required for the tentatively selected plan. This DQC effort has verified that the Real Estate analysis is compliant with clearly established U.S Army Corps of Engineers policies, regulations, and that the assumptions, methods, data and tools used are appropriate for purposes of a real estate plan and that the level of detail and scope are reasonable and consistent within the context of the Real Estate Appendix.

REAL ESTATE LEAD
I have ensured that the above products were prepared in accordance with standard quality control practices. I have also incorporated or resolved issues identified during District Quality Control (DQC) Review.

Lead Realty Specialist Name	Title: Realty Specialist	
Laurie Parker	Laurie Parker	2/19/2015
Print Name	Signature	Date

REVIEWER
I have reviewed the products noted above and find them to be in accordance with project requirements, standards of the profession, and USACE policies and standards.

DQC Reviewer: Name	Title: Chief, Civil Works Section	
Paul Zianno		2/24/2015
Print Name	Signature	Date

Common Features Real Estate Plan February 2015
DQC Comments
Reviewer: Paul Zianno, Chief, Civil Works Section

REPORT SYNOPSIS

DQC COMMENT	RESPONSE	BACK CHECK
Based on previous comments from HQ, make sure the maps are attached to the RE Plan and not on a DVD. You can send the DVD, just make sure the maps are attached to the REP. Page 4	Will include hyperlink in the document in lieu of a DVD. The reviewer can click on the link and the data will come up instantly	X
Please identify what the letters mean on the map. Need to identify as phases. Page 9	Concur	X
After reading through this section it needs to be rewritten describe in specific detail with the description of the estates required. List all of the estates required for this project and under each one describe the location, acreage, owner description (private or non-federal), tract #. Need to break out by Title of the Sacramento and American River Systems Mitigation discussion can be at the end of this section. Laurie, Please identify what the letters mean on the map. Need to identify as phases. Page 12	Concur -- rewriting section as stated above	X
Is this a Road Easement? Page 12	Yes it is a Road Easement	X
This is a non-standard estate? Page 12	No the mitigation is at a bank or on site. It could potentially become non standard if fee is not available on site.	X
This is also a non-standard estate? Page 12	Due to the SWIF variance this is no longer a requirement of the project and these section will be removed from the report	X
You need to include specifically and spell out each estates required for the project. Also, include the acreage, tract numbers and the number of and type owners impacted by this acquisition. Adding a Table showing all the estates with the required information might be beneficial to the reader. Page 15	Concur the table will be shown in Section 4. Description of LERRD's.	X
Is this a Road Easement? Page 13	No This was a vegetative free zone. Due to the SWIF variance it is no longer needed and will be removed from this report	X
Expand, include info as stated in comment 7. Page 13	This description is incorrect. It will be rewritten to reflect new levees, levee raises, seepage berms, cutoff walls, and floodwalls. There is no new setback in this project.	X
Road Easement? Page 13	Yes this is the road easement. I will rename the easement.	X
Road Easement or a non standard estate? Page 13	This would have been a nonstandard estate but due to the SWIF variance it is no longer a requirement and shall be removed from the report.	X
All of these estates need to be expanded to include the info I discuss in comment #7. Page 13	Concur this section is being rewriting in Section 4. Description of LERRD's.	X
Who are the owners? Specify. Page 13	No owners are identified at this time only areas where potential borrow may be available. Borrow may not be suitable after testing so more than one site has been identified and is shown in Figure 2 Proposed Borrow Sites	X

We need to explain to the reader how the SWIF relates to theis porposed Mitigation Sites. It might be better to include the SWIF discussion in this section. Page 15	Concur I will move the SWIF discussion to the mitigation sites. The SWIF variance relates to more than just mitigation areas. The SWIF eliminates the road easements and the vegetative free zone for almost the entire project.	X
The document needs to specifically state whether we are buying land for mitigation or are is the project purchasing mitigation bank creditd. Should include a map showing these proposed sites, owner description (Private or non-federal sponsor owned). Is this amount included in the 01 Account? Need to specify. Page 15	The project will be purchasing mitigation credits. There are no banks proposed yet to map.	X
Is this paragraph a part of the Flood Protection Levee Easement, if so, this section needs to be included in that discussion above. Page 17	Concur: This has been moved to the discussion above	X
This Figure needs to be referenced in the discussion on Borrow Easements. Need to include acreage, owner description, Tract number, if known, Need to discuss Environmental impacts, suitability of material, and costs associated with the Borrow Material. Page 18	We know how many cubic yards and how many acres of borrow we need but we do not know if the material is suitable so we have over identified borrow areas. At this time in the feasibility study I have not been provided which actual parcels we are going to use. Based on the Natural Resources Conservation Service soil survey data, there are approximately 425 million Cubic Yards of material that potentially meets geotechnical requirements for level fill within an approximate 25 mile radius of the City of Sacramento. A map that proposed potential sites was created and several potential sites identified. The rough assumptions the Corp used was the material had to meet geotechnical requirements either by open undeveloped land or agricultural areas, and was located between ground surface and a depth of 2.5 feet below ground surface. In the high confidence areas in each basin the estimated amount of borrow needed within a 25 mile haul route radius is calculated below with costs for borrow. The high confidence areas were defined as areas where up to 48 inches of borrow could be excavated as opposed to the low confidence areas where only up to 12 inches of material would be available where 3 times the amount of land would be required. Potential land costs for borrow sites were developed by the Appraisal Section, Sacramento District, Corps of Engineers. The below quantities estimate the potential quantities of material required and the cost. American River South Basin High Confidence Area requires 69.76 AC of land for 275,743 CY of borrow = $453,400 + (35% cont + 15% severance= 226,700) = $680,100 American River North Basin High Confidence Area requires 0.64 AC of land for 2,519 CY of borrow =$4,186 (35% cont + 15% severance $2,093) = $6,279 Natomas Basin High Confidence Area requires 337.43 AC of land for 1,333,747 CY of borrow = $2,193,295 (35% cont + 15% severance = $1,096,647.50) = $3,289,942. The below map shows high confidence areas of available borrow where up to 48" of material can be excavated at one time.	X
These Figures need to be referenced in the above text regarding the SWIF, Bank Protection, and Road Easement estate discussions. Page 19	Concur. The SWIF discussion will occur all in the same portion of the report.	X
Need to be more specific in what this entails. Does the project impact high traffic rail lines that will have to be relocated? What about Railroad bridges and approaches thereto? Is that bridge in the picture below need to be relocated?	Yes the railroad bridge and track crossing over the Sacramento Bypass will be unable to utilize that bridge for two years. The other easement areas should not prevent the trains from moving and include no closure structures. Page 20	X
Is this paragraph needed if so it needs to be wrapped up in the estate text above. Page 21	No this paragraph has been deleted it is not needed.	X

What's the required estate for these features. Need to revise the Table. Page 22	The estates are shown in Section 4 description of LERRD's. These tables have been deleted.	X
What does the Letters mean in the Figure please specify. Page 24	I will provide a definition of the letters in the report.	X
What are the estates required for these reaches? Page 25	The estates are shown in table 1 of Section 4. These tables have been deleted.	X
Again, these paragraphs need to be included in the required estate s language above. Page 26	These tables have been moved see comment L54.	X
Not quite sure what this figure is trying to show and is it needed in the REP? Page 32	These are the design feature maps that accompany the estates required tables. They are showing the construction area and the improvements we are making. This is needed in the REP.	X
Same as comments 26 above. The paragraphs below need to be included in the discussions on the required estates.	Concur will add this to Section 4. Page 33	X
In a previous section you mention that permanent flowage easements are required. Please clarify. Page 39	I will revise this to say permanent	X
There is no mention of Non-Standard Estates? What about the Environmental Mititgation lands required for the project?	No non standard estates have been identified thus far. Environmental mitigation is will be at banks. Page 37	X
We need to expand this paragraph on how we are going to apply Navigational Servitude. The ER 405 talks specific to the requirements. Page 39	Will include longer discussion.	X
Not quite sure why this map is shown here? It's not referenced in the text? Need to spell out NAT Page 40	I will delete this map	X
Based on the Figure below, the flowage easement will impact an industrial area? Is that one of the acquisitions for this project? Could be a business relocation under PL 91-646. Page 41	I have inserted a new map that does not show the relocation of any businesses. Civil Engineering has a new map I will be including.	X
This value seems low and it does not match Table 7. What are the contingency costs? Page 44	25% contingency included already	X
Need to describe specifically whether these relocations are business or residential. Any mobile home parks impacted? Page 44	The relocations are 13 residential, 2 commercial buildings and 2 marinas. No mobile homes impacted	X
Briefly describe what these UF Relocations are. Page 47	Concur I will add a category	X
Does the report need this table? Can we delete it and use the Table 8 below? A little confusing Page 47	I can delete it.	X
Briefly describe these relocations Page 48	Concur	X

ATTACHMENT E

ECONOMICS

QUALITY CONTROL CERTIFICATE

Economic Risk Analysis Section, Planning Division

PROJECT NAME: AMERICAN RIVER COMMON FEATURES (ARCF), CA
PRODUCT: ECONOMIC APPENDIX AND RELATED FILES ASSOCIATED WITH REVISED BENEFIT-COST ANALYSIS
Actual Completion Date: 13-Feb-15

PROJECT MANAGER: DAN TIBBITTS

The economic analysis noted below describes in a clear and concise manner the major assumptions, methods, data, and analytical tools used in the analysis, and summarizes the results of the analysis using table and text formats. This DQC effort has verified that the economic analysis is compliant with clearly established U.S. Army Corps of Engineers policies, principles and procedures; that the assumptions, methods, data and analytical tools used are appropriate for purposes of an economic analysis; that the level of detail and scope of the analysis are appropriate for purposes of an economic analysis; and that they results are reasonable and consistent within the context of an economic analysis.

Specific item being reviewed: This DQC review was primarily focused on the items that have changed since the last DQC was completed. These areas include a cursory review of the entire document with a more detailed review of Chapter 4, the benefit-cost analysis and other related files.

ECONOMIC LEAD

I have ensured that the above products were prepared in accordance with standard quality control practices. I have also incorporated or resolved all issues identified during District Quality Control (DQC) review.

Lead Economist: Timi Shimabukuro	Title: Economist	
(For) Aaron Schlein		13 Feb 2015
Print name	Signature	Date

REVIEWER

I have reviewed the products noted above and find them to be in accordance with project requirements, standards of the profession, and USACE policies and standards.

DQC Reviewer: Nicholas Applegate	Title: Chief, Economic Risk Analysis Section	
Nicholas Applegate		2/13/15
Print name	Signature	Date

RESOURCE PROVIDER – QUALITY ASSURANCE

I have reviewed the quality control process and ensured that comments have been adequately address, documented and resolved.

Section Chief: Nicholas Applegate	Title: Chief, Economic Risk Analysis Section	
Nicholas Applegate		2/13/15
Print name	Signature	Date

13 February 2015

To Whom It May Concern,

I, Aaron Schlein, have reviewed each of the 17 District Quality Control (DQC) comments, responses, and backchecks for the American River Common Features Economic Appendix. All of the review comments have been satisfactorily addressed by the economic lead and closed by the reviewer.

The economic lead, Timi Shimabukuro, was unavailable for the signing of the quality control certificate. After completing my review of the DQC documentation, I signed the certificate in his absence.

13 Feb 2015

Aaron Schlein
Regional Economist
US ARMY CORPS OF ENGINEERS
Sacramento District
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Economic and Risk Analysis Section
District Quality Control Review Comments
American River Common Features (ARCF) – Economic Appendix
January 2015

Comments submitted by: Nick Applegate, Chief, Economic Risk Analysis Section, SPK
Responses submitted by: Timi Shimabukuro, Regional Economist
Backcheck submitted by: Nick Applegate, Chief, Economic Risk Analysis Section, SPK

Note: This DQC review was primarily focused on the items that have changed since the last DQC was completed. These areas include a cursory review of the entire document with a more detailed review of Chapter 4, the benefit-cost analysis and other related files.

1. **Comment:** Sec 1.6, pg. 18. Fix reference from Figure 4 to Figure 3.

   Response: Concur. The references to Figure 4 and Figure 1.6 were changed to Figure 3.

   Backcheck: Changes verified, comment closed.

2. **Comment:** Section 2.4.2, pg. 21. Consider adding in ratio's after each exceedance prob. For example 0.5 (1/2), 0.1 (1/10)…"

   Response: The return period 1/X will be added. (It should be noted that the Risk Reviewer for the West Sacramento GRR recommended removing the 1/X return period from the West Sacramento documents because it is technically incorrect. However, in discussing our response to that Risk Review comment, several PDT members preferred keeping the 1/X terminology in the documentation since often times the lay person/public as well as other non-technical team members finds it easier to understand 1/X chance rather than 0.5% ACE.)

   Backcheck: Changes verified, comment closed.

3. **Comment:** Pg. 28, Par 2. Remove the "500-yr" and "500-year" references and replace with 0.2% (1/500) ACE.

   Response: The changes have been made to the document.

   Backcheck: Changes verified, comment closed.

4. **Comment:** Sec 2.7.7, pg. 33. Consider adding a summary table showing the different uncertainty parameters used.

   Response: Concur. A summary table displaying the uncertainty parameters will be included in the Final Draft.

   Backcheck: Comment closed.

5. **Comment:** Sec 3.3.2, pg. 38. Is it still appropriate to use N@RM post PACR when the AEP's are now at a more reasonable level of 1/67? Seems like N@RM should only be used if the frequency of flooding is unreasonably high (as was the case for the 2010 NPACR).

   Response: The adjustment factor derived from using the N@RM for the PACR was used to adjust the without-project damages/benefits for the Natomas Basin impact area primarily for reporting and consistency purposes. This allowed for the results to be somewhat consistent across both the PACR and GRR documents. Future analyses in the Natomas Basin will likely not use the adjustment factor. The Natomas Basin impact area is not included in any of the GRR alternatives.

   Backcheck: Concur, comment closed.

6. **Comment:** Pg. 40, Par. 3 Please add a note saying that emergency and cleanup costs will not impact plan selection and will be fully evaluated for the wo project and recommended plan for the final report.

   Response: Concur. Statements explaining that emergency cost damages/benefits would not affect plan selection and that they will be evaluated for the Final Report have been included in the last paragraph of Section 3.3.2.

   Backcheck: Changes verified, comment closed.

7. **Comment:** Table 21, pg 43. Why are the approaches different in ARS vs. ARN?

   For ARS the method indicates use of the highest residual EAD from index locations "B and E," but B&E aren't listed as index locations for ARS. Do you mean A and F?

   For ARN why are we adding EAD's using joint probabilities instead of using the highest residual EAD similar to ARS? May need to add a little more explanation as to why we are using different approaches for these areas.

   Response: The references to ARS B and ARS E have been changed to ARS A and ARS F (Table 21).

   In the ARN Basin, damages tied to flooding from ARN E (Arcade Creek) were added to damages tied to flooding from ARN A (American River) based on H/H information which indicates that these streams are uncorrelated. A joint probability using AEP information was calculated in order to prevent double counting of damages/benefits that might occur if floods along each stream occurred at the same time (higher AEPs would translate to a greater chance of flooding from the two sources at the same time); however the AEPs, which are relatively low for each source, indicate that having two floods at the same time is highly unlikely, allowing for the simple addition of EAD.

   For the ARS Basin, a comparison of risk was made (under both without-project and with-project conditions) between two index points located on the American River and the

Sacramento River, which are the two major sources of flood risk for the basin. The highest EAD (under the without-project and with-project conditions) was used in the calculation of benefits of proposed FRM features/alternatives. Based on H/H information, the American and Sacramento Rivers are moderately correlated, which indicates that adding EAD/benefits from the two index points would result in damages/benefits being overstated.

A description of the EAD computation methods is presented in Section 3.3.2.

Backcheck: Comment closed.

8. **Comment:** Sec 4.2, pg 43. It would be helpful to insert graphics/maps showing each alternative, which help make the Econ Appendix a stand-alone document. Should be added at least for the Final draft.

   Response: A graphical description of Alternatives 1 and 2 will be included in the Final draft.

   Backcheck: Comment closed.

9. **Comment:** Sec 4.3, 3rd Par. "This scenario only applies to the ARS E index point (Table 23), but the columns were added to the other tables for consistency purposes." Table 23 indicates ARS F, not ARS E…verify and correct.

   Response: Concur. The reference to ARS E in the sentence has been changed to ARS F. (The index point used in the analysis is ARS F.)

   Backcheck: Changes verified, comment closed.

10. **Comment:** Tables 32 and 33. Consider adding in a column to indicate which index location the residual damages are coming from.

    Response: The index location has been identified (in parentheses) in both the without-project damages and with-project damages column of Tables 32 and 33.

    Backcheck: Changes verified, comment closed.

11. **Comment:** Sec 4.7, pg. 50. Should we add here the details about the operation of the Sacramento Weir? Last I heard it would be operated to mimic existing conditions all the way up to the 1% ACE?

    Response: The details about the proposed operation of the Sacramento Weir under Alternative 2 should be included in the GRR Main Report.

    Backcheck: Comment closed.

12. **Comment:** Section 4.9, pg. 52. Remove text "Interest during construction for each alternative was calculated by the Sacramento District's Economic & Risk Analysis Section."

It shouldn't matter whether Econ or Cost Engineering calculates the cost. All that matters is that it's done correctly.

Response: This statement has been removed from the Appendix.

Backcheck: Changes verified, comment closed.

13. **Comment:** Table 41, pg. 53. Why are the incremental AAB exactly the same ($29,320k) for Raising the Sac River and Widening the Sac Bypass. Since these are totally different features, shouldn't these numbers be different?

    Response: The benefits from the Levee Raise (Alt 1)/Sacramento Bypass Widening (Alt 2) features are actualized in the next increment (or after the American River levees are fixed), which describes the residual risk remaining from the Sacramento River once the American River levees are also improved. Another way to look at the incremental analysis is to consider increment 2 (either levee raise or bypass widening) and increment 3 (improve American River levees) as increments that would take place in tandem; once both increments are completed, residual risk from the Sacramento River (after either the levee raise or bypass widening has been completed) would become the governing source of risk for the ARS Basin as a whole. (The residual risk from the Sacramento River is only slightly higher than the residual risk from the American River once all FRM components of the ARS Basin are implemented.) The benefits of either the levee raises on the Sacramento River or the widening of the Sacramento Bypass are realized once both sources of risk in the ARS Basin are addressed. Further explanation has been included in the economic appendix. (Also, increments 2 and 3 in Tables 41 and 44 were re-labeled as increments 2a and 2b.)

    Backcheck: Changes verified, comment closed.

14. **Comment:** Table 44, pg. 55. Since the Benefits during construction are attributable to the Fixing of the Sac River in ARS, why are they not in that respective row? Instead, it just looks like the BDC were added into the total.

    Response: Benefits during construction (BDC) were calculated based on complete alternatives (ARS and ARN Basins) so it may be more appropriate to include the benefits during construction in Table 46 as a separate benefit column rather than have separate incremental analyses tables specifically for BDC. This would be consistent with prior American River studies as well as the reporting of BDC in the current GRR – Main Report. This change will be made for the Final draft if reviewer agrees with reporting BDC this way.

    Backcheck: Okay. Comment closed.

15. **Comment:** Section 4.11, pg. 56. May want to indicate here that while the Net Benefits could be viewed as essentially equal from an R&U standpoint, Alt 1 costs ~$150M less, which by default would make it the NED Plan per guidance.

Response: Concur. A statement has been included in Section 4.11 that talks about net benefits being essentially the same for each alternative but that since costs for Alternative 1 are lower (significantly in this instance) than Alternative 2, Alt 1, per USACE guidance, would be considered the NED plan.

Backcheck: Comment closed.

16. **Comment:** General. For the final draft, we should include a "Residual Risk" section in the main part of the report. Much of this information already lives in the OSE attachment, but it would be good to pull it up into the main body. Things like Residual Floodplains, Population at Risk, Structures within the floodplain, evacuation routes, etc. Doesn't have to be a big writeup, just summary tables will do.

    Response: Residual risk summary tables will be included in the main section of the Economic Appendix. These will be added for the Final draft.

    Backcheck: Thanks. Comment closed.

17. **Comment:** General. For the final draft, we need to add a table summarizing NB and BCR at 7%.

    Response: A table showing the economics at 7% will be included in the Final draft.

    Backcheck: Comment closed.

B.2

AGENCY TECHNICAL REVIEW (ATR)

(to be completed prior to Final Report)

B.3

INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

(to be completed prior to Final Report)