

DOCUMENTATION OF REVIEW FINDINGS

HQUSACE, Office of Water Project Review

**AMERICAN RIVER WATERSHED, COMMON FEATURES PROJECT
INTERIM GRR**

NATOMAS BASIN, CALIFORNIA

Flood Risk Management Project

Final Integrated Feasibility Report and Environmental Impact Statement

(December 20, 2010)

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A. BACKGROUND

Purpose

It is clear that there is a very significant flood threat in the Natomas basin due primarily to under seepage problems with the levees. The risk of levee failure and the associated consequences of such failure are great. The purpose of the report is to seek Congressional authorization to quickly make needed repairs to strengthen the existing levee. It is clear that strengthening of the existing levee is an essential first step to eliminate under seepage problems. In addition, the report will identify a plan that most reasonably maximizes net benefits, and a locally preferred plan to determine the extent of Federal interest in these repairs. Levee raises will not be considered in this report. However, a General Reevaluation Report is underway to assess additional flood measures including levee raises.

Plan

The American River, Common Features Project was authorized in Section 101(a)(1) of WRDA 1996 (Public Law 104-303), as amended by Section 130 of the Energy and Water Development and Related Agencies Appropriations Act of 2008 (Public Law 110-161). Additional authority was provided in Section 366 of WRDA 1999. Significant changes to the project were approved via the Supplemental Information Report of March 2002. Additionally, Section 129 of the Energy and Water Development Appropriations Act of 2004 (Public Law 108-137) increased the authorized total cost of the project to \$205,000,000. The current allowable cost limit under Section 902 of WRDA 1986 is \$284,000,000.

This Interim GRR was prepared as the result of a reevaluation study of the American River, Common Features project that specifically identified changes to the Natomas portion of the authorized project. The Natomas Basin is a separable element of the authorized Common Features Project. While other significant changes are expected in the future to reduce risks in areas subject to flooding from the Lower American and Sacramento Rivers, only improvements to the Natomas Basin levees are the subject of proposed changes at this time.

The recommended plan –consists of construction to remediate seepage and stability issues along the 42 miles of the Natomas levee system that surround the Natomas Basin. The objective is to provide immediate, short term reduction in flood risk to the Natomas Basin. This is an interim repair, which reduces the flood risk from approximately a 1 in 5 to a 1 in 67 chance of having a levee failure in any given year. The Corps is concurrently performing a more detailed study (comprehensive GRR) to evaluate additional flood risk management measures and plans to include possible levee raises. The local sponsor's goal is to achieve a 1 in 200 chance of having a levee failure in any given year. The recommended interim solution addressing levee seepage and stability is being pursued because of the length of time required to complete the more comprehensive and detailed study.

History of the Project

The history of the Sacramento River Flood Control Project (SRFCP) dates back to the mid 1800's with the initial construction of levees along the Sacramento, American, Feather, and Yuba rivers. The early history of the system was characterized by trial and error, with initial construction followed by a levee failure, followed by improvement (strengthening and/or raising), followed by

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another levee failure, etc. This continued until the California Legislature authorized a comprehensive plan for controlling the flood waters of the Sacramento River and its tributaries in the Flood Control Act of 1911. This plan, which included the Natomas levee system, was approved by Congress in the Flood Control Act of 1917, Pub. L. 64-367, which authorized Federal participation with the State of California in construction of the flood control system.

Historically, from the mid 1800's onward, most hydraulic engineers at the Federal, State and local level thought that the most effective way to control flood flows in the river system was to construct levees close to the main channel. The record floods of 1907 and 1909 forced a re-evaluation of this historic approach. It was clear from the size of these flood events in relation to existing channel capacities that major bypass systems were needed to control excess flood flows. These bypass systems, were incorporated into the comprehensive plan adopted by the State Legislature and later approved by Congress.

Federal participation in the SRFCP began shortly after authorization in 1917 and continued for approximately 40 years. The system is designed to keep all flows from floods up to a certain magnitude within the Sacramento River channel and to divert flows into the bypass system once this magnitude is exceeded. Throughout the SRFCP, the frequency that flow starts to divert from the Sacramento River to the bypass system varies between a 3-year to 5-year flood event.

Folsom Dam and much of the north levee of the American River were authorized by Congress in the late 1940's. Folsom Dam was designed such that the flood control space would accommodate the Standard Project Flood (SPF), which did not have a specific frequency, but was estimated to be between the 250- and 500-year event. Construction of Folsom Dam was nearing completion in 1955 when a new flood of record occurred. This flood event caused the objective release for Folsom Dam to occur. Afterward, hydrology for Folsom Dam was reassessed with the 1955 flood event included in the analysis. This assessment showed that the City of Sacramento downstream of Folsom Dam and adjacent to the American River had considerably less flood protection, even with Folsom Dam, than was previously realized. Discussion soon began about the need for additional storage upstream of Folsom Dam, which led to a proposal for flood control dam near the town of Auburn.

Auburn Dam was authorized by Congress in the 1960's. The Auburn Dam project included additional flood control space to restore the flood performance that Folsom Dam was originally thought to provide. Design efforts began soon afterward by the U.S. Bureau of Reclamation (USBR) with construction effort beginning in the early to mid 1970's. A diversion tunnel around the dam site, foundation preparation, and a cofferdam to divert flow to the diversion tunnel had been completed when, in 1976, construction efforts were put on hold after an active earthquake fault was discovered near the Auburn Dam site. For a variety of other reasons the Auburn Dam project was not restarted.

No decision on Auburn Dam was made and the completed cofferdam and diversion tunnel sat unaltered until 1986. In 1986, a new flood of record occurred (which is currently the flood of record for the American River). The 1986 flood washed out the cofferdam. This flood very nearly caused catastrophic flooding of the City of Sacramento.

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The objective release of Folsom Dam is 115,000 cubic feet per second (cfs) and the emergency release is 152,000 cfs. Since construction of Folsom Dam, the objective flow rate has been met in 1955, 1964, 1986, and 1997. Based on experience from the 1955 and 1964 flood events, the ability of the American River levees to convey flow in excess of 115,000 cfs was somewhat uncertain because of the considerable flood fight activity required to convey 115,000 cfs.

In the 1986 flood event, Folsom reservoir rapidly filled up. At the time, USBR, the Corps, and the California Department of Water Resources (DWR) all agreed that the release from Folsom Dam needed to be raised above 115,000 cfs to manage the risk of a dam failure. The release from Folsom Dam was increased to 134,000 cfs. This flow seriously stressed the American River levees and came dangerously close to causing levee failures into the City of Sacramento. In addition, conditions at Folsom Dam were such that the operator of the dam (USBR) was within one hour of having to open the emergency gates of Folsom Dam, which would have released considerably more than 152,000 cfs, and flooded the City of Sacramento. Fortunately the storm abated and the inflow reduced such that releases higher than 134,000 cfs did not have to be made.

After the flood of 1986, Congress directed the Corps to investigate the feasibility of reducing the flooding risk of the City of Sacramento. The Corps completed that feasibility study in 1991. The recommended plan in this study was a concrete gravity flood detention dam at the Auburn Dam location along with levee improvements downstream of Folsom Dam. Due to environmental and cost concerns, Congress chose not to authorize the detention dam and instead directed the Corps to supplement the analysis of flood control options considered in the 1991 study. This supplemental study was completed in 1996.

While Congress chose not to authorize the detention dam in 1991, construction of improvements to the levees adjacent to the Natomas Basin was authorized in the Defense Appropriations Act of 1993, Pub. L. 102-396. This authorization allowed the non-Federal interests to construct the improvements and receive reimbursement subject to approval from the Assistant Secretary of the Army (Civil Works). SAFCA constructed the authorized levee improvements between 1995 and 1998, and reimbursement has begun.

The additional analyses requested by Congress were presented in the Supplemental Information Report American River Watershed Project, California, dated March 1996. This report also recommended a concrete gravity flood detention dam at the Auburn site along with levee improvements downstream of Folsom Dam. Other plans evaluated in the report were Folsom Dam improvements and a stepped release plan for Folsom Dam releases. These additional plans also included levee improvements downstream of Folsom Dam. Congress recognized that levee improvements were “common” to all candidate plans in the report and that there was a Federal interest in participating in these “common features.” Thus, the American River Common Features Project was authorized and a decision on Auburn Dam was once again deferred to a later date.

In 1999, Congress decided not to authorize Auburn Dam but instead to authorize improvements for Folsom Dam. By doing this, improvements to levees downstream of Folsom Dam could be fine tuned to work closely with the Folsom Dam improvements being discussed by Congress. The improvements being discussed for Folsom Dam involved control of a 200-year flood event

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with a peak release of 160,000 cfs. Therefore, the Common Features project was modified by WRDA 1999 to include additional necessary features for the American River so that it could safely convey an emergency release of 160,000 cfs. Also authorized in WRDA 1999 was the Folsom Dam Modifications project (modifications of the existing outlets of Folsom Dam), which would allow for higher releases from Folsom Dam earlier in flood events. At the same time, Congress also directed the Corps to review additional modifications to the flood storage of Folsom Dam, indicating that Congress was looking at maximizing the use of Folsom Dam for flood damage reduction prior to consideration of any additional storage on the American River. The Folsom Dam Raise project was subsequently authorized by Congress in 2004.

Major construction components for Common Features in the WRDA 1996 authorization include construction of seepage remediation along approximately 22 miles of American River levees and construction of levee strengthening and raising of 12 miles of Sacramento River levee in Natomas. Major construction components for Common Features in the WRDA 1999 authorization include construction of seepage remediation and levee raises along four stretches of the American River, and construction of levee strengthening and raising of 5.5 miles of Natomas Cross Canal levee in Natomas.

All American River features authorized in WRDA 1996 and 1999 have been constructed or are in design analysis for construction in the near future. Construction of the Natomas features was deferred after previously unknown deficiencies were discovered in these levees in the flood event in 1997.

Following the flood of 1986, significant seepage was experienced on the Sacramento River and on both the north and south bank of the American River. Seepage on the Sacramento River was so extensive that Congress soon after the 1986 flood event funded remediation in the Sacramento Urban Levee Improvement Project (Sac Urban) that included shallow seepage cutoff walls in portions of Natomas. At the time, only seepage through the levees was considered to be the seepage problem affecting the City of Sacramento.

After construction of the Sac Urban project, geotechnical evaluation of levees in the vicinity of the City of Sacramento showed that deep underseepage was of concern. Shortly thereafter, the Sacramento Valley experienced a flood event in 1997. Considerable seepage occurred on the Sacramento River as well as on the American River. Seepage on the American River was to be expected because remediation had yet to be constructed, but the occurrence of significant seepage on the Sacramento River in the reach remediated as part of the Sac Urban project was alarming and confirmed that deep underseepage was also of significant concern.

As a result of this determination, seepage remediation on the American River (then in the late 1990s in the design phase) would need to be designed to remediate both through-seepage and deep underseepage. This additional effort led to considerable cost increases over what was originally authorized by Congress and has led to two increases in the authorized cost for the Common Features project. WRDA 1999 increased the cost when it added components to \$91.9 million from the original \$56 million authorized in 1996. The Energy and Water Development Appropriations Act 2004 (PL 108-137) increased the authorized cost to \$205 million. The report to Congress recommending this increase recognized that significant additional work was going to

be needed in Natomas and would result in additional authorized cost increases which would be the subject of a future report.

Because of the considerable cost increase of seepage remediation on the American River, all funds appropriated by Congress throughout the late 1990s and the early part of the 2000s were used for construction activities on the American River instead of for design efforts in the Natomas Basin. Combining this with the recognition that all work in the Natomas Basin would also require significantly more effort than was anticipated at the time of authorization, it was determined that a reevaluation study would be required for at least the Natomas Basin portion of the Common Features project.

At approximately the same time that the reevaluation study was beginning for Common Features, the Folsom Dam Post Authorization Change report (PAC) was being completed by the Sacramento District. Results of this study, and the follow-on Economic Reevaluation Report (ERR) for Folsom Dam improvements, showed that additional levee improvements were needed on the American River and on the Sacramento River below the American River in order to truly capture the benefits of the Folsom Dam projects. These levee deficiencies consisted primarily of erosion concerns on the American River and seepage, stability, erosion, and height deficiencies on the Sacramento River below the American River. However, the full extent of these levee deficiencies was not known. (With the construction of the Sac Urban project, it was thought that the seepage and stability problems had been addressed. However, the 1997 flood event proved otherwise.) Because of this, it was realized that additional reevaluation studies are also needed to include the additional two basins comprising the City of Sacramento, as well as the Natomas Basin.

Project Location

The study area is part of the Sacramento and American River Watersheds. The Sacramento River watershed covers approximately 26,000 square miles in central and northern California. The American River Watershed covers about 2,100 square miles northeast of the City of Sacramento. In the Sacramento area, these two rivers form a flood plain covering roughly 110,000 acres, approximately half of which comprises the Natomas Basin. This report focuses on the Natomas Basin that is hydraulically separable and is a separable element of the authorized Common Features Project.

Authority

The Common Features Project was authorized by Section 101(a)(1) of the Water Resources Development Act (WRDA) of 1996 (Public Law 104-303), as modified by Section 366 of WRDA 1999 (Public Law 106-53) and as further modified by Section 129 of the Energy and Water Development Appropriations Act, 2004 (Public Law 108-137); and as amended by Section 130 the Energy and Water Development and Related Agencies Appropriations Act, 2008 (Division C of Public Law 110-161).

Non-Federal Sponsor

The non-Federal sponsor for the project and general reevaluation study is the State of California Central Valley Flood Protection Board (CVFPB). The Sacramento Area Flood Control Agency (SAFCA) has a Local Cooperation Agreement with the CVFPB.

Problems, Needs And Opportunities

The purpose of this report is to present the findings of an interim general reevaluation study of the authorized American River Common Features Project. The study was conducted specifically to determine if there is a Federal interest in modifying the authorized project features for flood risk management in the Natomas Basin portion of the project area. While other significant changes are expected in the future to reduce risks in areas subject to flooding from the Lower American and Sacramento Rivers, only improvements to the Natomas Basin levees are the subject of proposed changes at this time.

The existing levee system does not provide the intended level of flood risk management benefit. The following problems and opportunities have been identified during ongoing analysis of the existing levee system.

1) Flood Damages - Documented reports of flooding in the Sacramento/Central Valley Region have been described by Native Americans and pioneer settlers dating prior to 1850. Significant events have occurred on the Sacramento, the Feather, and the American River system in 1862, 1867, 1875, 1881, 1890, 1907, 1909, 1914, 1937, 1955, 1964, 1986, and 1997. Major flood risks include direct impacts to 550,000 people, 170,000 structures and potentially \$10 - \$46 billion in damage in a single flood event.

2) Underseepage and through seepage – High stage in the Sacramento and American Rivers or Natomas Cross Canal can cause higher pressure through the sand layer beneath the levee and in turn cause boils and erosion.

3) Vegetation and encroachments on Levees – Due to the unique history of the flood risk management system in the California Central Valley, levee slopes often contain brush and trees that are the last remnants of a vast riparian forest which once extended across the valley floor adjacent to the Sacramento and San Joaquin rivers. Much of this vegetation provides important environmental, recreational, and cultural benefits that would be impacted by the stricter enforcement of Corps regulations. In addition, a significant number of encroachments, including residences, commercial buildings, and roadways are present on the levees within the study area.

4) Levee Stability – Erosion and underseepage can impact levee instability. Sloughing of the levees or the formation of caves is caused by the erosion at the levee toe under water and eventually causes sloughing of the upper levee side slope. Underseepage can result in the removal of levee material leading to boils, erosion of the underlying material and potential levee failure.

5) Levee Erosion - The waterside levee slopes in the project area have been impacted by erosional forces. Waterside erosion is impacted by water draw down, sloughing of the levees, and overtopping.

Plan Formulation

During the plan formulation final screening of alternative plans, the final array of alternatives was narrowed down to two action alternatives; strengthening the perimeter levees of the Natomas Basin through the construction of an adjacent levee, where practical, and fixing in place where that was most practical.

An incremental economic analysis was performed for the purpose of identifying the NED Plan for the interim decision document. The Natomas levees were divided into nine reaches, based on similarity of identified problems. For the incremental economic analysis, the nine different index points were analyzed, each associated with one of the nine reaches identified for the Natomas Basin. Because the levees surrounding the Natomas Basin have different problems, or different combinations of problems, each levee reach therefore has its own differing probability of failure and associated specific set of consequences of failure. The result of the incremental analysis for the NED account was the development of a net benefit curve that while still rising for all nine reaches, flattened noticeably beyond the reach 6 fixes. Based upon this initial analysis, the preliminary determination of the NED plan for this interim document was Increment 6, as this is the last increment beyond which the net benefit curve starts to flatten out, and the net benefits do not increase substantially beyond this increment.

However, this initial NED plan analysis only addressed the NED account and did not fully consider and address the Principles and Guidelines' (ER1105-2-100) four criteria for alternative plan formulation: completeness, effectiveness, efficiency, and acceptability. As a result of further review and analysis towards consideration of the strategic infrastructure within the Natomas Basin (Interstates 80 and 5, Sacramento International Airport) and flood emergency response evacuation routes in support of the Natomas Basin Flood Plain Management Plan (RODs for the Natomas Levee Improvement Program), the further refined alternatives from the plan formulation process has identified all nine levee increments surrounding the Natomas Basin as the NED plan for this interim document.

On 24 September 2010, an In-Progress Review (IPR) meeting was held with HQUSACE, SPD and SPK staff. During the review of the draft Final Report and in preparation for the Civil Works Review Board (CWRB), a refinement in the plan formulation strategy took place during this IRC in preparation for the CWRB on September 24. The IRC was held to resolve HQ comments and concerns about the incremental cost analysis (ICA) not being an effective way to evaluate a closed system like the Natomas ring levee that surrounds the Natomas Basin. This was due to the uncertainty about stage flows and the ability to measure overtopping that resulted in an inappropriate extension of the ICA as an assessment tool for a closed system based on unreliable stage flow data. Consequently, the IRC determined that the basis of the levee performance improvements should be limited to the geotechnical fragility curves in setting the without-project conditions and for the levee performance improvements. Collectively, they will be aggregated into an NED plan.

Selected Plan

The selected plan modifies the authorized Common Features project to include a comprehensive plan to reduce the systemic risk associated with seepage and stability for the ring levee system surrounding the Natomas Basin. The recommendation is supported by the non-Federal sponsors, the State of California and the Sacramento Area Flood Control Agency. The primary actions are

fix-in-place cut-off wall construction and levee widening/seepage berm construction. The principal features of the recommended modifications include widening of about 41.9 miles of existing levee, installation of about 34.8 miles of soil bentonite cutoff wall and about 8.3 miles of seepage berms, and bridge remediation at State Route 99. In addition, mitigation features pursuant to the Endangered Species Act are recommended, including creation of 75 acres of canal habitat and up to 200 acres of marsh habitat, creation of up to 60 acres of landside woodlands, creation of 1,600 linear feet of tree plantings, and establishment of a monitoring program for assessing mitigation performance.

Project Costs

Based on October 2010 price levels, the estimated first cost of the recommended modifications for the Natomas Basin is \$1,111,600,000. Adding these improvements to the currently authorized Common Feature project cost of \$277,900,000 increases the estimated first cost of the total Common Features project to \$1,389,500,000. The Federal share of the total project cost would be about \$921,200,000 and the non-Federal share would be about \$468,300,000.

Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R)

The State of California will be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project after construction, a cost currently estimated at about \$5,300,000 per year.

Project Benefits

The Without-Project probability of failure for the Natomas levee is 0.21 (a five-year event). The probability of failure is due to the conditions of the levee related to seepage, stability, and erosion. Implementation of the recommended plan would result in an annual exceedance probability of 0.015 (a 67-year event). The selected plan would reduce average annual flood damages by about 96 percent and would leave average annual residual damages estimated at \$19,000,000. Average annual economic benefits are estimated to be \$502,500,000; net average annual benefits are \$420,000,000. The benefit-to-cost ratio is 6 to 1.

Cost Sharing

In accordance with the cost sharing provisions of Section 103(a) of WRDA 1986 (Public Law 99-662), as amended by Section 202(a) of WRDA 1996, and of Section 366(c) of WRDA 1999, the Federal share of the first costs of the flood damage reduction features will be about \$921,200,000 and the non-Federal share will be about \$468,300,000. The cost of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal areas is estimated at \$352,200,000.

Environmental Compliance

The plan will avoid any significant impacts on fish and wildlife habitat in the Natomas Basin, and contributes significantly to the habitat enhancement goals of the Natomas Basin Habitat Conservation Plan. Mitigation needs for the project have been coordinated with U.S. Fish and Wildlife Service (FWS), NMFS, and the California Department of Fish and Game. No additional compensation has been recommended during coordination under the Fish and Wildlife Coordination Act. In compliance with ER 1105-2-100, a Biological Assessment has been prepared and coordinated with the resource agencies. Section 7 Consultation under the Endangered Species Act has been on-going as part of the Natomas Levee Improvement Program

and this Phase will be appended to the Programmatic Biological Opinion. The final EIS was circulated for public review, and the comment period ended on 22 November 2010. No significant comments were received, and all comments were satisfactorily resolved.

B. POLICY COMPLIANCE REVIEW HISTORY

An Alternative Formulation Conference (AFB) for the subject project was held on 24 May 2010. The Draft Interim GRR was approved for public release on 2 July 2010. The report underwent a 45-day comment period, and the District produced a final draft document on 31 August 2010. As a result of the comments from SAFCA, CVFPB and Corps HQUSACE and higher authority the plan formulation strategy was revised in the Final Report. It considered the full implications of the Natomas Basin ring levee system and the systemic risk associated with multiple levee failure points for a closed system model and earlier concerns about the completeness of the plan due to residual risk. As a result of this change in strategy, the recommended plan is now a plan that encompasses the entire perimeter of the Natomas Basin. The plan consists of measures that neither promote nor constrain future plan formulation for a follow-on GRR that will address the remainder of the Common Features study area including overtopping while providing significant improvements in levee performance without raising the height of the levees.

A Civil Works Review Board was held on 27 September 2010, and the Board voted to give the report conditional approval to release the report for State and Agency Review. The approval was conditional upon making certain changes to the report. Those changes, documented herein, were made, and the report was released to State and Agency Review on 23 October 2010. The 30-day review period ended on 22 November 2010. In summary:

Planning Milestones

Feasibility Scoping Meeting:	11 MAR 2009
AFB Package Transmitted	23 APR 2010
Alternative Formulation Briefing:	24 MAY 2010
AFB Guidance Memorandum:	30 JUN 2010
Draft Report Guidance Memorandum:	27 AUG 2010
Draft Final Report Division Engineer Transmittal:	31 AUG 2010
CWRB Briefing:	27 SEP 2010
FEIS filed with EPA:	15 OCT 2010
30-Day S&A Review start:	22 OCT 2010
30-Day S&A Review end:	22 NOV 2010
Final Report and Chiefs Report	17 DEC 2010

B.1 Decision Quality Assurance:

The review process includes a transparent supporting agency technical review; state and agency review; and independent external review for a robust review as part of the HQUSACE

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decision quality assurance. All of those reviews were assessed and incorporated into the final recommendation in the Chiefs Report. In summary:

1. Agency Technical Review (ATR): The ATR lead was located in the Louisville District of the Corps. ATR review resulted in comments on levee performance curves, the plan formulation process, appropriate cost sharing percentages, issues related to levee vegetation, and historic versus modeled flood damage comparison. Consensus and resolution was reached on all ATR comments. ATR certification was done on 27 August 2010.

2. Independent External Review: An Independent External Peer Review (IEPR) on the study was certified as being completed by the Planning Center of Expertise for Flood Risk Management (FRM-PCX) on 16 September 2010. The IEPR was managed by an outside eligible organization (Battelle Memorial Institute) that assembled a panel of six experts with combined expertise in the fields of geotechnical, hydraulic engineering, economics, and environmental/NEPA. Ultimately, the panel identified and documented 35 comments. Six of the panel comments were classified as having high significance. These comments were related to the plan formulation process and the without project conditions, additional clarification of the discussion on induced floodplain development as related to Executive Order (EO) 11988, and clarification of including Native American residents in the discussion of EO 12898. An additional comment requested clarification on the order of implementation for levee fixes. The IEPR panel has concurred with all of USACE's responses and this process has led to improved report quality.

3. State and Agency Review: The Draft Feasibility Report/DEIS was circulated for a 45-day public and state and agency review in July 2010. The Final Feasibility Report/FEIS was circulated for 30 day public and state and agency review in October 2010. These reviews did not raise any significant environmental concerns with the proposed project if the environmental commitments in the report were adhered to.

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C. RESOLUTION OF CONCERNS IDENTIFIED DURING THE REVIEW OF THE ALTERNATIVE FORMULATION BRIEFING PACKAGE DATED APRIL 2010

1. **Without-Project Condition:** Page 3-1 of the PAC formulation text makes a distinction between the No Action Plan and the Without-Project Conditions, indicating that under the No Action Plan, it is assumed that no additional features would be implemented by the Federal Government or by local interests to achieve the planning objectives, over and above those elements of the Common Features project that will have been implemented prior to reauthorization of the project. It also states that the No Action Plan differs from the without project condition, which forms the basis from which all alternative plans are measured. It further states that the without project condition assumes that none of the features of the American River Common Features Project have been implemented. That allows the evaluation of the total Common Features Project, including those features constructed by both Federal and non-Federal interests in anticipation of credit. The Economics Appendix, however, appears to use the terms interchangeably. Section 6.2.3, for example, refers to without-project (no action) AEPs and EAD. This leads to confusion as to what is being considered as a basis for comparison in the future without project conditions and whether local actions being completed prior to the base year are intermingled in the with- project analysis. The draft report should use the terms consistently throughout the text for clarity in the presentation. Clear definition of the without-project conditions is needed as a basis for plan evaluation, comparison and selection per 2-4.b. (1) of ER 1105-2-100.

SPK Response: Concur. The “no action condition” assumes that no additional features would be implemented by the Federal Government or by local interests to achieve the planning objectives, over and above those elements of the Common Features project that will have been implemented prior to reauthorization of the project. The “without-project condition” assumes that that none of the features of the American River Common Features Project has been implemented. While this distinction is important when applied to the American River South and American River North Basins (GRR), it does not apply to the Natomas Basin. For the Natomas Basin, the “without-project condition” is the same as the “no action condition” since none of the features of the Authorized Common Features Project has been built or will be built prior to any reauthorization. For consistency purposes, the term “without-project condition,” the basis for which all alternatives are measured, will be used in the main Natomas Interim Reevaluation Report and the Economic Appendix.

Action Taken: The text is revised to read, “a. No Action. The Corps is always required to consider “No Action” as one of the alternatives for selection. With the No Action Plan, it is assumed that no additional features would be implemented by the Federal Government or by local interests to achieve the planning objectives. Since the No Action Plan is required to be included among the candidate plans in the final array of alternatives, it is described in more detail in the paragraph, Plan 1: No Action, later in this chapter. The No Action Plan is the same as the without project condition, which forms the basis from which all alternative plans are measured. In this report, the No Action Plan assumes that none of the features of the American River Common Features Project have been implemented. This allows the evaluation of the total Common Features Project, including those features constructed by both Federal and non-Federal interests in anticipation of credit.”

HQUSACE Assessment: The concern is resolved by the actions taken above and the changes to the Final Report in Chapter 3, Section 3-2.a. and Section 3-5.b.

2. EAD Values: The economic documentation reflects the extraordinary effort that was expended in analyzing the complex situation of multiple flooding sources and failure mechanisms. However, the presentation could be improved to further explain the rationale for the various EAD values shown in the Economic Appendix, which are a bit confusing and difficult to follow. For example, without-project EAD for index D is shown as \$1,167M in Tables 5-20, 5-21, and 6-1, \$894M for No Action in Table 6-3, and \$886M for No Action, Major Impact Area in Table 6-9. The recently provided briefing slides show EAD of \$482M. The reader is left wondering why all these different numbers exist and what led to the changes/inconsistency. Also, the Minor Impact Area was initially defined based on the EAD values shown in Table 5-35 for Index Points F (\$18M) and G (\$60M) given the flooding mechanisms in those segments. However, the final EAD value of \$477M in Table 6-10 for the Minor Impact Area accounts for about 35% of the total study area EAD of \$1.4B. So it isn't evident why that is being termed a minor impact area. Further discussion is needed at the AFB to clarify the without-project EAD methodology and the appropriate values to be used in the report in accordance with E-19.k. of ER 1105-2-100.

SPK Response: Concur. The Economic Appendix reports several EAD values associated with each step of the analytical process leading up to the full incremental benefit analysis. Reporting of several EAD values is confusing and probably reflects the complexity of the analysis. For clarity and better flow, the analysis steps taken, the purpose of each step, and a comparison of input data (e.g., inventory and floodplains) and results (EAD) of each step will be described in greater detail in the Economic Appendix; the “final” EAD without-project values used as the baseline to measure outputs of each fix in the incremental analysis will be clearly stated in the Appendix. When necessary, chapters/sections in the Appendix will include prefaces/bulleted points/tables which indicate the purpose of the results and their intended use in the overall incremental, net benefit, and benefit-to-cost analyses.

The “Major” and “Minor” areas were used initially as relative terms as well as to distinguish that one area was treated as the main area and the other as a secondary area (“residual” area) in order to perform the incremental analysis. On a relative basis and in terms of geographic area, the “Major” area is larger than the “Minor” area; in terms of EAD, the index points tied to the “Major” area are greater. On an absolute basis, damages in either area can be considered “major” and not “minor.” An explanation regarding the terminology used to describe the two impact areas will be incorporated into the Economic Appendix. See comment #10 for additional explanation regarding the approach to the incremental analysis.

HQUSACE Discussion: The briefing slides, the Main Report, and the Economics Appendix need to be reconciled. The economics Appendix has undergone significant change as a result of ATR comments.

Action Required: The Main Report was revised, and all documents reviewed for accuracy and consistency.

HQUSACE Assessment: The concern is resolved in the Final Report in the Main Report, Chapter 2, Section 2-4.1., revised discussion of EAD values; Chapter 3, Section 3-5.f., revised EAD values used in plan formulation; Economics Appendix, new Chapter 7.

3. Flood Warning and Evacuation Plan: Page 3-19 states that the County and City of Sacramento will implement a flood warning and evacuation plan when needed in the event of a flood. It is not evident how this figures into the damage analysis and EAD calculations. The discussion of auto damages indicates some assumptions for successful evacuation. What is assumed for content damages? The text should explain how effective these non-structural actions are, the resultant effects and costs, and they are accounted for under the without-project EAD calculations. See E-19 of ER 1105-2-100.

SPK Responses: Content damages were not adjusted for flood warning times. Flooding would likely occur from a levee breach and, depending on the location of the breach, flood waters would reach the urban area within minutes from a breach in reach A to approximately 20 hours (plus or minus a few hours) from a breach in reach D. The 50% assumption (percentage of autos moved out of the floodplain) used for automobiles was made based on the potential short warning time, the large number of people who live in the Basin, the relative small number of major routes (highways) for evacuation, and EGM 09-04 which recommends a removal rate of 50.6% for areas where the warning time is less than 6 hours.

Action Required: None.

4. Alternatives, page 3-20 PAC Formulation: The discussion of Fix In Place Alternative measures provides cost information for construction (\$650,422,000), Real Estate (\$35,800,000), and Mitigation (\$82,355,000) that doesn't account for all the costs that total \$915,184,000. Similar text follows Table 3-8, however the cost value doesn't correspond to that shown in the table for the 200-year plus three feet design (\$950M) but is similar to the \$915M shown for the 100-year plan. This is confusing and the text should be corrected to consistently describe the plan costs. The additional cost items should be accounted for in the discussions to arrive at the total. Plans 4 and 5 have no cost information provided as done for Plan 3. It is also indicated that Plans 4 (Adjacent Levee) and 5 (Lowest Cost Fix in Place and Adjacent Levee) are the same. Therefore it is unclear why Plan 5 was established. It is also unclear what portion of these costs may relate to the seepage and stability fix that could be considered for cost sharing as opposed to the local sponsor's O&M requirements. This discussion should be reviewed and revised for consistency and clarity in the draft report. See ER 1105-2-100, paragraph 2-3.c.(2) which deferred maintenance has been added to the report.

HQUSACE Discussion: The initial concern resolved. The discussion of alternatives at the AFB was different than those described in the report.

Action Required: A section has been added to the discussion of the Fix In-Place alternative discussing the costs of bringing the existing levees up to Corps O&M standards. Those costs

have been removed from the cost of the Fix In-Place alternative, assigning those costs as totally non-Federal. This does not affect the formulation, as the adjacent levee is still more efficient than fix in-place minus the costs for deferred maintenance. The screening estimates have been revised to remove the costs of deferred maintenance. The economic analysis for the fix in-place alternative has been conducted. These sections of the report have been revised.

HQUSACE Assessment: The concern is resolved in the Final Report in Chapter 3, Section 3-5.d.

5. NED Plan Optimization:

a. Economic Optimization: On page 3-23, PAC Formulation Table 3-20 presents information on the economic optimization relative to groups of fixes. This explanation is different from that in Section 6 of the Economic Appendix and raises some questions. The first group shown after the without-project has annual costs of \$38.1M, annual benefits of \$1298M, incremental costs of 38.0, and incremental benefits of 65.0. This raises a question as to what the incremental values are measured from that provided an annual benefit of \$1,233M (1298-65) at an annual cost of \$0.1M (38.1-38.0). Does this represent a fix to section D or some O&M or other fix by the sponsor? It should be explained in the text. The group explanation in this section also needs to be correlated with the incremental (A through I) analysis as discussed in Section 6.3 of the Economics Appendix for consistency and to provide a complete story of the incremental analysis. See 2-4.e. of ER 1105-2-100 regarding incremental analysis.

SPK Response: Concur.

Action Required: The Main Report has been extensively revised to be consistent with the Economics Appendix.

HQUSACE Discussion: The concern is partially resolved in the Draft Report: Chapter 2, Section 2-4.j., new discussion of EAD values, consistent with Economics appendix; Chapter 3, Section 3-5.f., discussion of incremental analysis, consistent with Economics Appendix.

b. NED Plan: Use of Net Benefits in Plan Formulation, (Economic Appendix). The report presents a rationale for determining the priority of levee fixes in different locations; however, the report does not present net economic benefits for each of these alternatives. The report must display net economic benefits for each alternative and base the rationale for formulation of the NED plan on maximizing NED benefits, subject to environmental acceptability. It is noted that the formulation section of the Economic Appendix is much more detailed than what is displayed in the Main Report. The Main Report should include a higher level of detail similar to the Economic Appendix, including the display of net benefits as described above. See 2-3.f.(1) of ER 1105-2-100.

Action Required: The Main Report will be revised including more detail on the economic analysis.

HQUSACE Discussion: The concern is partially resolved in the Draft Report Chapter 3, Section 3-5.f Geotechnical Performance. It is still unresolved as to what the TSP should be.

HQUSACE Discussion: From the AFB Conference on NED plan optimization: After listening to the presentation in the AFB, OWPR was not clear on what the NED plan is. Increments 7 through 9 have similar net benefits. The District's initial recommendation at the AFB was a nine-increment plan. Because it is policy that the least costly plan is recommended, OWPR advised the District that it needed to be prepared to ask for waiver from ASA(CW) to recommend increments beyond 6. The Economics ATR reviewer commented that the NED plan really cannot be identified because several damage categories were not evaluated, and it would be very difficult to say that there is any degree of confidence in what is the "NED Plan". While the argument can be made that there is enough differentiation between increment 5 and 6 to say it is likely increment 6 would have higher net benefits once the full evaluation is completed during the GRR, beyond that, he feels that the District can only say that increments 6-12 are all well justified from an economic perspective.

The SPD Chief of Planning offered that the plan that had been identified by Increment 6 is the plan that reasonably maximizes net benefits. And the SPK Chief of Economics stated that while this plan is on the rising limb of the NED curve, the remainder of the curve is difficult to define. The NED account is being used to establish efficiency.

The ATR Chair asked what basis for determining federal investment is. The SPD Planning Chief stated that the policy is either to identify the NED plan, or show that the plan on rising limb. HQUSACE recommended that the District start to draft a letter to ASA(CW) about the inclusion of Increments 7-9 (G, F, and I).

After the AFB, there was internal discussion at SPK about this topic. It was determined that the District's determination that the plan that maximizes net benefits would be the Increment 6 plan. This would establish the basis for cost sharing and crediting.

HQUSACE Discussion on the Draft Final Report: The Tentatively Selected Plan (TSP) in the Draft Report circulated for public comment identified plan (F) or the increment 6 plan. Based on comments from the public and OWPR concerns about the completeness of the plan, as well as its higher residual risk, the vertical team concluded that TSP did not address sufficiently the goals and objectives of the project. It was found that technically the economic and hydraulic models were constrained due to the inability to capture conditional probabilities associated with dependencies in a reach by reach analysis and consequently the results distorted the incremental analysis.

Issue Resolution Conference September 27, 2010: The IRC was held prior to the CWRB. A complete discussion on the plan formulation strategy can be found in AFB issue #21 Plan Formulation and Residual Risk; AFB issue #27 Plan Formulation and Levee Performance and AFB issue #28 Plan Formulation Strategy and Cumulative Risk Reduction. The revised plan formulation strategy in the Draft Final Report took this into account. It considered the full implications of the Natomas Basin ring levee system and the systemic risk associated with

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multiple levee failure points for the closed system model and addressed earlier concerns about the completeness of the plan.

HQUSACE Assessment: The issue is resolved: The Final Report released for S&A review was revised with the new plan formulation strategy based on levee performance and identified the new NED plan for improving levee performance for all nine reaches of the ring levee system. See AFB issue #21, #27, #28 and Draft Report issue #15 Planning Process and Report Organization.

6. Interior Drainage: Discussions in the report materials do not seem to mention interior drainage considerations. Are any drainage modifications required based on the stability and seepage measures being proposed? Given the fairly infrequent level of residual damages under the with-project conditions it raises questions as to what happens with interior water during high flow events and whether the plans are complete per 2-3.c.(2) of ER 1105-2-100.

SPK Response: The modifications to existing interior drainage facilities have been limited to bringing the facilities in compliance with USACE criteria for penetrations through levees (upgrading discharge lines, pumps, etc. to raise the drainage over the top of levee). No assessment of the capacity of existing facilities to address the residual flooding from interior runoff was accomplished. The interior drainage plan of the Natomas Basin was developed by the City of Sacramento and is documented in the "Natomas Comprehensive Drainage Plan Conditional Letter of Map Revision", May 1997. Therein it lays out the plan to keep the urban areas of the Natomas Basin out of the 100-yr floodplain. Beyond the 100-yr event, residual flooding from the exterior reaches would cause much more significant flooding than interior residual flooding. Residual flooding from both interior and exterior sources will be considered further under the GRR as additional increments.

Action Required: This discussion of interior drainage has been added to the report.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 4, Section 4-1.a.

7. Current and Prior Cost-Sharing: The report states that cost-sharing for the reauthorized project will be 75% Federal and 25% non-Federal, however it is Corps policy to cost-share newly reauthorized projects at 65% Federal and 35% non-Federal as required by WRDA 1986, as amended. Note that current cost sharing has even been applied in cases of design deficiency corrections pursued under existing project authority unless Congress has specifically directed that the prior cost sharing for the project be applied. The report should be revised to reflect the correct cost-sharing numbers per E-21 of ER 1105-2-100.

SPK Response: Concur.

Discussion: HQUSACE and SPD felt that the old authority would not be relevant. Had any of the features previously authorized had actually been constructed, those would have been cost shared at the authorized cost sharing. And if the Natomas project could be broken into separable elements, the District might be able to make a case that certain areas have different cost sharing. However, in light of the fact that the project needs reauthorization, current cost sharing needs to

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be applied. A question was raised as to whether a new PPA would be needed or if the existing PCA could be amended. Clark Frentzen agreed that SPD would take that as a question to be answered.

Action Required: The District will recommend cost sharing consistent with WRDA 1986, as amended. The Federal share will be 65%, and the non-Federal share will be 35%.

HQUSACE Assessment: The concern is resolved in the Final Report: Chapter 5, Section 5-4, Cost Apportionment.

8. Model Certification. The economic analysis employs the HEC-FDA model to assess flood damages. HEC-FDA is a certified planning model. However, because of the complexity of the flooding situation in the Natomas basin, additional post-processing of HEC-FDA output is required. This additional post-processing is accomplished using spreadsheets with an @Risk add-in. These additional spreadsheets will have to be certified or as a minimum, “approved for use” as required by Corps policy (see EC 1105-2-407).

SPK Response: Concur. The EAD and benefits results obtained by using the HEC-FDA program will be adjusted using a second model (@Risk/Excel). This model was developed in response to agency technical review (ATR) comments and adjusts the EAD and benefit values by accounting for human behavior in the floodplain in the form of a rebuild period after a flood event, a loss of inventory stock as people move out of the floodplain after a flood event, and a cap to the number of flood events allowed to occur before the Natomas Basin is completely abandoned. The Center of Expertise (PCX)/Model Certification team for flood risk management (FRM) in San Francisco has been engaged regarding the PDT’s intent to have this @Risk/Excel model “approved for use.” The SPK Economics team will be submitting to the PCX a framework of the model Review Plan (RP) and the model approval documentation by 25 May 2010.

Action Required: The SPK Economics team submitted a framework of the model Review Plan (RP) and the model approval documentation to the PCX on 25 May 2010.

HQUSACE Discussion: The model review was completed by the PCX in September 2010. A recommendation for approval and all model documentation was sent by the PCX to HQ in September 2010. The District was informed via e-mail that the HQ model committee had met and approved the N@RM for use on the Natomas Interim GRR.

HQUSACE Assessment: The concern is resolved by the approval of the model by HQ prior to the CWRB and transmitted to the PCX on September 28.

9. Floodplain Assignments by Event: Economic Appendix. Tables 6-7 and 6-8. rationale for the ordering of index points provided in the Economic Appendix is perplexing. For example, it is not clear why Index Point “E” is identified as the critical index point (CIP) in line 3 of Table 6-7 as it is not assigned for any specific event at that point. It appears that Index Point “B” should be the next most critical point, followed in order by C, H and then E. The report needs to provide a clear explanation of the basis for selection and ordering of critical index points.

SPK Response: Concur. The ordering of increments and the selection of floodplains (i.e., flood depths taken from specific floodplains) as currently documented in the Economic Appendix is unclear and confusing. This process will be described in more detail and with more clarity in the Appendix. The order of increments described in Chapter 6 of the Economic Appendix and used to perform the incremental analysis was based on the EAD and AEP results reported in Chapter 5; these results informed/guided the order of increments outlined in Tables 6-7 and 6-8. The order was based on a combination of AEP and EAD values for each reach. Generally, a reach with a high AEP also had high expected damages (e.g., NAT D); the reach with the highest AEP would be fixed first. After this fix, the reach with the next highest AEP was considered the “weakest link” in the Basin and so would be fixed next. The “floodplain assignments” (which are really flood depths taken from the floodplain of the reach listed in the tables) displayed in Tables 6-7 and 6-8 show the progression (i.e., reduction in the number of floodplains from the total mix of floodplains) as each reach is fixed. Based on AEP base modeling results, the reaches in the Major area would be ordered as follows: D (AEP = .21), A (AEP = .20), E (AEP = .18), B (AEP = .12), C (AEP = .04), H (AEP = .04), and I (AEP = .015). In the case of reaches C and H, where AEP is the same, EAD was used to determine which reach would be fixed first. Here, reach C had a much greater EAD value than reach H (\$215 million for C versus \$76 million for H), so C was selected to be fixed before H. For increment 2, NAT E was selected as the controlling index point (CIP), or the next “weakest link” in the Basin, since NAT D was already fixed in the prior increment and NAT A is being fixed in this increment; floodplain assignments for each frequency event were selected based on the remaining floodplains in the “mix” after taking into consideration 1) those reaches that have already been fixed 2) those that still need to be fixed and 3) the floodplains still in the mix that result in the most severe consequences (damages) for each frequency event. So, for increment 2, since NAT D and NAT A have already been fixed, some of their event floodplains can be removed from the mix, but some of their event floodplains still remain (e.g., NAT D’s 100-yr through 500-yr, since even with the fix NAT D has an AEP of .016). Once a floodplain is removed from the mix, the floodplain with the greatest consequences still remaining takes its place, per frequency event. For increment 2, NAT B’s 2-yr and 10-yr event floodplains were assigned since these produced the most consequences (as shown in Tables 5-23 to 5-33), higher than any other event floodplains, including reach E’s.

Action Required: This process above will be described in more detail and with more clarity in the Appendix.

HQUSACE Assessment: The concern is resolved in the Economics Appendix, Section 6.4.

10. Historic Record of Potential Flood Events: It is noted that, for a variety of reasons, the Natomas area has never experienced significant flooding or a levee failure. Geotechnical investigations indicate that there is great potential for levee failures; however, estimated probabilities of failure for the levees do not appear to be consistent with the historical record. The main report contains very little information on potential flood events that have threatened the Natomas area. The report should provide information on peak stages that have occurred, by year, at key index points and relate these to the estimated levee failure probabilities at these index points. If there are obvious inconsistencies between the historic record and the estimates developed by the study team these need to be clearly explained. See E-19 j. and k. of ER 1105-2-

100 which explains the relevance of historic flood data in determining existing and future flood damages.

SPK Response: Do not concur. In an e-mail discussion among SPD, HQUSACE, and SPK, HQUSACE's assessment of the methodology used to develop the levee performance curves is that the process was correct. While the Risk Management Center is taking on the task of having a more repeatable and defensible process that doesn't solely rely on expert elicitation, for the time being it is the best available, and it is a recognized and accepted method. Ultimately all risk analysis requires the judgment of experienced engineers and scientist.

Discussion: The probabilities were estimated without relying on human intervention. Intervention is a typical USACE response that tends to mask the severity of the problem at hand. Historic flood events had segments of the levee that were heavily flood fought with sandbag rings, increased monitoring, seepage blankets, and installation of plastic sheeting. It is not unreasonable to say that there were in fact failures initiated that without intervention would progressed to breaches. If you consider that multiple failures initiated over the years and were arrested by either intervention, blind luck, or receding loads, then the high Pfs are reasonable. Internal erosion, scour and like problems usually get worse with time, not better, and they are almost always worse than predicted to begin with.

Action Required: The goal was to describe the conditions, discuss levee performance in the past, and to present the probability of failure. To address this comment HQUSACE and the District coordinated on the drafting of the problems and opportunities. Chapter 2 has extensive revisions. See Draft Report issue #15 Planning Process and Report Organization for further discussion.

HQUSACE Assessment: The concern is resolved in the Final Report Section 2-7.

11. Rebuilding Assumptions. The geotechnical assessment of the Natomas levees indicates that they are in extremely poor condition due primarily to sub-surface problems. Probabilities of failure of 15%, to as much as 30%, per year are estimated for some levee locations for all flood conditions. Consequences of levee failure vary considerably depending on where failure occurs, but damages are estimated to exceed \$6.7 billion for the 2-year event in a worst-case scenario. Because of the high probability of levee failure and the resulting frequent and severe consequences in the future "without" project condition, it is highly unlikely that the floodplain inventory will be completely repaired to pre-flood conditions between major flood events. In addition, it is likely that some people, after suffering multiple significant flood events will choose not to return to the floodplain. The economic analysis needs to account for this human behavior in this case. It is noted that in typical flood damage analysis severe events are rare and this type of behavior would not be expected.

SPK Response: Concur. An adjustment to the EAD and benefit values has been completed using an @Risk spreadsheet model. This model accounts for human behavior in the form of a rebuilding period, a rebuilding schedule (percent rebuilt per year during the rebuild period), loss of inventory stock following a flood event, and the number of flood events allowed before floodplain occupants decide to completely abandon the Natomas Basin. The revised analysis showing the

adjusted EAD and benefit values will be documented in a separate chapter (Chapter 7b) in the Economic Appendix. These adjusted numbers are used as the basis for plan formulation.

Action Required: Report revisions.

HQUSACE Assessment: The concern is resolved in the Economics Appendix, Chapter 7. Main Report, Chapter 2, Section 2-4.j.

12. Future Floodplain Development: The economic evaluation currently does not include consideration of future development in the flood plain. In the existing condition a moratorium has been placed on development in the floodplain. However, it is clear that once the levees are repaired, substantial future development will occur under the “with” project condition. This future development must be evaluated in a reasonable way. The resulting increases in residual damages must be reported and incorporated into the economic analysis. See E-18.b.(1) of ER 1105-2-100 regarding induced new development.

SPK Response: Concur. Based on current HEC-FDA project performance statistics, new development in the Natomas Basin would be allowed and the building moratorium lifted once levee raises begin to occur, which is when the 90% conditional non-exceedance probability (CNP) for the 1% chance event is met. Additional work is currently being completed by the PDT (engineering) for the GRR, which will allow for a more accurate levee raise alternative analysis. For the GRR, with-project residual damages associated with future development for levee raise alternatives that meet the CNP requirement (and which therefore would allow for new development in the Basin to take place) will be completed. The results of this analysis will be incorporated into the economic analysis.

HQUSACE Discussion: In addition to consideration of additional development resulting from the implementation of the Federal plan, the report, in particular the NEPA document needs to address likely actions of others. HQUSACE feels it is important to communicate residual risk. SAFCA’s plans to address residual risk need to be included in the PAC. The District should address the issue of future floodplain development and residual risk in the narrative of the Main Report, with more detailed economic analyses related to this issue in the GRR.

Action Required: Revisions to report.

HQUSACE Assessment: The concern is resolved in the Final Report: Chapter 4, Section 4-12. Addresses Residual Risk and efforts SAFCA is taking to reduce it.

13. O&M Costs to Bring Existing Levees Up to Standards: O&M costs to bring the Natomas levees up to current standards are currently included in cost estimates for some project alternatives. This includes both the costs to remove vegetation, including mitigation for removal of vegetation, and the cost to address levee encroachments. The non-Federal sponsor is 100% responsible for O&M, including any mitigation related to O&M. The O&M cost to bring the existing levees into compliance should not be included in the Fix-in-Place alternative or any other

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alternative under consideration. These costs should be included in the future “without” project condition and the Federal government will not share in these costs. In addition, they are not considered in the benefit-to-cost ratio or net benefits for any alternative. This cost adjustment will likely affect the plan formulation for this report. It is noted that it is appropriate to include incremental O&M associated with proposed project improvements in the economic cost estimates; however, these are also a 100% non-Federal responsibility. SPK has transmitted a request to HQUSACE for a variance on the Natomas levees and this request is now under consideration.

SPK Response: Concur. A section has been added to the discussion of the Fix In-Place alternative discussing the costs of bringing the existing levees up to Corps O&M standards. Mitigation and vegetation removal costs were taken out of the average annual costs for each alternative, designating those costs as non-Federal. These revised costs were used to perform the economic net benefit and benefit-to-cost analyses and for plan formulation purposes.

HQUSACE Discussion: In order to have a policy-compliant document, costs to bring levees up to current standards cannot be included in any alternatives. Therefore, for the fix in-place alternative should be removed.

Action Required: The screening estimates have been revised to remove the costs of deferred maintenance. The economic analysis for the fix in-place alternative has been conducted. These sections of the report have been revised.

HQUSACE Assessment: The concern is resolved in Final Report Chapter 3, Section 3-5.d.

14. Flood Fighting and Upstream Levee Failures: The report includes an attachment that addresses the impact of flood fighting and upstream levee failures, both of which have played a role in protecting the Natomas area from incurring significant damage during flood events. However, flood fighting and upstream levee failures are not incorporated into the baseline estimate of flood damages. For this reason the report likely overstates flood damages to some extent. See E-19.b.(3)(c) of ER 1105-2-100 regarding emergency actions and costs.

SPK Response: Do not concur. SPK conducted sensitivity analyses considering both upstream levee failures and flood fighting. Results of this sensitivity analysis are documented in the memorandum, Subject: American River Watershed, CA, Common Features, General Reevaluation Report - F3 Report/Feasibility Scoping Meeting, Resolution of Upstream Levee Failure Issue, Dated 15 December 2009. This memorandum is part of the ARCF Final F3 Closeout Package. The basic conclusion from the sensitivity analyses was, "Based on the analyses performed, it was concluded that nominal changes in the probability-stage curves to account for possible upstream levee failures have only negligible impact to the EAD and AEP results. Additionally, EAD and AEP results changed only minimally with modifications to the probability of failure values made to model the effects of flood fighting."

Action Required: None

HQUSACE Assessment: The concern is resolved

15. Levee Superiority and Planned Overtopping Design: It is noted that Corps levees now must be designed to manage floods that exceed the design of the levee. Overtopping must be handled in such a way that the levees are protected from failure and risk to the public is minimized by planned gradual overtopping that avoids a catastrophic failure. The report should include some consideration of overtopping in levee design. Detailed design of overtopping features and locations can be accomplished during PED.

SPK Response: Do not concur.

Discussion: Additional discussion has been added to section 4-12 of the report that addresses levee superiority. The Natomas Basin already has superiority over adjoining flood basins (these flood basins would be overtopped before Natomas). In addition, this levee superiority is going to remain. California Senate Bill 5, signed into law in September 2007, defines and mandates a level of protection for urban levees. Not yet specifically stated, the intent is for rural levees to have lower levels of protection than urban levees; these details are being worked on by the State as part of the State Plan of Flood Control. In addition, under the interim PAC, levee raising is not part of the recommended plan because there is not enough hydraulic model information to optimize the levee height. This is in regards to the hydraulic model being developed in the NGVD 29 vertical datum, and Corps policy mandating the NAVD 88 vertical datum. Levee superiority cannot be accurately considered until the datum conversion has been fully incorporated into the hydraulic model. Additionally, what level, if any, of federal participation in levee raising also cannot be accurately considered until the datum conversion has been fully incorporated into the hydraulic model. Therefore, since datum conversion is being incorporated into the hydraulic model for the GRR, both levee raising and levee superiority will be addressed as part of the GRR. This future analysis and discussion in the follow on GRR will address magnitude of events that cause overtopping into the Natomas Basin, the implications of this overtopping, and measures to prevent catastrophic failure as a result of overtopping.

Action Required: The District will add discussion of levee superiority to the PAC, but to defer the detailed discussion to the GRR. Some of the key points to cover are to know where the water might get in, to protect against system failure, and to protect the structure.

HQUSACE Assessment: The concern is resolved in Final Report Chapter 4, Section 4-12.

16. Warning Time and Evacuation Time: The report does not discuss the warning time or time required to evacuate the floodplain. If a flood warning system and preparedness plan have not been developed for Natomas, this should be considered as a first added flood risk management measure to minimize loss of life and property in the floodplain. If such plans already exist they should be discussed in the report as part of the without-project conditions per ER 1105-2-100, paragraph 2-4.b.(3). The potential for loss of life under the future “without” project condition and the various “with” project alternatives also needs to be addressed.

SPK Response: Section 4-13 discusses the Flood Warning and Evacuation Plans. The county has developed different evacuation/emergency levels that are triggered based on gauge levels at monitoring locations on the Sacramento and American Rivers. When river levels reach a certain

point, different evacuation actions are started. Low level emergency triggers assisted evacuation of special needs persons or groups in vulnerable areas. Medium level evacuation emergency triggers mandatory evacuation of vulnerable population in potentially impacted areas and voluntary evacuation notice to general population in impacted area. High Level Evacuation emergency means that massive numbers need to evacuate.

The County is currently determining evacuation times for various areas. Flood depths and times to reach certain depths have been developed for Natomas based on the location of the levee failure, as have inundation times for various evacuation routes. Rescue and evacuation areas have also been determined for each levee failure location. Rescue areas are defined as areas where water has the potential to reach depths of at least one foot after two hours from the time of levee failure. Evacuation areas are defined as areas that, after 10 days from the time of levee failure, water depth will range from 15 feet at the deepest point to one foot at the flood boundary. Based on information on these maps there are potential loss of life issues for portions of the Natomas Basin in the without project condition. The project team is currently developing potential loss of life values for portions of the Natomas Basin based on actual loss of life ratios developed from actual fatalities in Hurricane Katrina. While the recommended plan would substantially reduce the probability of an uncontrolled flood in the basin due to levee failure, there still is the risk of flooding and loss of life for flood events that could overtop the improved levees.

Action Required: The project team developed potential loss of life values for portions of the Natomas Basin based on actual loss of life ratios developed from fatalities in Hurricane Katrina. This information has been added to the report as well as qualitative discussion on areas at risk

HQUSACE Assessment: The concern is resolved in Final Report Chapter 4, new Sections 4-13.f. and 4-13.g. Also see issue #21 Plan Formulation and Residual Risk

17. Automobile Losses, Economic Analysis: Appendix, Paragraph 5.6, page 48 indicates that average values of \$14,925 and \$28,500 were used for used and new cars, respectively. It is noted that U.S. Bureau of Transportation statistics cites values of \$7,988 for used cars and \$26,477 for new cars for 2008. Interestingly, the BTS data indicates that used car values have generally been declining since 2000. The concern is that there is large difference in used car value estimates between the BTS value and the value used in the report. The report should use the value published by USDOT-BTS, which is the Federal agency responsible for the collection and dissemination of this data, or provide a convincing explanation for the significant difference in values and explain why the value adopted for the report is more appropriate. In addition, the economic analysis assumes 50% of residential vehicles and 20% of dealership vehicles will be removed from the flood plain due to the short evacuation time. The report needs to specifically document the assumption used for evacuation time.

SPK Response: EAD has been adjusted to reflect the \$7,988 used car value published by the BTS; depending on the where the levee breach occurs, flood waters would reach the urban area of the Basin within minutes to 20 hours (+/- a few hours). The 50% assumption was based on the potential short warning time before flood water reach the urban area, the large number of people who live in the Basin, the relative small number of major routes (highways) for evacuation, and

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EGM 09-04 which recommends a removal rate of 50.6% for areas where the warning time is less than 6 hours.

Action Required: Revisions to report include documenting the assumption used for evacuation time.

HQUSACE Assessment: The concern is resolved in the Final Report Economics Appendix, Section 5.6.

18. Certification of the Cost Estimate: It is noted that the cost estimates need to be completed and certified by the Cost-Estimating Center of Expertise in the Walla Walla District. See 5.c. of ER 1110-2-1302.

SPK Response: Comment noted.

HQUSACE Discussion: The cost certification process is currently underway.

Action Required: Complete the cost certification.

HQUSACE Assessment: The concern is resolved: The cost estimates were reviewed by the Cost Engineering Center of Expertise and were certified on 26 August 2010.

19. Plan Formulation and EO 11988: The early elimination of alternatives that would have limited further development in the Natomas floodplain is contrary to Executive Order 11988. This order requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities." The PAC needs to address the EO since it has both eliminated opportunities in the formulation of alternatives while identifying them as actions being considered and planned in other studies (see residual risk discussion). Recommend a separate section of the PAC to address compliance with 11988.

SPK Response: Concur that more discussion of EO 11988 is needed. Do not concur that the project contradicts EO 11988. When the Corps approved the NLIP 408 request, this requirement was addressed. Since the time that the 408 approval was granted, the local sponsor has started to implement these improvements. The 408 approval was based on several factors that effectively limit the development to the already urbanized area. The first is a Habitat Conservation Plan (NBHCP) that applies to the 53,341-acre interior of the Natomas Basin. The purpose of the NBHCP is to promote biological conservation along with economic development and the continuation of agriculture within the Natomas Basin. The NBHCP establishes a multi-species conservation program to mitigate the expected loss of habitat values and incidental take of

protected species that would result from urban development, operation of irrigation and drainage systems, and rice farming. The goal of the NBHCP is to preserve, restore, and enhance habitat values found in the Natomas Basin while allowing urban development to proceed according to local land use plans. The second factor is the Sacramento Region Blueprint, a comprehensive land use plan that promotes compact, mixed use development within existing developed areas as an alternative to low density development. The Blueprint and the NBHCP were designed to work together, confining development to the existing developed footprint as much as possible while maintaining sustainable habitat. The third factor that will influence development in Natomas is the enactment of the Development Impact Fee, which requires developers in Natomas to pay a fee to develop in a floodplain. Additionally, the physical construction of NLIP features along the north boundary of the Basin would render any other alternative ineffective. For example, a cross-Natomas levee protecting existing development would appear at first glance to be an effective way to implement the requirements of EO 11988. However, the presence of the levee improvements on the north boundary means that even with the construction of a cross-Natomas levee, development could occur in the north part of the Basin. It is not practical to build additional features that would comply with EO 11988, particularly if they are more costly, only to have them rendered useless by the construction of NLIP.

HQUSACE Discussion: This discussion needs to be added to the Main Report. There is a good discussion of EO 11988 in the EIS that can be referenced.

Action Required: Add discussion demonstrating how the project complies with EO 11988.

HQUSACE Assessment: The concern is partially resolved in the draft Final Report. Need additional information that specifically addresses wise use of the flood plain.

SPK Response: Discussion on the Habitat conservation Plan and how it addresses wise use of the flood plain will be incorporated in context of addressing EO 11988.

HQUSACE Assessment: The concern is resolved: Final Report Section 4-15, 4-16 is a comprehensive discussion of EO 11988. See issue #14 Compliance with EO11988 under section D: Draft Report issues Prior to Public Release.

20. Plan Formulation and Proactive Risk Management in the Flood Plain: The study repeatedly states that there is an urgency to initiate measures to reduce the likelihood of failure and formulate an alternative on the heels of SAFCA's program. However, it does not attempt to identify proactive risk reduction measures associated with enhanced monitoring, corrective actions at high priority areas, advanced flood fighting capability, etc. Cumulative risk reduction in the short term could be assessed and quantified in an interim risk management plan in conjunction with SAFCA measures. From the incremental analysis we know that action associated with levee segment D provides the largest reduction in damages so that could provide a substantial risk reduction increment that would allow for a larger watershed, system based approach to decision making. Recommendation: A project risk management plan be completed to address the short term risk reduction measures to allow for federal decision-making associated with a systems and watershed approach.

SPK Response: Do not concur. The District responded that while the Corps' planning process requires that the study be conducted as if SAFCA had not already started implementing measures, the reality is that several sections of the NLIP project have already been constructed. In fact, Reach D is one of those reaches under construction. The levee maintenance personnel already know the worst sections of the levee, regularly patrol them during a flood, and have preplanned for flood fighting. The PDT considers this PAC to be a short-term risk management plan, identifying which failure mechanism dominates the analysis (seepage), which sections of the levee are at the greatest risk of failure, and the least cost way to address the problems. While a systems or watershed approach is generally regarded as the best way to make decisions, the analyses done for this report show that the Natomas Basin has probably the highest risk and most severe consequences in the American and Sacramento River system, and that systems approaches (like upstream detention and bypass modification) do not provide enough reduction in stage to alleviate the problems associated with the levees.

HQUSACE Discussion: Other actions underway in the basin and in the Sacramento and American River flood plain need to be disclosed so there is more comprehensive discussion about how these actions are part of larger plan to reduce damages systematically.

Action Required: The District will revise the report to include more discussion of watershed initiatives and their relation to the current study. Much of the information is in the EIS. It will be incorporated into the Main Report.

HQUSACE Assessment: The concern is resolved: Final Report Chapter 1, Section 1-6 has been revised to move the discussion of the NLIP project to the beginning as well as to incorporate more discussion about how this report and NLIP relate to the various watershed efforts underway.

21. Plan Formulation and Residual Risk: Since this study is focused on flood damage reduction, it will need to comply with WRDA 2007, Section 2033. This requires a feasibility study for a flood damage reduction project to include, as part of the cost/benefit calculation, calculations: (1) of the residual risk of flooding, of loss of human life, and to human safety following completion of the proposed project; (2) of any upstream or downstream impacts; and (3) to ensure that the benefits and costs associated with structural and nonstructural alternatives are evaluated in an equitable manner.

SPK Response: Concur.

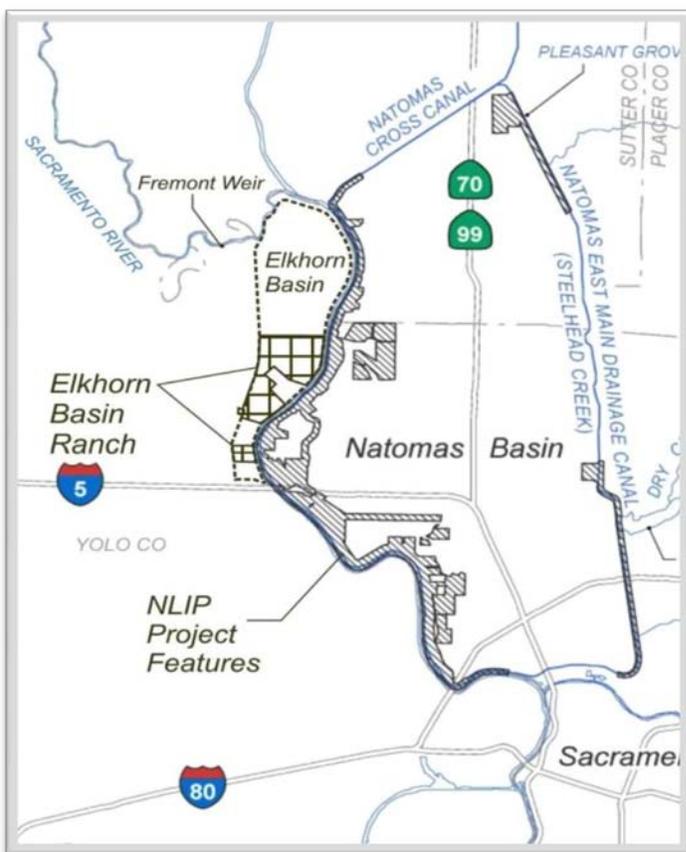
Action Required: This discussion on residual risk has been added to the draft Final Report in Chapter 4, Section 4-12. Potential loss of life is discussed in Section 4-13.f. and Table 4-6. Upstream and downstream impacts are discussed in Chapter 4, Section 4-14.

HQUSACE Assessment: The concern is partially resolved: In the draft Final Report Residual risk of flooding is discussed in Chapter 4 as noted above, however, other actions are being taken by SAFCA to address residual risk. Those actions need to be described more fully.

Action Required: Add a graphic showing levee superiority considerations including location of Elkhorn that will be considered in the GRR but actions SAFCA has already initiated under expanded jurisdictional powers granted by the CA legislature.

SPK Response: Concur.

Action Taken: A new figure has been added to Section 4-11 and in Chapter 4, Section 4-11.b is new as follows:



“b. Local Sponsor Actions. In order to reduce residual risk, SAFCA has taken actions to control where development occurs. SAFCA has acquired agricultural conservation easements in the Elkhorn Basin, located west of the Natomas Basin. Figure 4-2 shows the locations of these conservation easements. The acquisition of these easements will advance regional flood protection by helping to concentrate new development in well protected urban areas. It will also help preserve the agricultural character of the property with the goal of reducing the long-term risk of flooding. The agricultural conservation easements achieve the objective of precluding development which could increase flood risks for the region. SAFCA has also acquired other conservation easements with the goal of preserving habitat, open space, agricultural land, and precluding development which could increase flood risks.

“Figure 4-2. Agricultural Conservation Easements in Elkhorn Basin Acquired by SAFCA.”

HQUSACE Assessment: The comment is partially resolved. Due to the significance of the risk, SPK should develop a ranking of reach significance by impact on evacuation times to show how the plan addresses life safety formulation goals. Integrate results into the discussion on the recommended plan on how its supports the evacuation critical infrastructure.

District Response: Concur.

Action Required: A new table added to Chapter 2 that is similar to CWRB Slide 21 with estimated evacuation times by reach. Table 2-9. The new text and table follow:

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“Because the urban area of the Natomas Basin is also the lowest in elevation in the basin, levee failures have swift impacts on evacuation routes from the basin. Large scale flooding can happen very rapidly, depending upon the location of a levee failure. Table 2-9 shows the times expected until urban evacuation routes are impassible for various levee failure locations.”

Table 2-9. Expected Time for Flooding of Urban Evacuation Routes

Reach	Minimum Time until Urban Evacuation Routes are Impassible
American River North Levee	20 minutes
Sacramento River just above Confluence with American River	1 hour
Lower Natomas East Main Drainage Canal	2 hours
Sacramento River	1.5 days
Natomas Cross Canal	1.5 days
Upper Natomas East Side Levees	1.5 – 2 days

HQUSACE Assessment: The concern is resolved by the changes noted above.

22. WOP USACE Existing Studies and Reports: Section 2.4.a should include findings from the OMRR&R reports that were conducted for the Natomas system of levees. The findings from these reports could inform priority areas from previous field investigations and or performance concerns from prior flood events and repairs that were made to improve performance. They should provide the foundation for an assessment of existing conditions.

SPK Response: Concur. The PDT will continue to research this topic and present it in the report. Additionally, the report will reference the results of the Levee Seepage Task Force that prompted the decertification of the levees.

Action Required: Available information will be referenced in the report.

Action Taken: An extensive section on levee performance was added to the report describing the historic performance of the levees and the results of O&M reports. This can be found in Chapter 2, Section 2-3.b, beginning on page 2-7.

Chapter 1, Section 1-6.a.(2), page 1-18. The list of documents supporting the NLIP contains the following entry:

“2003 CESPCK Levee Task Force, Recommendations for Seepage Design Criteria, Evaluation and Design Practices, prepared by the U.S. Army Corps of Engineers, Sacramento District, dated July 2003.”

Additionally, Section 2-3.c describes the findings of the levee seepage task force:

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"After the 1997 flood event, the Corps, in conjunction with SAFCA and the State, put together a task force to extensively study the seepage problems. Based on the recommendations of the task force, studies of Natomas were finalized in 2005 and then thoroughly reviewed. On the basis of those results, in June 2006, the Corps stated that, primarily because of underseepage, the Natomas levees were no longer certifiable for the flood event that has a 1% chance of occurrence in any year, or the 100-year event."

HQUSACE Assessment: The concern is resolved by the changes to the Final Report including available O&M and levee performance information from the levee seepage task force.

23. Plan Formulation: Levee Problems by Reach: In Section 2.4.k the Report states that "because the levees around the Natomas Basin have different problems or different combinations of problems, each has a different probability of poor performance in a flood....and different consequences when the levee fails." This statement should be used for the formulation of the project alternatives in Ch3. See comments below for Ch 3.

SPK Response: Concur. This information was used in the incremental analysis phase of the formulation to determine the order of inclusion of the reaches.

Action Required: None

HQUSACE Assessment: The concern is resolved for the Draft Report. See issue #15 below.

24. Planning Objectives: In Section 2.5 the objectives noted for the project appear to be goals. The main objective of the American and Sacramento River Common Features Project PAC based on the authorization is flood damage reduction in the vicinity of the Natomas Basin. The objectives stated are goals of the project to reduce seepage, erosion, stability etc. They could be put in context of requirements to re-certify the levees for FEMA.

SPK Response: Concur. A new section has been added called "Local Concerns." Several items have been moved from "Objectives" and "Constraints" to this new section.

Action Required: As described above.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 2, new Section 2-7, Local Concerns.

25. Method of Assessment for Formulating Alternatives: If a Levee Risk Based Ratings by Reach Matrix was developed that gives initial assessment results (could be based on the decertification report) and analysis required to identify rehabilitation priorities. Then a complementary table identifying performance factors that increased the probability of failure could be compared with management measures to reduce risk. This would assist in the development of response plans to reduce cumulative risk by each reach and goal type. This would logically lead you towards prioritizing management measures based on performance as well as economic efficiency. Because

this was not done, there are no levee rehabilitation program scenarios that include an assessment of their cumulative risk reduction.

SPK Response: Do not concur. In an e-mail discussion between HQUSACE, SPD and SPK, Headquarters (Engineering) is satisfied that the process of developing levee performance curves used for the analysis was correct, given where we are with methodology. Coupling this with the incremental analysis done by economics produces a logical progression of features to be included and those to be excluded. As stated above, the PDT considers this PAC to be a short-term risk management plan, identifying which failure mechanism dominates the analysis (seepage), which sections of the levee are at the greatest risk of failure, and the least cost way to address the problems.

Action Required: None.

HQUSACE Assessment: The concern is resolved.

26. Appropriate Planning Constraints: Section 2-6 notes several of the planning constraints found on pages 2-22 to 2-24 do not appear to be appropriate for a Corps study including 200-year level of protection; considering O & M (its part of the overall NED benefit calculations) and quick implementation. See AFB issue #47 Planning Constraints.

SPK Response: Concur. A new section has been added called “Local Concerns.” Several items have been moved from “Objectives” and “Constraints” to this new section.

HQUSACE Discussion: None

Action Required: As described.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 2, new Section 2-7, Local Concerns.

27. Plan Formulation Strategy and Levee Performance: While the Objectives noted in Table 3-1 are matched with measures, the screening based on the quantification of how much the probability of failure is being reduced by each type of measure by reach is not assessed. This would produce an incremental risk reduction for each reach by measure. For example, there are 24 measures identified for seepage. What combinations of measures (as a system) reduce under seepage and through seepage to an acceptable level of performance? And what combination of objectives and measures reduce the cumulative P (f) for the levee section. This could also be assessed by priority areas as noted in Table 2-1 that identify erosion risk at different river miles by length of levee that SAFCA did in their analysis rather than at the courser scale established by the Corps.

SPK Response: The levee performance Risk & Uncertainty curves for each alternative analyzed are provided in the report. Some measures (such as deep cut-off wall fully penetrating the aquifer), will be needed from very low water stages, but the same depth solves seepage for any

river stage. The R&U for each risk was provided for water from toe to top of the levee. Combinations of measures are provided in the geotechnical appendix with the associated R&U.

HQUSACE Assessment: The concern is partially resolved: Reference Hydrology and Geotechnical Appendix. Additional coordination with ENC and SAC on modifications to the Main Report on how to describe and quantify WOP and FWP levee performance for the formulation of alternatives and their evaluation. See Draft Report issue #15 Planning Process and Report Organization.

SPK Response: Concur.

Action Taken: Extensive revision of Chapter 2 was completed in which the focus of the Problem Identification was shifted from the general issue of flooding to the more focused issue of deficiencies related to the performance of existing levees. Discussions were added to the Draft Report concerning the without-project performance of the levees. These discussions center on past levee performance, deficiencies in the levees affecting levee performance, the development of the levee performance curves, the probability of failure, and the consequences of levee failure. These consequences include very short warning times, flood damages, loss of critical infrastructure (including major highways and a major international airport), loss of life, and health and safety issues. Change to the Draft Report are in Section 2-3.b., Section 2-7, Tables 2-6 and 2-7.

HQUSACE Assessment on the Draft Report: The concern is partially resolved. Recommend that the P(f) for each reach be noted on the figure or in an adjacent table in the Final Report for comparison purposes.

SPK Response: Concur.

Actions Taken: Figure 2-6 And Figure 2-7: A reach by reach notation to the figure to graphically identify each reach.

HQUSACE Assessment: Issue partially resolved. The benefits from the new figures show that the reach with the greatest consequences has the least benefit. Recommend that 1) the formulation strategy take into account the limitations of the water surface elevations data that are necessary for evaluating overtopping and how those limitations constrain the formulation of alternatives for this interim evaluation; 2) describe how overtopping will be assessed in the future in the GRR when data and modeling issues are resolved; 3) describe how this Interim report WOP conditions will be defined by the geotech risk assessment fragility curves (reach by reach) to address the unique management measures required for each reach; 4) describe and assess the entire Natomas ring levee as an integral system of dependent reaches forming one hydrologic unit and 5) combine the with and w/out project fragility curves together to show improvement to levee performance for the measures taken. Clarify that the P(f) in table 2-9 for benefit calculation and evaluation purposes is 100yr and reconcile footnote at bottom.

SPK Response: Concur. The incremental analysis contained in the Draft Report document produced results that seem counterintuitive. The area in the south of the basin has the least

amount of warning time and the most severe effects from a flood, yet the incremental analysis shows that remedial action on the levees in this area would have few net benefits. The results of this analysis led to discussions by the sponsor and public concerning whether or not the recommended plan met the planning criteria of completeness, given that the NED plan described in the draft document did not include the entire perimeter.

HQUSACE Discussion: After the District documented the critical infrastructure in the basin and the short warning times in the most populated areas, it was determined that an IRC on the plan formulation strategy used for identifying the NED plan was required for the Final Report. An Issue Resolution Conference was scheduled and held with HQUSACE, SPD and SPK prior to the CWRB.

Issue Resolution Conference September 27, 2010: A pre-CWRB formulation IRC was held with the vertical team to resolve how to consolidate the formulation strategy. The IRC guidance the District received noted that the formulation strategy had not fully considered the criteria of completeness, and that the formulation was incomplete if it did not improve levee performance for the entire ring levee system due to the residual risk associated with critical infrastructure and evacuation requirements. The formulation strategy would be revised such that any plan that did not improve levee performance for the entire ring levee was considered incomplete. The criteria by which the performance of the system wide alternatives would then be compared based on the reduction in flood risk and associated damages for the entire system.

This resolution is consistent with the District's decision to complete an interim document once the need for immediate action was recognized following the geo-technical assessment of the Natomas levee system due to high probability of failure from under seepage. The revised plan formulation strategy is consistent with measures that are effective and efficient for addressing levee performance issues related to seepage and stability. These measures 1) neither promote nor constrain future plan formulation for a follow-on GRR that will address the remainder of the Common Features study area including overtopping; 2) are not affected by the limitations in the hydraulic modeling associated with datum conversion and 3) provide significant improvements in levee performance without raising the height of the levees. And overtopping issues can be addressed in a follow-on GRR once the datum issues have been resolved:

Action Required: Revisions are needed to Chapters 1, 2, 3 and 4, explaining the rationale for an interim document to address only levee performance and the limitations of using the hydraulic modeling due to issues related to datum conversion and model validation. Additionally, the report should discuss the effectiveness, efficiency, and usefulness of the levee performance measures, that the measures retained neither promote nor constrain future plan formulation in the follow-on GRR, and that overtopping is not addressed in the interim GRR. The Without-project and with-project fragility curves have been added to the report (Chapter 3, Table 3-10). A footnote has been added to Table 2-9 (now Table 2-10).

Action Taken: Draft Final Report Chapter 1, Section 1-2, page 1-4 includes the following:

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“The focus of this interim general reevaluation study is to authorize immediate improvements to the levees surrounding the Natomas Basin while developing an overall GRR for the Common Features project, lessen risk in the Natomas Basin (regarded to be one of the most at-risk areas in the United States), to implement “no regrets” measures”

Draft Final Report Chapter 1, Section 1-6, page 1-17 includes the following:

“While the Common Features Project consists of more than just Natomas, this interim GRR is confined to improving levee performance in the Natomas Basin. The Natomas Basin is an independent hydrologic unit within the Sacramento River Flood Control System. Levee failures upstream of Natomas have little effect on flood levels adjacent to Natomas. Conversely, a failure into the Natomas Basin would have little effect on the remainder of the Sacramento River Flood Control System. Its geographic location below the Fremont Weir, above the Sacramento Weir and the confluence with the American River, and having very little border along the American River means those actions in other parts of the watershed have minimal effect on water levels in Natomas.”

Draft Final Report Chapter 2, Section 2-3.c.(4), page 2-13 now includes the following:

“It has been determined that in formulating a plan to address levee performance in Natomas, raising levees will not be a part of the selected plan because of the uncertainty in the hydraulic model being used for this analysis. Hydraulic modeling for the Common Features Project continues to be under refinement. The model was developed using the NGVD '29 datum rather than the NAVD '88 datum. This results in additional uncertainty in the stage/frequency relationship. The topography from the Comprehensive Study is being used as the basis for the current hydraulic model. Review of recent ground control elevations has determined that the ground control for the Comprehensive Study topography is not exactly based upon the NGVD'29, as was originally thought. This is mainly due to the use of obsolete ground control elevations in areas of ground subsidence. Because of this, one cannot simply convert the Comprehensive Study topography from NGVD'29 to NAVD'88 using Vertcon (a National Geodetic Survey software tool for datum conversion) because the data was not relative to the NGVD'29 datum to begin with. Without a hydraulic model that is fully corrected for the NAVD'88 datum, refinements of the model could potentially affect the optimization of benefits associated with levee raising. Therefore, this levee raising cannot be confirmed to be in the Federal interest without additional hydraulic modeling efforts.”

Draft Final Report Chapter 3, Section 3-1, page 3-1 now includes the following:

“A guiding principle in the plan formulation strategy was that all of the reaches were dependent upon each other, forming a closed system around the Natomas Basin. The Natomas basin is protected by 42 miles of perimeter levees that are part of the Sacramento River Flood Control System. The levees are configured such that they prevent the various rivers and channels that completely surround the basin from overflowing into the basin. Therefore, the 42 miles of levee protecting the basin form a ring levee protecting the basin. In addition to the basin being protected by a ring levee, it is also a single

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hydrologic unit. Depending on the magnitude of a flood event, a levee failure anywhere on the perimeter of the basin would cause damages to the densely populated southern end of the basin. For certain reaches, it takes a larger flood event to cause serious flooding as compared to other reaches. However, for all reaches, it is possible to have serious flooding with a certain level flood event, making it a single hydrologic unit as well as a system.

“Therefore, any plan that did not improve levee performance around the entire perimeter of the basin would be considered incomplete. The criteria by which the performance of the alternatives was compared were the reduction in flood risk and associated damages. Reduction of flood risk translates into a reduction in risk to public health, safety, and property associated with seepage, erosion, instability, vegetation, and encroachments.”

Draft Final Report Chapter 4, Section 4-13, page 4-34 now includes the following:

“The hydraulic modeling developed for the Comprehensive Study was based upon NGVD29 rather than the NAVD88 datum. As indicated in the discussion of risk and uncertainty, this results in additional uncertainty in the stage/frequency relationship. The District is presently in the process of updating and refining the hydraulic models, which will be used to confirm/refine the system analysis of hydraulic impacts as part of the GRR.

“Although the Corps accepted SAFCA modeling for the Section 408 permit analysis, it was determined at that time that neither the SAFCA nor the Corps modeling was acceptable for optimizing the levee height or for project decision-making purposes. This is because the issues associated with the vertical datum could potentially affect the optimized levee height. Modeling used by SAFCA under the Section 408 approval was used as a means to compare without- and with-project conditions only, and not for optimizing a specific levee height. In the SAFCA Section 408 analysis, the existing top of levee and the proposed top of levee were known with certainty using recent survey information in the NAVD88 vertical datum. The critical output for a Section 408 analysis is the relative difference in performance. It is the relative difference that helps determine if a project causes a significant impact. It was determined at the time of SAFCA’s Section 408 analysis that the modeling used to perform the analysis was adequate for making a comparison and determining the relative difference. Though the model could potentially have datum issues, those issues are the same in both without- and with-project conditions models and are not critical in making a relative difference determination. In addition, a sensitivity analysis was conducted by SAFCA on the potential error associated with vertical datum. This was reviewed by the Corps and provided further reasoning for the Corps to accept SAFCA’s 408 analysis.

“While the design top of levee was known with certainty under the Section 408 analysis, it must be determined in the Corps decision making process. In this PAC report, because there is uncertainty about the vertical datum used in the hydraulic model, there is associated uncertainty in the n-year frequency estimates of water surface elevations. Therefore, while it appears as if raises are in the Federal interest, the amount of raise cannot be optimized. The optimization of levee raise height is a relatively refined analysis

that compares the economic performance of various increments of levee raise. The cost increase in each additional levee raise increment is expected to be relatively subtle, based on the general understanding that a significant amount of the cost of raising a levee is associated with fixed type expenses such as mobilization and real estate acquisition, that are relatively insensitive to the amount of levee raising to occur. As a result, it becomes critically important to accurately assess the benefits provided by each increment of levee raise, which are also expected to differ subtly. This requires a higher order of accuracy from the hydraulic modeling that determines the benefits of each levee raise increment. The hydraulic modeling conducted is not up to the task of supporting the economic evaluation of raise increments because the vertical datum error uncertainty in it severely undermines the ability to confidently determine the federal interest in raising the levees.

“For the follow-on GRR, the model will be converted to the NAVD88 vertical datum, and the amount of raise will be optimized. At that point, a definitive analysis of hydraulic impacts due to these raises will be made, and any needed mitigation determined. In addition to the vertical datum issue, the upstream levee performance issue must be resolved in the future Common Features GRR study in order to be able to optimize the levee height.”

HQUSACE Assessment: This issue is resolved with the changes to the Draft Final Report. All changes were incorporated into the October 22 release of the revised Draft Final Report prior to S&A review and notice in the Federal Register. See AFB issues #21 Plan Formulation and Residual Risk, #28 Plan Formulation and Cumulative Risk Reduction and Draft Report issue #15 Planning Process and Report Organization.

28. Plan Formulation and Cumulative Risk Reduction: A Reach by Reach Assessment of Risk Reduction would help screen the management measures. Chapter three attempts to screen the management measures based on economic efficiency without considering reach by reach cumulative risk reduction based on history, repairs and existing conditions. Consequently, the formulation of alternatives is constrained types of measures and their cost effectiveness (Table 3-3) rather than the risk reduction they provide per dollar spent. Recommendation: develop a cumulative risk reduction by measure and levee section. This could be developed by identifying probable modes of failure and the conditions that have changed that have reduced levee performance and increased P (f). For example, piping: Is there uncontrollable seepage through the levee and or foundation. Is it increasing, decreasing. Is it being monitored and measures to correct it. Levee slope stability: is their sliding or deformation and why? Has it been corrected? Is it being monitored? What is the P (f) associated with slope stability and its contribution to P (f) for the levee system?

SPK Response: There was uncontrollable seepage through the levee, and flood fighting even during a 10 year event (2006). Stability issues on the levee requiring flood fighting have occurred. Erosion of the riverbank reaching into the levee prism has occurred. After each flood event, the levee was weaker due to material washed out by piping from the levee foundation. Monitoring of levee performance only does not decrease the potential for failure. Corrections of deficiencies were made only through PL 84-99, which serve only as a patch. While these PL 84-

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99 repairs may bring the levee to the pre-flood condition, that condition is that of a weak deficient levee, not a strong stable levee. The 1987 flood had the highest water elevation on the levee, the damages were repaired after that by PL 84-99, the levee was monitored. However, subsequent flood events were lower than the 1987 flood, so there is no information except that seepage and stability issues were observed even for lower flood events after that, on those or other locations.

HQUSACE Discussion: This comment is partially resolved: The levee performance assessment needs to consider modes of failure. Additional coordination is needed with ENC and SAC on text additions on the history of Levee Performance. Recommend using information and evidence found in the Levee Vegetation Variance Report. In addition, the formulation is based on improvements to levee performance. Add figures by reach showing the combination of fragility curves for the WOP and W/P improvements for comparative purposes. (See IEPR comment for additional information).

SPK Response: Concur.

Action Taken: Report revisions as noted in discussion. : A section on levee performance has been added to the report including WOP and WP fragility curve comparisons by reach.

HQUSACE Assessment: The concern is partially resolved in the Draft Final Report: Final Report Section 2-7 and Table 3-10 contain the without- and with-project fragility curves, in tabular and graphical format. The plan formulation needs further refinement to capture objective of levee performance in the formulation. Need to shift the rational from incremental approach for system to incremental approach by reach as a tool for determining cost effective measures by reach. Then the reach assessment can be put in context of the “Natomas System unique characteristics as a closed system design (ring levee). Consequently, system performance is only as good as its weakest link). Describe the reach dependencies even though each reach has an independent failure mode.

District Response: Concur. The incremental analysis will be changed to reflect that the reaches are dependent.

Action Required: In accordance with the discussion above Chapter 3, Section 3-5.f will be revised to references of an incremental analysis for identifying efficient measures for each reach, and the overall plan formulation strategy of a system approach will be incorporated.

Action Taken: Chapter 3, Section 3-1, Plan Formulation Rationale, now includes the following text:

“A guiding principle in the plan formulation strategy was that all of the reaches were dependent upon each other, forming a closed system around the Natomas Basin. The Natomas basin is protected by 42 miles of perimeter levees that are part of the Sacramento River Flood Control System. The levees are configured such that they prevent the various rivers and channels that completely surround the basin from overflowing into the basin. Therefore, the 42 miles of levee protecting the basin form a ring levee protecting the basin. In addition to the basin being protected by a ring levee, it is also a single

hydrologic unit. Depending on the magnitude of a flood event, a levee failure anywhere on the perimeter of the basin would cause damages to the densely populated southern end of the basin. For certain reaches, it takes a larger flood event to cause serious flooding as compared to other reaches. However, for all reaches, it is possible to have serious flooding with a certain level flood event, making it a single hydrologic unit as well as a system.

“Therefore, any plan that did not improve levee performance around the entire perimeter of the basin would be considered incomplete. The criteria by which the performance of the alternatives was compared were the reduction in flood risk and associated damages. Reduction of flood risk translates into a reduction in risk to public health, safety, and property associated with seepage, erosion, instability, vegetation, and encroachments.”

Chapter 3, Section 3-5.e now contains an extensive discussion of geotechnical levee performance curves for each reach, including graphs showing without- and with-project curves. Chapter 3, Section 3-5.f. now has no discussion of increments, instead describing the steps as “building blocks” of a complete plan. Incremental benefits have been removed from the tables.

HQUSACE Further Assessment: The Draft Final Report chapter three is based on water surface elevation constraints. Need to reconsider the validity of this approach in the formulation. The report acknowledges that we have datum problems and an incomplete model to assess water surface elevations so we cannot assess levee raises. So how can the report then rely on water surface elevations to constrain the formulation? Recommend that the formulation be centered on levee performance only until the GRR when we have more accurate data and models. Focus the reach by reach assessment and measures that solve the levee performance problems by reach.

District Response: Concur.

Action Required: Chapter 2-7 has been revised containing a detailed discussion of levee problems by reach. Chapter 3 has been extensively revised to detail the formulation by reach and the determination of the most effective measures by reach, as building blocks to a complete plan.

HQUSACE Assessment: Issue is partially resolved with changes to Chapter 2-7, Chapter 3, Section 3-5.f. Remaining concern is documenting the formulation strategy as discussed above in the Final Report. Recommend a vertical team IRC prior to the CWRB to document changes to the Draft Final Report.

Issue Resolution Conference September 27, 2010: A pre-CWRB formulation IRC was held with the vertical team to resolve how to consolidate the formulation strategy. The revisions to the Draft Final Report noted in the September 27 CWRB slides including District, Division and HQ presentations that incorporated the resolution of key issues including but not limited to 1) plan formulation strategy, 2) the reach by reach assessment methodology and the 3) development of the NED plan and 4) revisions to the text are needed to clarify the limited application of ICA in the formulation of measures by Reach. The Final Report will be consistent with all the material presented at the CWRB.. The

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responses to the concerns identified at the IRC should be incorporated into the PGM that will then become the basis for the back check on the final report prior to S&A release.

SPK Response: Concur. The incremental analysis will be changed to reflect that the reaches are dependent. The most efficient measures for each reach were combined to form system-wide alternatives. Doing so enabled differentiation of outputs for effectiveness and efficiency by reach.

Action Required: Chapter 3, Section 3-1, will be revised to reflect this system-wide plan formulation strategy. Chapter 3, Section 3-5.f will be revised to eliminate references to an incremental analysis, and the plan formulation strategy of a system approach will be integrated. The information contained in Slides 25, 26, 27, 36, 37, and 107 will be incorporated into the report.

HQUSACE Assessment: The concern is resolved: The Final Report released for S&A included the revisions based on the formulation strategy developed through the integrated review process. Chapter revisions noted above as well as Chapter 3, Section 3-1, Section 3-5.f. See AFB issue #21 Plan Formulation and Residual Risk; issue #27 Plan Formulation and Levee Performance and Draft Report issue #15 Planning Process and Report Organization.

29. Consequences of Capacity Exceedance and Loss of Life: Section does not discuss the consequences of capacity exceedance including quantifying the time that would be needed to repair and reconstruct failed system components and potential lives lost from capacity exceedance.

SPK Response: The consequences of capacity exceedance are that the levee is overtopped. Overtopping has been evaluated. Due to the uncertainties associated with the hydraulic model, levee raises have not been optimized nor recommended in this PAC. The follow-on GRR will address levee raises. Information is being added to the report concerning evacuation time and potential loss of life in the event of levee failure.

HQUSACE Discussion: As above.

Action Required: Information is being added to the report concerning evacuation time and potential loss of life in the event of levee failure.

HQUSACE Assessment: The concern is resolved in Chapter 4 in new sections on Potential loss of life. See sections 4-13.f. and 4-13.g and AFB issue #21 Plan Formulation Strategy and Residual Risk.

30. Changed Conditions and Engineering Deficiencies: Deficiencies are based on changing engineering standards...what were the standards that changed? And how did that lead up to the decertification of the levees?

SPK Response: Concur. The references to changing engineering standards are unclear. These references have been replaced with a concise description of the events that led to the decertification of the levees.

Action Taken: The report has been revised to include a concise description of the events that led to the decertification of the levees. Chapter 2, Section 2-4.b. includes a discussion on why the levees were decertified. Revisions have also been made to PAC Sections 1 and 5, Chapter 1, Section 1-17, and Chapter 3, Section 3-5.c., removing references to changing engineering standards.

HQUSACE Assessment: The concern is resolved by the changes in the Final Report.

31. Without-Project Condition and Levee Decertification: The Corps decertification of the Natomas levees defines the WOP condition. We need a better understanding about why that happened.

SPK Response: During the 1997 storm event that impacted the Natomas basin, there were problems with water seeping under the levees. Based on that 1997 event, the Corps, in conjunction with SAFCA and the State, put together a task force to extensively study the seepage problems. Based on the recommendations of the task force, studies of Natomas were finalized in 2005 and then thoroughly reviewed. Based on those results, in June 2006, the Corps stated that, primarily because of underseepage, the Natomas levees were no longer certifiable for the flood event that has a 1% chance of occurrence in any year, or the 100-yr event.

In December 2006, FEMA notified the City and County of Sacramento and Sutter County that they planned to revise the community's existing Flood Insurance Rate Map resulting in the entire Natomas Basin being placed within a regulatory Special Flood Hazard Area. In October 2007, the City and County of Sacramento and SAFCA asked the Corps if the Natomas levee system could be certified for the 3%, or 33-yr event, and qualify under FEMA rules for a less restrictive, AR or Restoration Flood Hazard zone.

The Corps completed preliminary analysis and concluded that the Natomas basin levee system does not meet 3% annual flood event certification requirements at this time. All 43 miles of levees within the system must meet certification requirements. Not enough information about the levees along the Natomas East Main Drainage Canal was available at the time to finalize our determination there. We did fully analyze two levee reaches on the Sacramento River between the American River and the Natomas Cross Canal and found significant issues with levee slope stability and underseepage. We also found areas that did not have sufficient levee height. Based on our conclusions, FEMA notified the City and County that the new flood plain maps for Natomas are for an AE zone where building restrictions apply

HQUSACE Discussion: More of this discussion is needed in the without project condition discussion.

Action Required: An explanation of the reasons for decertification is now included in the text.

HQUSACE Assessment: The concern is resolved in Final Report Chapter 2, Section 2-4.b.

32. Without-Project Conditions – Relationship Common Features: Over \$140M is shown expended in the table 1 History of Federal Funding with no reference as to what was accomplished in relationship to the project features listed.

SPK Response: Concur. A table has been added showing the status of Common Features project implementation.

Action Required: The PAC has been revised to show the status of Common Features implementation.

HQUSACE Assessment: The concern is resolved, Table 2 has been added to the document.

33. Feasibility Study Purpose in Context of 408 EIS Document: The statement is made that “The purpose of the limited reevaluation study is to establish the degree of Federal financial participation in this plan (Natomas Levee Improvement Plan) building upon the Section 408 approved features being implemented by SAFCA.” From reading the report, this is not its purpose. It may be an outcome. Recommendation - reference ER 1105-2-100 Chapter 4, Types of Studies Reports and Procedures.

SPK Response: Concur. The study purpose has been rewritten.

Discussion: HQUSACE felt that the EIS is clearer document on project purpose and recommended integrating it with the Main Report. At a minimum the two documents need to be cross referenced. The District will maintain the separate documents because of time constraints but will assure accuracy in cross referencing text and descriptions.

Action Required: The study purpose has been rewritten. Narrative from the EIS will be incorporated into the Main Report. Project features from the NED plan and the NLIP plan will be cross referenced in both the Main Report and the EIS.

HQUSACE Assessment: The concern is resolved in Final Report Chapter 2, Section 1-2.

34. Without-Project Conditions Changes From Original Authorization: A description of the project conditions that affected decision making since the original authorization needs to be added. For example describe how continued urbanization, population increase, fragmentation of habitat etc. and how they effected the recommended plan and why and how the PAC takes that into consideration.

SPK Response: Concur. This discussion has been added.

Action Required: This discussion has been added to the report.

HQUSACE Assessment: The concern is resolved

35. Without-Project Condition – Multiple Floodplains: This is a Natomas PAC so a project specific description of the landscape and development of the Natomas Basin (Section 1.3.c) and how it evolved as a flood plain in context of the surrounding floodplains would provide a system wide context for the study.

SPK Response: Concur. This discussion has been added.

Action Required: This discussion has been added to the report.

Action Taken: In Chapter 1, Section 1-3.c. adding discussion on the development of Natomas. AFB Comments D-21.a and D-23, pages 23 and 28. Comment D-21.a on Study Information and General Comment D-23 on Watershed planning asked for additional information to be placed in the report on the watersheds impacting the Natomas Basin.

HQUSACE Assessment: The concern is partially resolved in the Draft Report. Both sections would benefit from adding a figure and then a description of the major watersheds that impact the Natomas Basin (i.e. Hydrology Appendix for map). By including a figure that describes the Natomas Basin under the influence of separate watersheds, it may be a more effective way to describe and cluster the related reaches (by watershed) to communicate the management measures and related effectiveness as a system of management measures and alternatives by watershed (American River, Sacramento River, etc.). Recommend adding discussion and figure to communicate the multiple system context of the Natomas Basin improvements.

SPK Response: Concur.

Required Action: Three new maps will be added to Section 1-3, Location and Description of the Study Area. These new maps show: 1) the entire Sacramento River watershed; 2) the major tributaries to the Sacramento River that affect the Natomas Basin; and, 3) minor tributaries to the Natomas East Main Drain Canal on the east side of the Natomas Basin. Additionally, a new section has been added, “Watershed Setting,” that describes the location of Natomas in the context of these watersheds.

Action Taken: New maps and watershed descriptions added to text per discussion.

HQUSACE Assessment: The concern is resolved in the Final Report Section 1-3.

36. Comprehensive Watershed Planning and Residual Risk: Section 1.6.8 refers to a SAFCA Impact Fee that includes supporting a comprehensive bypass plan. Yet this alternative is screened out as an alternative in Chapter three. Chapter four’s discussion of residual risk gives the best description of what is being planned from a comprehensive watershed perspective. Recommend using some of that text in the PAC and Chapter 1 to give the reader a watershed context for the PAC and explain how it contributes to a larger strategy for the watershed.

SPK Response: Concur. Discussion has been added to the report concerning the comprehensive bypass plan. It was screened out for this report because it does not reduce damages in Natomas enough to offset the need to mitigate for seepage and stability concerns. It may yet be part of a regional, comprehensive plan for flood risk management, but for now is beyond the scope of this report.

Action Required: Report has been revised including more discussion of the comprehensive bypass plan.

Action Taken: Sections 3-4.b., 3-4.c., and 3-4.d. have been revised to discuss the limitations of a comprehensive bypass plan on the flood risk in Natomas. Chapter 1 has been revised to discuss the NLIP earlier, to add more discussion of the Development Impact Fee, and the role of bypasses in the CVFPP.

HQUSACE Assessment: The concern is resolved in the Final Report.

37. Problem Identification: In general, the PAC story is rather confusing as it attempts to address one significant changed condition: the degree of under seepage associated with the Natomas levees and the associated reduction in levee performance that have led to their decertification. Consequently, the findings are that the levee remediation is more extensive than originally understood but does not describe consistently whether it was due to poor maintenance or due to unforeseen conditions. The fact that the levee has withstood two 100 year events and been in place for almost 100 years requires some assessment of the O&M practices and corrective action taken during the life of the levee system. What are the incremental improvements over the years that have made the levee more resilient to large flood events? If this report had followed the draft guidance on *Certification of Levee Systems from the National Flood Insurance Program* we would have had a more transparent discussion in the report about these issues. Recommend that an appendix be added that documents the O&M, monitoring and field observations in accordance with ER500-1-1 and other levee safety policies; the documentation of the decertification and the assessment of the needs to recertify the levee to provide a context for the WO project condition.

SPK Response: The problems with the levees are due primarily to the unforeseen conditions of severe underseepage. During the development of levee performance curves, an expert elicitation convened to quantify the risk associated with vegetation, encroachments, and other “judgment” considerations that cannot be determined through engineering analysis. The results of this panel showed that maintenance, or lack thereof, had minor effect on the levee performance, while seepage is the driving factor in determining levee risk. While the District acknowledges that these levees have not failed, it is with the caveat that extreme human intervention has been the primary reason for that. Examining Figure 2-3 in the Main Report, one can see that multiple failures were occurring during the 1986 flood, and only the intervention of flood fighting prevented a catastrophic failure. The decertification of the levee was based on the discovery of seepage problems in 1997 and 1998 and subsequent study of those problems. The PDT is attempting to gather O&M reports, letters to the sponsor about O&M, and other documentation of O&M deficiencies. So far, there is a paucity of official documentation in this regard.

Action Required: Add discussion in the report about the levee decertification, the reasons for it, and attempted to clarify the discussion of levee problems.

Action Taken: Chapter 2, Section 2-4.b. has additional information on the discovery of underseepage problems, the resulting investigation, and the decertification of levees.

HQUSACE Assessment: The concern is resolved in the Final Report.

38. Effects on the WOP Condition from the Natomas Levee Improvement Program: Section 2.1. How much of the Natomas Levee Improvement Program (NLIP) has been completed and how much of it is included in the WOP condition? Are any improvements in the NLIP considered maintenance? A table by USACE study reaches indicating what has been completed and what will be included in the alternatives analysis would clarify how and who are generating the benefits for the project. Some or all of the Natomas levees were decertified. There is little or no discussion about why they were decertified and how this PAC attempts to rectify those conditions. For levee certification, knowledge of how the levee system performed during past floods is an important piece of information. If the system in question has successfully withstood a 1% annual exceedence flood event, records of its performance during and after the event will provide important information on their reliability and resilience. Records of flood fight will identify weak spots. Performance records of seepage related issues from previous flood events are generally good indicators of future performance. Seepage induced soft spots, pin boils and sand boils and at what river stage did these develop. Have sand boils that were active at higher stages appear at lower stages (ref. ER500-1-1 and other applicable levee safety policies)

SPK Response: None of the NLIP program has been considered in the without-project condition, since the sponsor has requested 104 credit, and it was necessary to evaluate the NLIP in those terms. These improvements are not considered maintenance, since their primary function is to address seepage and stability concerns. As for where flood fighting and levee distress actually occurred, all of these things were considered in the development of the levee performance curves.

HQUSACE Assessment: Recommend that all of the conditions above be discussed in context of the assessment of the existing conditions and any ongoing monitoring of seepage, stability, and erosion.

Action Required: Add a discussion of the constructed sections of NLIP.

Action Taken: These discussions have been added to the report in the Draft Final Report Chapter 1, Section 1-6.a.2. discusses the constructed features of the NLIP.

HQUSACE Assessment: The concern is partially resolved. There is additional guidance on reconstruction of levees related to AFB comments on Without Project conditions. Review CECW-PB guidance memo dated 16 August 2005 on Reconstruction and assess requirements for determining the Federal interest in reconstructing Federal levees. Clarify where in the report

these requirements have been met. Recommend adding a summary paragraph in the Tentatively Selected Plan regarding complying with these requirements.

SPK Response: Do not concur. CECW-PB guidance memo dated 16 August 2005 on Reconstruction does not apply to this project. There are several reasons why this PGL does not apply. 1) The policy applies to "Federally-constructed structural flood damage reduction projects and separable elements for which non-Federal interests are responsible for OMRR&R." The Natomas levees were not constructed by the Corps, but by local interests. The system was later assumed into the Federal levee system. 2) The Natomas Interim GRR is not being prepared under Section 216 authority. Section 216 authority applies to projects that have been authorized, completely constructed, and turned over to local interests for OMRR&R. Section 216 states, "The Secretary...is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control,..." 3. According to ER 1105-2-100, post-authorization change reports are for making changes to uncompleted authorized projects. This project was authorized in WRDA 1996 and WRDA 1999, and partially constructed, and subsequently is the subject of a post-authorization change report. 4) The Natomas Interim GRR was prepared in response to the authorizations in WRDA 1996 and 1999, to clarify the scope of the project, determine the economic feasibility of providing flood risk management in Natomas, and establish an appropriate cost estimate. 5) The project does not meet the definition of reconstruction in the PGL. Reconstruction has been defined as, "...addressing the major performance deficiencies caused by a long-term degradation of the foundation, construction materials, and engineering systems that have exceeded their expected service lives and the resulting inability to perform its authorized functions." This implies that the levee was designed and constructed according to Corps design standards, and the problems associated with it are the result of aging.

In the course of determining the applicability of this PGL, it was determined that the Natomas Interim GRR does meet several of the requirements of the PGL. Specifically: 1) The non-Federal sponsor is responsible for deferred O&M. In the formulation of the recommended plan for Natomas, the fix in-place plan was evaluated without the costs included for vegetation removal and mitigation for that removal. 2) Cost sharing is in compliance with WRDA 1986, as amended. 3) The implementation process is being pursued under the two-phase preauthorization study process.

Action Required: None.

HQUSACE Assessment: The concern is resolved.

39. Vegetation and Encroachments Section 2.2.f: The text describes that due to the unique circumstances of CA levees, Sacramento O&M manuals allowed for preservation of brush and trees to remain, and there is a framework in place for "undesirable vegetation" and that "the major problems associated with the Natomas levees are due primarily to seepage and stability issues, and it has been determined that the problems without Natomas levees are not due to deferred maintenance." Pg2-14 Who made this determination? Deferred maintenance will influence the WOP condition. This whole section would benefit from a what has changed discussion noted in comments above from the previous authorizing document (more structures, improved

maintenance, recognition of extent of under seepage, increased bank side erosion and why they have occurred.

Section would benefit with the inclusion of climate change and how that will affect the watershed and the potential performance changes required for the Natomas levee system.

SPK Response: The determination was made by the PDT based on the results of the geotechnical expert elicitation that concluded that the vegetation had only minor effects on the levee problems. However, in an effort to be as transparent as possible in addressing the question of deferred maintenance, the cost estimates for the fix in-place alternative were reduced by the costs required to remove waterside vegetation and mitigate for the loss. By removing these costs from project costs, the assumption was made that these costs were all deferred maintenance, non-Federal costs, borne before the implementation of the Federal project. A comparison of these costs to the adjacent levee alternative costs shows that the adjacent levee alternative is better in the reaches where large amounts of waterside vegetation exist.

As for climate change, it is expected that climate change will cause flood levels to be higher. This will be a consideration in the optimization of levee raises to be done in the follow-on GRR.

Action Required: The analysis of the fix in-place alternative accounting for the “deferred maintenance” has been added to the report.

HQUSACE Assessment: The concern is resolved: Final Report Chapter 3, Section 3-5.d discusses the analysis accounting for deferred maintenance.

40. Erosion Measures Under Different Authorities: Table 3-7 Erosion Measures include WS Armor for Reach B and C that would be done under the Sac Bank Program. In Table 3-13 Adjacent Levee Alternative Measures do not include them. Explain the disparity in the table.

SPK Response: Table 3-13 does not include them because they would be done under a different authority.

Action Required: None.

HQUSACE Assessment: The concern is resolved.

41. Array of Alternatives Cost Analysis: Section 3.5 (PP3-26) states “(T)he conditional statement is made that the costs of replacing the road for the adjacent levee work was not included in the screening costs and the costs between the fix in place and adjacent levee alternatives would have been closer.” Recommend language be dropped when the cost risk analysis is completed and reevaluate the alternatives that are impacted by the change in costs.

SPK Response: Concur. The statement will be removed. The PDT has reevaluated the costs of the alternatives for the east side of the basin, accounting for several factors that had not been previously considered.

Action Required: The report has been revised as discussed.

HQUSACE Assessment: The concern is resolved in Chapter 3, Sections 3-5.f. used revised costs.

42. Selected Plan and Residual Risk: In Section 4.13.b Evacuation Routes there is a reference to the SAFCA maps that show shallow flooding and those that may experience rapid deep flooding. Do we know which breach scenarios have adequate routes and capacity for occupant evacuations and those that do not? This information should be assessed to determine if the proposed plan is decreasing (increasing) evacuation times. Chapter 6.5 General Accounting Office Audit:

“The self assessment of how we have adopted GAO’s recommendations needs to consider that the GAO Report recommended a close look at Yolo Bypass. The PAC report’s early elimination of this alternative in Chapter 3 should be discussed in context of the Residual Risk section that states it is still being pursued as part of a larger system wide flood reduction strategy. GAO’s recommendation:

“...(O) ne possible alternative method for flood protection identified by the Sacramento Area Flood , as well as the Corps, involves lowering the water level in the Sacramento River during floods by diverting water through the Fremont Weir and into the Yolo Bypass, which is located at a point just before where the Sacramento River flows past the Natomas Basin. The Fremont Weir is a low dam that controls the movement of large volumes of floodwater from the Sacramento River by diverting it into the Yolo Bypass. The Yolo Bypass is a continuous, 40-mile open space corridor that is protected from urban development pressure by flood easements. (See fig. 3.)...”

SPK Response: Section 4-13 discusses the Flood Warning and Evacuation Plans. The county has developed different evacuation/emergency levels that are triggered based on gauge levels at monitoring locations on the Sacramento and American Rivers. When river levels reach a certain point, different evacuation actions are started. Low level emergency triggers assisted evacuation of special needs persons or groups in vulnerable areas. Medium level evacuation emergency triggers mandatory evacuation of vulnerable population in potentially impacted areas and voluntary evacuation notice to general population in impacted area. High Level Evacuation emergency means that massive numbers need to evacuate.

The County is currently determining evacuation times for various areas. Flood depths and times to reach certain depths have been developed for Natomas based on the location of the levee failure, as have inundation times for various evacuation routes. Rescue and evacuation areas have also been determined for each levee failure location. Rescue areas are defined as areas where water has the potential to reach depths of at least one foot after two hours from the time of levee failure. Evacuation areas are defined as areas that, after 10 days from the time of levee failure, water depth will range from 15 feet at the deepest point to one foot at the flood boundary. Based on information on these maps there are potential loss of life issues for portions of the Natomas Basin in the without project condition. The project team is currently developing potential loss of life values for portions of the Natomas Basin based on actual loss of life ratios developed from

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actual fatalities in Hurricane Katrina. While the recommended plan would substantially reduce the probability of an uncontrolled flood in the basin due to levee failure, there still is the risk of flooding and loss of life for flood events that could overtop the improved levees. Improvements to the Fremont Weir and the Yolo Bypass were evaluated early in the formulation process and eliminated from consideration. The reason for their elimination was that they did not provide enough reduction in the flood water surface elevations to offset the need to alleviate seepage and stability problems with the levees in the Natomas Basin. It was recommended that this be put in the PAC part of the report.

Action Required: Discussion of the recommendation from the GAO report have been added to the report.

HQUSACE Assessment: The concern is resolved: Final Reprt Chapter 6, Section 6-5 has been expanded to include this discussion. PAC section has also been expanded to include this information.

43. Vegetation and Encroachments: Section 2 pg 11 doesn't address when the Framework expires in July 2012 and USACE has not agreed to California's Life Cycle Management Approach. Also, it should be noted that the April 2009 ETL for vegetation management did not create any new standards or new requirements. Not sure of the date of the Unit 124 levee, but the O&M manual is out of compliance. The Framework is not the system-wide vegetation management plan. It's an interim agreement until California presents their long-term to meet USACE standard in 2012. This section needs to be revised to reflect the above and the statement of "it has been determined that the problems with Natomas levees are not due to deferred maintenance" needs to be removed.

SPK Response: More information on the Framework has been added to the report, including the expiration date and its function as an interim plan. As for the O&M manual, it may be out of compliance, but that is what was provided to the local sponsor, and what has been used as guidance for maintaining the levee. Do not concur that the statement is inaccurate. The expert elicitation conducted for the development of the levee performance curves concluded that.

Action Required: More information on the Framework has been added to the report, including the expiration date and its function as an interim plan. Adjustments have been made to account for the costs of complying with the ETL for vegetation for the alternative that requires it.

Action Taken: Chapter 2, Section 2-4.f. has been revised in the Report.

HQUSACE Assessment: The concern is resolved by the changes in the Final Report.

44. Levee Vegetation: Why are native tree trees of 4 inches being allowed to remain? Is it assumed that a variance will be approved for this? This is highly unlikely, especially on the landside. Why are two inch diameter trees being allowed to remain? Two inch diameter trees are not our minimum allowable standard for trees. No trees are allowed.

SPK Response: It is assumed that a variance to the vegetation on levee policy will be approved. The sponsor is actively seeking a variance. Indications are that all technical concerns have been resolved:

Action Required: None. The variance has been approved prior to the release of the Draft Report for public comment.

HQUSACE Assessment: The concern is resolved.

45. Life Cycle Approach to Levee Vegetation: It is not clear on what it means when it states that the Life Cycle approach will be reviewed to ensure consistency with the Framework. We have not approved the Life Cycle approach and the Framework sets minimum vegetation criteria for the short-term to allow inspections and discusses new work and modifications. The Framework does mention CA Life Cycle approach for the long term, but again the Corps has not approved it as an acceptable O&M practice. Plus the Framework expires in 2012. As stated, it does not influence formulation or the recommendation, so it is fine to assume this approach for the without project condition, but each reach of Natomas should either meet the ETL or have an approved variance. If there are portions of Natomas that are not compliant with our standard and the intent is to use this life cycle approach for those portions, then there would be a situation when Natomas could be removed from PL 84-99.

SPK Response: Concur. At the FSM, the PDT proposed that the Life Cycle Management approach be assumed for the future without-project condition. That is the assumption that has been used. For the future with-project condition, an assumption has been made that a variance will be obtained.

Action Required: None. The variance has been approved.

HQUSACE Assessment: The concern is resolved.

46. Life Cycle Management Not Accepted Practice: Approach has not been accepted by the Corps. We understand that the levees have received unacceptable ratings for O&M and the district has sent letters to the sponsor in the past about lack of O&M.

SPK Response: Concur that that the Life Cycle Management plan has not been accepted by the Corps. However, it was necessary to make an assumption in order to start plan formulation, and in the absence of a project, the LCM was chosen as a reasonable assumption. Concur that the sponsor has been advised of maintenance deficiencies.

HQUSACE Assessment: The concern is resolved.

47. Planning Constraints: In Section 2-6 several of the planning constraints found on pages 2-22 to 2-24 do not appear to be appropriate for a Corps study including the following six constraints noted in the Draft Report;

- a. Local Land Use Plans and Conservation Plans: Constraint 7, local land use plans. Federal planning efforts are not constrained by local land use plans or other local agreements, such as the Natomas Basin Habitat Conservation Plan (NBHCP). While such plans and agreements may be a consideration in plan selection and could have implications for cost-sharing under an LPP, they should not be viewed as constraints on the plan formulation process. This constraint should be deleted.

SPK Response: Concur. While this item may not be classified as a constraint, it characterizes a legitimate local concern, and helped guide plan formulation, particularly when the output from various alternatives was very similar. The District has retained the discussion of this item in a section called “Local Concerns.”

Action Required: A discussion of local concerns has been added.

HQUSACE Assessment: **The concern is resolved** in Final Report Chapter 2, new Section 2-7.

- b. 200-year level of Protection: Constraint 8, 200-year level of protection. This constraint should be deleted, because it is inconsistent with the Corps’ planning process to reasonably optimize flood risk management benefits (NED) consistent with the Principles and Guidelines.

SPK Response: Concur. While this item may not be classified as a constraint, it characterizes a legitimate local concern, and helped guide plan formulation, particularly when the output from various alternatives was very similar. The District has retained the discussion of this item in a section called “Local Concerns.”

Action Required: A discussion of local concerns has been added.

HQUSACE Assessment: **The concern is resolved** in Chapter 2, new Section 2-7.

- c. Plans Must be Economically Justified: Constraint 12, plans must be economically justified. Really not constraint, but a basic tenet of the Principle and Guidelines. Suggest deletion because this statement adds little to no value.

SPK Response: Concur.

Action Required: This was deleted from the discussion of constraints.

HQUSACE Assessment: **The concern is resolved** in the Final Report Chapter 2, Section 2-6.

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- d. Resiliency: Constraint 13, resiliency. The meaning of this constraint is unclear, given that the basis for evaluating this constraint is not provided.

SPK Response: Concur. This constraint has been deleted.

Action Required: This was deleted from the discussion of constraints.

HQUSACE Assessment: **The concern is resolved** in the Final Report Chapter 2, Section 2-6.

- e. Minimized O & M Costs: Constraint 14 minimized O & M costs. This constraint should be removed, given that O &M is properly considered as part of the overall NED benefit calculations.

SPK Response: Concur. While this item may not be classified as a constraint, it characterizes a legitimate local concern, and helped guide plan formulation, particularly when the output from various alternatives was very similar. The District has retained the discussion of this item in a section called “Local Concerns.”

Action Required: A discussion of local concerns has been added.

HQUSACE Assessment: **The concern is resolved** in Chapter 2, new Section 2-7.

- f. Quick Implementation: Constraint 15, quick implementation, WRDA 2010. While timely implementation of any project is generally desirable, quick implementation should not be included among the constraints because it could be misinterpreted by some readers to mean that the Corps would not properly consider effective and efficient plans that may require a longer implementation time.

SPK Response: Concur.

HQUSACE Discussion: While this item may not be classified as a constraint, it characterizes a legitimate local concern, and helped guide plan formulation, particularly when the output from various alternatives was very similar. The District has retained the discussion of this item in a section called “Local Concerns.”

Action Required: A discussion of local concerns has been added.

HQUSACE Assessment: **The concern is resolved** in the Final Report Chapter 2, new Section 2-7.

48. Federal Endangered Species Act: There is no discussion in the Main Report regarding the process for consideration of the Endangered Species Act, as outlined in section C-3 (2) of ER 1105-2-100. The process as discussed in the ER states that the Corps shall request a list of T & E species and habitats from the USFWS and/or NMFS, shall prepare a biological assessment (BA) within 180 days, and shall send the BA and the Corps’ affect determination to USFWS and/or

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NMFS for their consideration (Note: Section 6-6 of the Main Report states that a draft biological assessment for the NLIP is currently in review, and will be finalized in May 2010). The ESA process consistent with that outlined in ER 1105-2-100 is required for this study. If the process outlined in the ER has been followed, the Main Report should be revised to be clear that the feasibility study is in compliance with established Corps policies.

SPK Response: We are in compliance with 1105-2-100.

HQUSACE Discussion: Consultation is underway for compliance with the Endangered Species Act. A biological opinion will be received prior to signing of a ROD. The following will be added to the document:

“In compliance with ER 1105-2-100, a Biological Assessment has been prepared and is being coordinated with both FWS and NMFS. Section 7 Consultation will be completed and a Biological Opinion received prior to signing of the ROD.”

Action Required: The required change has been made in the document.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 4, Section 4-15.

49. Environmental Mitigation: The basis for the various environmental mitigation measures is not clear in the report, although it appears that almost all of the proposed mitigation is related to compliance with the Federal Endangered Species Act, or the California Endangered Species Act. Clarification of the basis for all mitigation measures is requested.

SPK Response: All mitigation for the project is being required under the Biological Opinion and Section 7 Consultation. A Coordination Act Report (CAR) will be prepared for the project; however, coordination with FWS has indicated that no additional mitigation will be required as part of the CAR. This is due to the fact that all of the Natomas Basin and waterways included as part of the project are considered habitat for either Federal or State Endangered Species.

Action Required: Mitigation will be listed in report.

HQUSACE Assessment: The concern is resolved: Chapter 4, Section 4-15, new Table 4-6 outlining what mitigation features are included in the design of the project.

50. Habitat Conservation Components: Section 4-6 page 4-15 Main Report state that the basis and justification for the habitat conservation components, discussed in subsections (a) through (e) of this section of the report as part of the tentatively recommended plan is not clear. It appears that some of the proposed measures are based on the NBHCP and may go beyond the requirements of the Federal project. The basis and justification for these proposed measures as they relate to the Federal requirements should be provided, and any cost-sharing implications should be discussed in the report. For example, the sites discussed in subsections (a)-(c) would be used for borrow areas, but it appears that some of the proposed post-borrow reclamation/mitigation measures may exceed the requirements of a standard real estate easement for borrow areas (i.e., essentially, to

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ensure that the borrow site does not constitute a hazard to public safety). The basis for the extra work that is proposed for these borrow areas should be provided. The site discussed in subsection (d) would be used for levee improvements. The project-related use of the lands discussed subsection (e) is not apparent.

SPK Response: The project is not based on the NBHCP. It is being coordinated with the NBHCP and is in compliance with the conditions of the HCP as required by FWS.

HQUSACE Discussion: Partially Resolved: The response to comment 35 of the AFB project compliance memorandum states “The project is not based on the NBHCP. It is being coordinated with the NBHCP and is in compliance with the conditions of the HCP as required by FWS.” This is a contradictory statement. The HCP does not, and cannot, apply to the Corps. This needs to be clarified in the report.

SPK Response: Concur.

Action Required: Revise Section 4-6.

HQUSACE Assessment: The concern is resolved: Final Report Section 4-6.

51. Mitigation required under Fish and Wildlife Coordination Act: In Section 6-8 the second to the last paragraph in this section should be revised to clarify that the Fish and Wildlife Coordination Act does not and cannot require the Corps of Engineers to implement mitigation measures. The Act requires the Federal action agency to solicit the views of the Federal and State resource agencies concerning the impacts of a proposed water resources development project, and to give full consideration to the views of these agencies in the development of the recommended plan. Any recommendations received through coordination under the Act may not be viewed as requirements, i.e., something that must be implemented.

SPK Response: Concur.

Action Required: The statement should not state that we are required to comply with CAR only consider the recommendations. However, we have never not done this. The report has been revised to clarify this.

Action Taken: The following has been added to Section 4-6 in the Main Report:

“Several goals and objectives of the Natomas Basin Habitat Conservation Plan (NBHCP) are relevant to the proposed action. In general, they address similar issues as the conservation strategy, such as establishing and managing a habitat reserve system and ensuring connectivity between reserves. Relevant habitat-specific goals and objectives include establishing a mosaic of habitats and connecting corridors to provide breeding, wintering, foraging, and cover areas for wetland and upland species; and providing habitat to maintain viable populations of endangered species protected in the Natomas Basin. The Corps of Engineers is not required to comply with the NBHCP as this is a document

resulting from Section 10 Consultation with non-Federal Agencies. When evaluating potential mitigation options for the project, a habitat based approach, including location of NBHCP lands, was used to allow for the maximum benefit for listed species.”

HQUSACE Assessment: The concern is resolved in Chapter 6, Section 6-8 revisions noted.

52. Problems and Opportunities - Encroachment: The report states that the problems with the Natomas levees are not due to deferred maintenance (page 2-14). This conclusion is supported by the described vegetation management issues (that vegetation can help reduce erosion and wave wash and provides wildlife values, including T&E species) and the need to apply a life cycle management plan to systematically reduce undesirable impacts from vegetation on levees over time. However, the report does not explain how allowing encroachments from housing, landscaping, and other construction-related actions by individual homeowners that have negatively impacted levee integrity does not violate the standard O&M Manual for the Sacramento River Flood Control Project. Since the problems of flooding in the Sacramento area are so tied to levee seepage, erosion, and stability, the question as to whether encroachments have played a role in undermining levee integrity should be addressed in the report.

SPK Response: Concur. More detail can be added in the Main Report about the development of the geotechnical levee performance curves, although that data is readily available in the geotechnical appendix. As stated above, the expert elicitation convened to quantify the risk associated with vegetation, encroachments, and other “judgment” considerations that cannot be determined through engineering analysis concluded that maintenance, or lack thereof, had minor effect on the levee performance, while seepage is the driving factor in determining levee risk.

HQUSACE Discussion: HQUSACE felt that the discussion of the geotechnical levee performance curves and the expert elicitation should be brought into the Main Report.

Action Required: This technical detail will be added to the Main Report.

Action Taken: A new section was added in Chapter 2, Section 2-4.g., to discuss the development of the geotechnical levee performance curves.

HQUSACE Assessment: The concern is resolved.

53. Problems and Opportunities - Flood Damages: The values shown in Tables 2-6 and 2-7 regarding single event damages and expected annual damages most likely need to be revised or corrected. For example, damages of \$6.9 billion for a 0.50 annual exceedance probability event and \$1.4 billion in expected annual damages seem highly unlikely considering the numerous flood events over the last 100 years that have not resulted in damages anywhere close to those levels.

SPK Response: Concur. The economic analysis has been revised significantly, and these damages are significantly reduced.

Action Required: Revised economic analyses are to be incorporated into the report.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 2, Section 2-4.1.

54. Planning Objectives: Most of the planning objectives listed in Section 2.5 list reduction of flood risk to public health, safety, and property in the Natomas Basin, but then they go on to include “associated with...” levee under-seepage, erosion, instability, vegetation, overtopping, etc. The problem with crafting objectives using solutions embedded within them is that, by definition, the formulated management measures or alternative plans will now be evaluated in terms of reducing flooding via these means. In other words, only management measures or alternatives that include these levee fixes will be retained or will score well in terms of reducing flood damages AND meeting the planning objectives. For example, in Table 3-6 most of the management measures are eliminated because they don’t address the levee seepage, erosion, instability, vegetation, or overtopping issues. It seems that the best defense and justification of the levee alternatives is through an objective net benefits analysis, and the fact that other measures or alternatives are infeasible due to various reasons (e.g., insufficient time to investigate any upstream “system storage” solutions, the need for quickly implementable solutions due to flood risk to large population, the cost-ineffectiveness of certain measures, such as the Yolo bypass widening, etc.). Suggest revising the rationale for measure eliminations in Table 3-6.

SPK Response: Do not concur. In Table 3-6, measures were eliminated not because they didn’t address specific measures, but because they were not effective. At the initiation of the screening of measures, the PDT did not know which of the problems with the levees would dominate the formulation. As it turned out, seepage dominated the formulation, followed closely by stability. In fact, solving the seepage problems often solved the stability issues. However, just because seepage was the dominant factor does not mean that the PDT examined only cutoff walls, relief wells and other measures installed directly into the levees to solve the seepage problem. If bypass and/or storage measures had reduced flood levels enough, seepage and stability issues would have been addressed. The seepage and stability analyses were driven by the water level, and if adequate reductions in water levels could have been achieved, then the problems might have been alleviated. However, the measures eliminated did not cause water levels to be reduced enough to effectively address seepage and stability problems. Since this study focused on the Natomas Basin, the effectiveness of the measures evaluated was determined for that location. In a systems context, some of the measures considered and eliminated might be effective for other locations in the Sacramento Valley system. The District feels that an adequate analysis was made of all the measures considered for their effectiveness in Natomas.

HQUSACE Discussion: The table appears to show that management measures were rejected because they didn’t address specific problems. More explanation is needed in the table.

Action Required: Table 3-6 will be revised including more of the discussion provided as the response to this comment.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 3 and Table 3-6 has been revised.

55. No Action and Future Without Project Conditions: The distinction in Section 3-2 between “No Action” and FWOP condition is interesting. Usually these two conditions are synonymous (the Planning Manual on page 101 describes them as the same condition). The report states that FWOP will be used as a basis for comparison against all the with-project alternatives, but that the “No Action” will include certain American River Common Features components. Then on page 3-19 the report states that the “No Action” alternative will serve as the baseline which the impacts of the action alternatives for the Natomas Basin are evaluated. HQ requests consistency in the definition of these terms throughout the report and further suggests that “No Action” and FWOP be defined synonymously for consistency with the Planning Manual.

SPK Response: Per response to Comment #1. Concur. The “no action condition” assumes that no additional features would be implemented by the Federal Government or by local interests to achieve the planning objectives, over and above those elements of the Common Features project that will have been implemented prior to reauthorization of the project. The “without-project condition” assumes that that none of the features of the American River Common Features Project has been implemented. While this distinction is important when applied to the American River South and American River North Basins (GRR), it does not apply to the Natomas Basin. For the Natomas Basin, the “without-project condition” is the same as the “no action condition” since none of the features of the Authorized Common Features Project has been built or will be built prior to any reauthorization. For consistency purposes, the term “without-project condition,” the basis for which all alternatives are measured, will be used in the main Natomas Interim General Reevaluation Report and the Economic Appendix.

HQUSACE Discussion: The Without-Project Condition and the No Action Plan are the same. The text has been revised.

Action Required: The text is revised.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 2, Section 3-2 revisions.

56. Alternative Plans & Costs: The costs of various alternatives in section 3-5 between Tables 3-8 and 3-12 and accompanying text do not seem to correspond (i.e., costs such as \$922 million for the fix-in place alternative and \$838 million for the adjacent levee alternative are not listed in the referenced tables). Does “Plan 4” mean the same thing as “Group 4” in Table 3-10? The report states that Plan 4 is the least costly plan. Plan 4 may maximize net NED benefits, but it is not the least costly – only the 500-year levee alternatives cost more than Plan 4. How is the SAFCA/ Corps Combination Alternative (in Table 3-13) different from the Adjacent Levee Alternative Measures Plan in Table 3-8? These tables appear to be the same, but the SAFCA Alternative contains fix in-place levees for certain reaches, correct?

SPK Response: The discrepancies in costs have been corrected. Plan 4 and Group 4 are not the same thing. The Groups represent increments in the development of complete plans. The tables describing the plans contained errors and have now been corrected. Yes, the SAFCA alternative contains fix in-place measures.

Action Required: The discussion of alternatives and the incremental analysis has been rewritten. The errors in the tables have been reconciled.

HQUSACE Assessment: The concern is resolved in Chapter 3 of the Final Report.

57. Mitigation for Environmental Resource: The EIS does an excellent job of describing the significant environmental impacts of the various alternatives and the required or proposed mitigation measures. However, no cost information is provided on the recommended mitigation measures. ER 1105-2-100 C-3 (e) requires that a cost effectiveness/incremental cost analyses be performed on the mitigation components. The appropriate amount of mitigation will need to be justified through the CE/ICA.

SPK Response: All components of mitigation are incorporated into the project design to avoid additional mitigation for impacts. The project is considered to be self-mitigating and the costs for these features have been incorporated into the project. Additional mitigation beyond this is not required and therefore, no incremental cost analysis is required.

HQUSACE Discussion: Information from the EIS should be brought into main document. HQUSACE felt that the alternative is not complete without mitigation costs. SAFCA and SPK added that the features of the project were designed such that the need for mitigation was avoided. However, the project features are contingent on an approved variance from the vegetation ETL. A discussion on the collaborative planning process that determined the designs by which mitigation costs were avoided should be added to the document. The SPD Planning Chief felt that an explanation of how mitigation is worked into the plan through good plan formulation and that there are no associated mitigation costs should be added.

Action Required: The report will be revised to include this discussion.

HQUSACE Assessment: The concern is resolved in Chapter 4, Section 4-15, Environmental Summary, new Table 4-6.

58. Induced Development: The construction of this project has an intended objective of increasing flood protection and reducing the potential flood damages in the Natomas Basin to meet FEMA flood zone requirements that currently preclude additional development in the Basin. Additional urban development in this area is part of the future land use plan for Sacramento and Sutter Counties. This project would therefore contradict Executive Order 11988 on Floodplain Management, which seeks to avoid flood plain development and preserve natural floodplain values. EC 1165-2-26 outlines the steps that must be taken to formulate and evaluate alternative plans to be in compliance with EO 11988: "It is the policy of the Corps of Engineers to formulate

projects which, to the extent possible, avoid or minimize adverse impacts associated with use of the base flood plain and avoid inducing development in the base flood plain unless there is no practicable alternative. The decision on whether a practicable alternative exists will be based on weighing the advantages and disadvantages of flood plain sites and non-flood plain sites. Factors to be taken into consideration include, but are not limited to, conservation, economics, aesthetics, natural and beneficial values served by flood plains, impact of floods on human safety, locational advantage, the functional need for locating the development in the floodplain, historic values, fish and wildlife habitat values, endangered and threatened species, Federal and State designations of wild and scenic rivers, refuges, etc. and, in general, the needs and welfare of the people. The test of practicability will apply to both the proposed Corps action and to any induced development likely to be caused by the action. Identification and evaluation of practicable alternatives shall include consideration of alternative sites (carrying out the proposed action outside the flood plain); alternative actions (other means which accomplish the same purpose as the proposed action); and no action. When a determination is made that no practicable alternative to undertaking an action in the flood plain exists, it will be appropriately documented and the features or qualities of the flood plain that make it advantageous over alternative non-flood plain sites shall be described and adequately supported.” The issue of induced floodplain development should be addressed in this Natomas Basin IRR.

SPK Response: Do not concur that the project contradicts EO 11988. When the Corps approved the NLIP 408 request, this requirement was addressed. Since the time that the 408 approval was granted, the local sponsor has started to implement these improvements. The 408 approval was based on several factors that effectively limit the development to the already urbanized area. 1) The Habitat Conservation Plan (NBHCP) that applies to the 53,341-acre interior of the Natomas Basin. The purpose of the NBHCP is to promote biological conservation along with economic development and the continuation of agriculture within the Natomas Basin. The NBHCP establishes a multi-species conservation program to mitigate the expected loss of habitat values and incidental take of protected species that would result from urban development, operation of irrigation and drainage systems, and rice farming. The goal of the NBHCP is to preserve, restore, and enhance habitat values found in the Natomas Basin while allowing urban development to proceed according to local land use plans. 2) The Sacramento Region Blueprint, a comprehensive land use plan that promotes compact, mixed use development within existing developed areas as an alternative to low density development. The Blueprint and the NBHCP were designed to work together, confining development to the existing developed footprint as much as possible while maintaining sustainable habitat. 3) The third factor that will influence development in Natomas is the enactment of the Development Impact Fee, which requires developers in Natomas to pay a fee to develop in a floodplain.

Additionally, the physical construction of NLIP features along the north boundary of the Basin would render any other alternative ineffective. For example, a cross-Natomas levee protecting existing development would appear at first glance to be an effective way to implement the requirements of EO 11988. However, the presence of the levee improvements on the north boundary means that even with the construction of a cross-Natomas levee, development could occur in the north part of the Basin. It is not practical to build additional features that would comply with EO 11988, particularly if they are more costly, only to have them rendered useless by the construction of NLIP.

HQUSACE Discussion: HQUSACE felt that the discussion of EO 11988 in the EIS was better than what is in the Main Report. There was also discussion about growth inducement. At the moment, FEMA certification of the levees is gone so there is a building moratorium. The moratorium cannot be changed until there is an authorized federal project. In the section on residual risk in the Main Report, some of the measures that were previously screened out were proposed as measures to deal with the residual risk. A consistent story line of how they are linked together needs to be told. These measures were initially screened out because they didn't take care of the problems in the Natomas Basin. However, they may be employed to deal with the residual risk. The sequence in which these risk management features is employed is crucial to their effectiveness. Discussion was held in terms of perspective of not understanding the risk. District needs to address the things that have been learned over the past ten years in their narrative.

Action Required: Additional discussion of the compliance with EO 11988 has been added to the report. The information contained in Section 5.2 of the EIS will be added to the Main report. The District will add discussion of the residual risk, why certain features might be considered, and what has been learned in recent history.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 4. A new Section 4-16 has been added to describe residual risk.

D. RESOLUTION OF NEW CONCERNS IDENTIFIED DURING THE REVIEW OF THE DRAFT REPORT DATED JUNE 2010 PRIOR TO PUBLIC RELEASE FOR COMMENT

1. Terminology Relative to Plan Selection/Recommended Plan: Various sections of the report use different terms for the Recommended/Tentatively Selected Plan (TSP). Consistency is needed to avoid confusing readers regarding what is recommended and what features are included. During the 16 June telephone conference it was indicated that the Recommended Plan is the NED Plan. However, that is not apparent in the current text. Specific discrepancies that need to be resolved are as follows:

(a) Tentatively Selected Plan. Section 4-1.a. describes the tentatively selected plan as including the features in the 1996 and 1999 authorizations, and the additional features to complete the plan for flood risk management to the Natomas Basin. This is confusing in that the report is an interim report which is addressing only the separable elements in the Natomas Basin, which can be implemented ahead of studies needed for the overall GRR. Further, the recommendations include project costs of \$1,223,078,000 for the recommended plan, which is different from and greater than the LPP and NED plan costs shown in Appendix G. This number appears in the Cost Apportionment Table, but the basis for it is unclear. It appears to include additional costs from Common Features elements.

SPK Response: Concur. The purpose of Chapter 5 is to incorporate the Natomas Basin portion of the project into the Common Features Project with the other previously authorized and constructed portions.

Action Required: Chapter 4 has been revised so that it discusses only the Natomas Basin. The costs in the tables in Chapter 4 have been revised to reflect only the NED plan.

HQUSACE Assessment: The concern is resolved in the Final Report Chapters 4 and 5, Tables 4-4, 5-2, and 5-3.

(b) Federally Supportable Plan: Main Report, Section 3.8. This section of the main report indicates that the NED Plan was not identified and net benefits keep rising as the scale increases. It states that the NED plan would be identified during further GRR studies and that the cost sharing is based on a Federally Supportable Plan. Please note that the term Federally Supportable Plan generally applies to situations where an LPP larger than the NED plan is recommended and in accordance with the P&G the OASA(CW) grants an exception to cost share the uneconomical increment above the NED Plan based on other rationale such as risk reduction considerations associated with the larger plan. As such the text should avoid using that term instead of the NED Plan, which is used elsewhere in the text. The terminology should be used consistently throughout.

SPK Response: Concur.

Action Required: The report revisions such that the recommended plan is referred to as the NED plan. The term LPP has been removed from the report.

HQUSACE Assessment: The concern is resolved in the Final Report Section 3-7.b.

(c) Locally Preferred Plan. Cost Engineering Appendix. The appendix presents information on an NED Plan and a Locally Preferred Plan.

SPK Response: Concur. During the development of the recommended plan, the PDT knew that the local sponsor would prefer a plan that incorporated raises and encompassed the entire perimeter of the basin. Not knowing how the formulation would turn out, the PDT opted to prepare an estimate for the plan that the sponsor preferred, and called it the Locally Preferred Plan, because it was the plan the sponsor preferred. After the economic analysis was complete, and the NED plan was determined not to be the plan that the sponsor preferred, a cost estimate was prepared for the NED plan. Both were included in the report, for information purposes only.

Action Required: Report revisions addressed in the new Section 4-19, Potential Additional Increments. The report has been revised to remove references to an LPP.

HQUSACE Assessment: The concern is resolved in the Final Report Section 4-19

(d) Selected Plan. Appendix D. Appendix D, page D-27 refers to the “selected plans” described in the main report, and discusses plans that include improvements in all the reaches. It specifically refers to the Early Implementation Plan (the raised levee plan, adjacent levee fort reaches A-C, and raise/fix-in-place for reaches D-I), and the Reduced Early Implementation Plan(improvements to the top of the existing levee only, adjacent levee plan for reaches A-C, and fix in place for reaches D-I). Neither of these corresponds to the recommended plan, which excludes levee raising and F, G, and I improvements.

SPK Response: Concur. Because of the schedule, designs were being developed for a plan that included the levee raises that the local sponsor preferred and for a plan that did not include levee raises. Both of these designs were developed for the entire perimeter of the Natomas Basin. Once the economic analysis was complete, and the PDT was aware that the NED plan was not going include raises or the entire perimeter, those designs were not used. Chapters 3 and 4 have been extensively revised to correctly describe the NED plan so as not to include increments, F, G, and I. References to the Reduced Early Implementation Plan have been removed.

Action Required: Report revisions as described in discussion.

HQUSACE Assessment: The concern is resolved in the Final Report Chapters 3 and 4.

2. EIS Development: The EIS indicates on page 1-5 that the proposed action is the Adjacent Levee Alternative, which is also the LPP. It further indicates that the Corps has not determined

whether the levee raise and improvements in Reaches F-G and Reach I will be in the Federal interest (NED Plan). It also states that USACE will recommend the NED Plan to Congress (without the levee raises and improvements in F, G, and I). It continues by stating that the Locals will pay the difference between the NED and LPP, which is what ultimately could be constructed. It then states that the USACE has evaluated the impacts associated with the levee raise and improvements in F, G, and I because they will be constructed as part of the project and funded by the non-Federal sponsor.

SPK Response: Concur. The EIS was written in this manner so as to support implementation by either the Corps or the local sponsor. The follow-on GRR may yet find that these increments are federally supportable.

Action Required: None.

HQUSACE Assessment: The concern is resolved.

3. Betterments: (Main Report, Economic Summary) Section 5-2 describes separable costs of \$234,631,000 as being a local betterment for levee raising. However, Section 4-7 on Local Betterments indicates the betterments include raising of levees around the basin as well as levee improvements in reaches F, G, and I as part of the LPP. The description of betterments should be consistent throughout the text. ER 1105-2-100, paragraph E-21.c.(1) indicates that betterments are the costs of departures from the NED plan that are not part of a waiver granted by the ASA(CW). Exhibit G-10 of the ER indicates that betterments and OMRR&R are not part of the Total Project Costs for Section 902 calculations. Please clarify why the betterments are being treated as such rather than recommending the LPP which would include them in the project at local expense.

SPK Response: The District has removed references to an LPP from the discussion.

Action Required: Report revisions as described in response.

HQUSACE Assessment: The concern is resolve: in the Final Report Section 4-7 where reference to Local Betterments is now removed.

4. Inconsistent MCACES Costs Between Alternatives: The respective costs in Appendix G for the NED and LPP plans are \$708,947,000 and \$943,491,000, with the difference corresponding to the betterments proposed for raising levees in reaches D, C, and A and repairing levees in reaches F, G, and I. Note that in the main report Table 4-3 shows the cost of the recommended plan as \$708,947,000, but Table 4-4 shows the costs for the LPP as \$943,578,000. It is not clear why the LPP costs are not consistent. Please verify and correct.

SPK Response: Concur. The tables have been revised to be consistent. References to LPP have been removed.

Action Required: Report revisions as described in discussion.

HQUSACE Assessment: The concern is resolved in the Final Report Table 4-4.

5. Selected Plan Descriptions: On page 4-2 of the main report the plan description elements should be checked and revised as needed for consistency to avoid confusion. Examples include: reaches C and D are described as including levee raisings for 7.1 miles and they are only 5 and 5.5 miles long. Also, Reach H is described as including improving and raising the existing levee by fix in place construction, while the last sentence indicates no levee raising is included. Also, the betterments are described as including the raisings around the basin in Section 4-7. Section 3.8.b. on the Recommended Plan indicates that it does not include levee raisings or improvements in F, G, or I. This is contrary to the description for each reach of the Tentatively Selected Plan in Section 4-1.b on page 4-2, which includes raisings.

SPK Response: Concur.

HQUSACE Assessment: The plan description elements have been revised. The recommended plan is the NED, and there is no reference to LPP.

Action Required: Report revisions as described in discussion.

HQUSACE Assessment: The concern is resolved: Chapter 4.

6. Cost Apportionment: Table 5-2 is confusing and needs to be revised. The basis for the costs shown as Combined Features Project is not totally understood, but appears to include the recommended Natomas features plus additional items related to constructed features. The information shown as Authorized Cost Sharing at the bottom of page 5-3 is the same as what is shown as WRDA 96, as amended cost sharing for Natomas at the top of page 5-4 rather than displaying different values. The last two entries in the table for Authorized Cost Sharing and WRDA 96 Amended Cost Sharing are also shown as being the same. The basis for the \$1,223,078 cost shown in the table appears to be the constructed features, the recommended Natomas features plus the betterments. The costs of betterments should not be included in the total project costs for authorization since betterments are not included in 902 calculations. It is also unclear why the recommended Natomas feature costs are not being cited as the basis for the new authorization on Natomas features. Costs should be identified as being expressed in (\$000s) also.

SPK Response: Concur. Chapter 5 incorporates the recommended plan for the Natomas Basin into the already authorized Common Features project. Table 5-2 has been revised, and should be clearer. Betterments were not included in the calculations in the tables.

Action Required: Revision to Tables 5-2.

HQUSACE Assessment: The concern is resolved in the Final Report Table 5-2.

7. OASA(CW) Waiver: The report indicates in some places it is recommending an LPP and in others it is saying the recommended plan is the NED. The betterment features discussed in the report represent the difference between the two. If the LPP is being recommended, a waiver request should be coordinated with OASA(CW). Otherwise, the betterment costs should be discussed outside of the total project costs and the NED Plan should be the basis for the costs recommended in the report.

SPK Response: Concur. The recommended plan is the NED plan. The report has been revised to eliminate the discussion of betterments. The references to the LPP have been removed.

Action Required: Report revisions as described in discussion above.

HQUSACE Assessment: The concern is resolved in the Final Report Section 3-7, Chapter 4.

8. Regarding Managed Grasslands: Chapter 3-9, Sec. 8 (3): Regarding Managed Grasslands, suggest elaboration on extent to which alfalfa grasslands would reduce hazardous wildlife populations and, notably, such migratory waterfowl as Canadian geese.

SPK Response: There are no alfalfa grasslands on the airport bufferlands – these are outside the critical fly zone. All land uses within the airport bufferlands have been coordinated with the airport and meet their criteria to reduce bird strike hazardous.

Action Required: None.

HQUSACE Assessment: The concern is resolved.

9. Mitigation Distinctions Between State and Federal Listing: Reference Chapter 3-9 Mitigation, Sec. b, para. 1, 3rd sentence: “Although mitigation for State listed species is not necessarily required for a Federal project, these impacts also affect federally listed species and [mitigation] would be required under Section 7 consultation with NMFS.” Suggest clarify/correct to read that mitigation for the aforementioned federally listed species, not State listed species, would be required with NMFS.

SPK Response: Concur.

Action Taken: Document has been corrected to read “Removal of waterside vegetation under the Fix-in-Place alternative would require mitigation under Section 7 Consultation with NMFS”. Changes in document as noted in response include Chapter 3-8 Mitigation, Sec. b, para. 1, 3rd sentence.

HQUSACE Assessment: The concern is resolved.

10. Plan Elements and Table Description Consistency: Ch. 3-9, Sec. F, pg. 3-41, state that plan E adds 1.7 acres of woodland. Table 3-21, however, shows added 47.9 acres. On pg. 3-41 similarly plan F adds 34.6 acres, but on Table 3-21 shows only 1 acre added. G adds 47.9 acres, but on table only shows acres added. ETC. Plan elements, Table and respective discussion need, therefore, to be corrected.

SPK Response: Tables and discussions have been corrected.

Action Required: Changes in document as noted in Chapter 3-8, Section f and Table 3-22 have been corrected.

HQUSACE Assessment: The concern is resolved in the Final Report.

11. Mitigation plans should be developed for all the alternatives: The mitigation plan costs are therefore included in the costs of all the alternatives. The mitigation section as written in the PACR/GRR appears to be the mitigation plan for the recommended plan. If this mitigation plan is identical for the fix-in place and adjacent levee alternatives, then this should be made clear. However, in the EIS I believe the mitigation plans differ between these 2 alternatives?

SPK Response: Mitigation plans have been done for both alternatives. The only difference between the two plans is the mitigation required for the waterside vegetation. The “Environmental Considerations of Alternatives” section explains that both alternatives are similar except for the SRA removal required under the Fix-in-place alternative.

HQUSACE Discussion: Headquarters now understands that the mitigation plans are similar other than waterside vegetation replacement for the fix-in place levee alternative. However, what is confusing in the write-up is that the CE/ICA for the endangered species (fish species) mitigation only shows the costs for the adjacent levee alternative (8.3 acres of mitigation), not the costs for the fix-in place levee alternative (42.84 acres of mitigation). HQ requests showing the mitigation costs for the fix-in place alternative as well. These costs will of course be higher than for the adjacent levee alternative, and will demonstrate the lower impacts, lower costs, and general cost efficiency of the adjacent levee alternative. These changes can be included in next version of document.

Action Required: None at this time. The next version of the document will show the mitigation costs for the fix in-place alternative.

HQUSACE Assessment: The concern is resolved.

12. The CE/ICA for the Giant Garter Snake habitat mitigation: Mitigation features appear to be presented correctly. However, there are some problems with the presentation and calculations for CE/ICA for the grasslands/woodlands habitat mitigation features. The values in Table 3-21, Incremental Cost Analysis, and Figure 3-3, CE/ICA for state-listed species and FWCA recommendations, do not match up. The incremental costs per unit of output in the table are not

the same incremental costs per unit of output in the graph. Moreover, the table should list, for each alternative plan: total output, total cost, incremental output, incremental cost, and incremental cost per unit of output. The total output and incremental output columns are identical and this is incorrect. There is no incremental cost column. And the values listed in the incremental cost per unit of output column are incorrect. They are showing average cost per unit of output, not incremental cost per unit of output. This might explain why the table and graph do not match up.

SPK Response: Concur. Document will be corrected to reflect this information. However, the alternative to place mitigation in non-borrow sites was not cost effective and is therefore not presented in the tables. This is explained in the narrative of the document.

HQUSACE Discussion: Headquarters agrees that the mitigation in non-borrow sites is not cost effective and does not need to be shown in the tables. That was not the point of the comment. Headquarters would be willing to work with the District to improve the display and accuracy of the tables and graphs as represented. These can be corrected in next version of document.

Action Required: Changes in document as noted in response.

HQUSACE Assessment: The concern is resolved in the Final Report Table 3-22.

13. Habitat Units Metric: Habitat units (or some quantity-quality metric), rather than acres, should be used for the CE/ICA. ER 1105-2-100 C-3 e. (4) states that habitat units or other habitat quality indicators should be used. However, if the F&WS and State resource agency have agreed to use habitat acres, I won't protest, but they should state why acres are an appropriate metric.

SPK Response: Because the habitat is being replaced in-kind for GGS – acres of lost was replaced. There was not temporal loss of habitat – this is what FWS provided in the programmatic B.O. and in all previous phases.

HQUSACE Assessment: Headquarters requests that the statement be included in the next version of document that the FWS agreed to or requested acres as the appropriate mitigation metric in the Biological Opinion and this is consistent with the mitigation metric used in all previous phases of the NLIP.

Action Required: Changes in document as noted in response. See Chapter 3-8, Section e.

HQUSACE Assessment: The concern is resolved in the Final Report.

14. Compliance with EO11988: The main report concludes that the recommended plan is compliant w/EO11988 yet the report does not contain the 8 step analysis process nor a rationale for meeting the EO critical facilities requirements of 500-year floodplain performance. How has this been analyzed?

SPK Response: Concur. The 8 step analysis has been added to the Natomas Interim GRR. Also, added is the discussion of EO critical facilities and the airport Emergency Management Plan.

Action Required: Changes in document as noted in response in Section 4-11.d., Sacramento International Airport, Section 4-12, Flood Warning and Evaluation Plans and Section 4-15, Executive Order 11988.

HQUSACE Assessment: The concern is resolved in the Final Report.

15. Planning Process and Report Organization: The 6-step planning process needs to be followed in the report as described in Section 1-7. It also needs to be revised to include a description of step 2 (Inventory and Analysis) which is to establish the without project condition used in the formulation of alternatives in Chapter 3.

Chapter 2 Problem Definition needs to be reorganized by following the 6-Step Planning process noted above. Specifically sections 2.4 Problems and Opportunities, 2.5 Planning Objectives and 2.7 Planning Constraints should precede section 2.3 W/O project Condition.

Then the report needs to establish a more coherent statement about the W/O Project assessment of levee performance. It is the basis of the alternatives analysis and should be developed in a way that the reader can go logically through the 6-step planning process and link it to the DEIS. To accomplish this I am recommending the following modifications that will also help with the resolution of PGM comments 24 & 25.

- a) History of Levee Performance. Modify Section 2.4 Problems and Opportunities that 13 sub sections. Based on the PGM comment 24 & 25 add a new section called “History of Levee Performance” added from the Vegetation Variance Report to help establish additional evidence about the existing assessment of levee performance and their deterioration subsequent the 2004 Natomas decision document noted in chapter 1.
- b) W/O Project Levee Performance. Create a new section titled 2.5 W/O Project Levee Performance with two parts: 2.5.a W/O by Reach and 2.5.b W/O Summary should be created by combining three subsections: 2.4.g (Geotechnical Levee Performance Curves), the last half of 2.4.j (Flood Damages) that includes a w/o project damages table 2-6 and 2.4.m (Summary of levee problems by reach). This new section would establish the without project condition based on the existing levee performance assessments.
- c) Without Project Levee Performance. New section 2.5 Without Project Levee Performance would include: 1) a revised Section 2.4.g Geotechnical Levee Performance Curves that would describe and show the Geotechnical levee performance curves by reach. 2) A revised Table 2-10 Levee Problems by Reach. This table would have a new column Levee Performance with p(f) from geo tech assessment that would logically follow from the levee performance curves by reach. Then table 2-6 without project single event damages that is a summary of the reach performance curves based on the flood damages. 3) Revised text to explain Table 2-6 W/O single event damages explaining how HEC-FDA uses the geotech risk assessment results from Table 2-10.

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- d) The W/O Project Summary. Should conclude with the revised planning objectives for the reevaluation of the Natomas levees (existing section 2.6)

Action Required: Revisions as noted.

Action Taken: Final Report Chapter 2 has been revised to include additional documentation on levee performance.

HQUSACE Assessment: The concern is resolved. See related AFB issue #27 Plan Formulation and Levee Performance and issue #28 Plan Formulation Strategy and Cumulative Risk Reduction.

16. Natomas Levee Improvement Program: PAC / DEIS Consistency: In section 1.6.1 (2) noted under Watershed studies needs to describe further to give it context in the PAC report. It could be placed in section 1-6 Planning Process and Report Organization describing how components of the NLIP may or may not be part of the tentatively selected plan after following the 6 step planning process. Section 4-1 Description of the Tentatively Selected Plan because the formulation process was by reach yet we develop another description for implementation by NLIP phase. Plan components formulated by reach need to be carried into the description for implementation under NLIP. Recommend taking each NLIP implementation phase in Section 4.1.c and create a new subcategory within the phase showing actions by Reach A, Reach B etc. This will help create some consistency in the analysis between the PAC and the DEIS. 3-40 ES CE/ICA not-likely to adversely affect listed fish species. Will this change with the partial approval of the levee vegetation variance?

SPK Response: Concur. A table was developed that shows the relationship between the NLIP phases and the Corps reaches. This has been added as Table 4-1. The approval of the variance does not affect the listed fish species.

Action Required: Report revisions as described in the discussion above.

HQUSACE Assessment: The concern is resolved in the Final Report Table 4-1.

E. RESOLUTION OF NEW CONCERNS IDENTIFIED DURING THE REVIEW OF THE DRAFT REPORT DATED JUNE 2010 DURING CUNCURRENT PUBLIC AND IEPR REVIEWS PRIOR

1. Price Level and Contingencies: Table 4-4, Main report the price level was not stated on Table 4-4. Also, it is not very clear whether the costs included contingencies. A price level date should be stated to let the readers/reviewers know whether the costs are in constant dollar or inflated. Also, a foot note should be added to indicate whether contingencies have been applied.

SPK Response: Concur. The price level has been added as a footnote to the table. Another footnote has been added stating that the cost estimate includes contingencies.

Action Required: The correction has been made to Table 4-4.

HQUSACE Assessment: The concern is resolved in the Final Report.

2. ATR Open Comment Certifying MCACES: DrChecks report dated 6/29/2010 shows several cost engineering comments have not been resolved (“comment open”). Majority of those comments are flagged as critical issues and could considerably impact the accuracy of the MCACES cost estimates. Confirm all ATR comments have been resolved and closed out.

SPK Response: Concur. The Walla Walla District has certified the cost estimate for the recommended plan. All cost tables in the report have been updated to reflect results of the certified estimate. Additionally, the certified estimate is included in the appendices.

Action Required: In the Final Report all Cost tables in the main report and cost engineering appendix have been updated the MCACES was certified.

HQUSACE Assessment: The concern is partially resolved: During the review of the draft Final Report Dr Checks comment 3284268 states the cost ATR is based on the MCACES cost estimate dated April 2010. However, the MCACES cost estimate in Appendix G shows a preparation date of August 16, 2010. It’s unclear clear whether the latest MCACES estimate have undergone a back check review. Also, the narrative in the body of the MCACES estimate did not include documentation about changes to the April 2010 estimate.

SPK Response: Comment 3284268 was basically for information only, indicating the review began with the draft MCACES/MII estimate dated April 2010 and relating the criteria that applies to Civil Works projects and that would be used for the ATR. SPK, with Walla Walla cost center’s concurrence, believes that the narrative should not document changes made from the Apr 2010 estimate. The Apr 2010 report was a Draft report, and was subject to change based on continuing design additions and ITR and ATR reviews. Through an iterative process over the summer, updated cost data [MII files (the last being August 16 file) along with Construction Schedules, CSRA and the TPCS] were provided for review and the Cost DX provided cost certification August 26, 2010. Also, Walla Walla noted that the review complication may be that Dr Checks

was closed for new comments in June. The review after that time was via telephone and email messages.

Action Required: None

HQUSACE Assessment: The concern is resolved.

3. Cost Appendix: The following are missing in the Cost Appendix. 1) Estimate narrative describing the basis and assumptions used for the development of the estimate. 2) MCACES output report (to sub-feature level) for the selected plan. 3) Cost Risk Analysis Report and 4) Cost Engineering DX Certification.

SPK Response: Concur. The Walla Walla District has certified the cost estimate for the recommended plan. All cost tables in the report have been updated to reflect results of the certified estimate. Additionally, the certified estimate is included in the appendices.

Action Required: None

HQUSACE Assessment: The concern is resolved in the Final Report Cost Appendices that have been updated and certified by the DCX.

4. Biological Opinion: The date of the completion of the biological opinion is not provided (page 3-37), and the statement that the biological opinion would be received prior to the signing of the Record of Decision (page 4-34) is of concern, because no assurance can be offered that the costs of any mitigation measures for Federally-listed species is captured in the feasibility study. Also, it is uncertain whether Corps leadership would agree to support a recommendation to the Chief of Engineers that did not include a completed biological opinion. HQUSACE requests that a date for completion of the biological opinion be provided, and that the reference to the ROD be deleted.

SPK Response: A Biological Opinion will be received by December 2010.

Action Required: Revision to Section 3-8.c and Table 4-9.

HQUSACE Assessment: The concern is resolved in the Final Report. The completed Biological Opinion and updates are found in Section 3-8.c and Table 4-9.

5. Use of Mitigation Ratios: The use of mitigation ratios as presented in Table 3-20 is at odds with the requirement of ER 1105-2-100, paragraph C-3 (d) (5) to utilize habitat-based methodologies to evaluate and describe recommended mitigation features. The basis for the use of these ratios should be explained, and the methodology used to arrive as these ratios should be described in the report.

SPK Response: Concur. The following text has been added to the document:

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“Early discussion with the U.S. Fish and Wildlife service indicated that compensation for effects to federally listed species would require replacement of any habitat lost due to project activities. Because the Natomas basin is an isolated basin which must function alone to provide habitat for the species, compensation would be based on an acre for acre replacement. Habitat for species includes aquatic and rice habitat, canals, and managed marsh. Mitigation for woodlands was based on canopy cover lost and diameter of trees removed. The required amount of replacement acres is based on ratios of trees per acre that will result in a similar habitat that will be lost due to project construction. Shaded riverine aquatic habitat mitigation was based on linear footage of trees removed and temporal loss of habitat for endangered species.”

The ratio column of the table has been removed to prevent further confusion.

Action Required: Revise Section 3-8.c and Table 3-20 as noted.

HQUSACE Assessment: The concern is resolved: Final Report Section 3-8.c and Table 3-20.

6. CE/ICA for Endangered Species: Recommend that additional information be provided describing how the Cost Effectiveness / Incremental Cost Analysis (CE/ICA) for the endangered species mitigation was carried out. Given that the mitigation areas are strongly linked to the proposed borrow areas, a map of the potential borrow areas would be useful, as would a comparison of haul distances and other significant factors affecting costs and habitat outputs of the alternatives.

SPK Response: Plate 14 provides borrow sites locations. It is unknown what haul routes would be used for alternative mitigation sites, as specific location of non-borrow mitigation sites have not been designed. Borrow sites used for the project and now being converted to mitigation lands are adjacent to the levees which reduces not only the cost of hauling but also the cost of mitigation. Section 3-8 has a detailed description of the mitigation approach and selection process.

Action Required: None

HQUSACE Assessment: The concern is resolved in the Final Report Plate 14.

7. Habitat Conservation Components: The discussion of habitat conservation components needs clarifying language by pointing out that these features discussed in these Section 4-6, pages 4-15, 4-16 and 4-33. sections of the report are needed to comply with the Endangered Species Act or Section 404 of the Clean Water Act, and have nothing more than an incidental association with the Natomas HCP. These changes are recommended in order to avoid giving readers the impression that the Corps formulated specific measures to expand, connect or enhance the holdings of the TNBC. It is OK state that the mitigation features were configured and designed in

an intelligent manner, but the report must avoid giving the impression that improving TNBC lands was a stealth project purpose.

SPK Response: Concur.

Actions Taken: The last sentence of section 4-6 a. has been removed. The reference to TNBC has been removed from Section 4-6.c. Section 4-14 3rd paragraph, the last sentence has been revised to read:

“Rather, it would consolidate, expand and connect the habitat preserves in the basin and thus contribute significantly to the habitat enhancement goals of the Natomas Basin.”
See response to “2.c.” above with explanation of HCP relation to NLIP.

HQUSACE Assessment: The concern is resolved in the Final Report Section 4-6.a, 4-6.c, 4-14.

8. Description of Project Features for Recommended Plan: The recommendation section should be revised to include a complete description of the features that are included in the project (see example in ER 1105-2-100, Exhibit H-9). The existing recommendation does not contain any project-specific information other than a summary of costs and cost-sharing.

SPK Response: Concur.

Action Taken: Chapter 7 was rewritten and now includes a description of the features in the Recommended Plan.

HQUSACE Assessment: The concern is resolved in the Final Report revisions to Chapter 7.

9. Hydraulic Impact Evaluation: Section 4-13 Hydraulic Impact Evaluation and others describe the limitations in the hydraulic model due to datum conversion issues that limit the ability to assess levee raises. However, SAFCA indicates that they will be pursuing levee raises in the EIS. In addition other parts of the report indicate that the forthcoming GRR may include climate change and levee superiority considerations that could result in additional modifications to the TSP. Does the TSP include design ‘flexibility’ that would allow for raises due to climate change, levee superiority for resilience, and flood reduction goals associated with a 200 yr event? If so they should be described, what the benefits are of that flexibility and the cost of incorporating the flexibility into the TSP. Recommend adding a new summary section that describes what the TSP will accomplish and what the GRR will consider and whether the TSP is flexible to accommodate recommendations associated with sea level rise, levee superiority requirements and levee raises.

SPK Response: Concur. SAFCA’s plan is for raising levees in Natomas to meet the new state standard of 200-yr mean water surface plus three feet of freeboard. This is beyond what the current tentatively selected plan (TSP) recommends, since the TSP recommends modifications to address levee problems only to the top of the existing levee. The SAFCA design is considered a conservative design for a number of reasons. First, the design assumes no upstream levee

failures. This results in more flow downstream in the project area, than may actually occur during a flood event and results in a higher levee design in consequence. Second, at the upstream end of the Natomas Basin sits the Fremont Weir, which is an uncontrolled weir. The weir acts as a regulator to the flow coming from the upper part of the system. What this means is that larger flood events upstream from the weir do not necessarily translate into larger floods in the project area because flow is diverted before it gets to the basin. This creates a practical limit to raising the Natomas levees. Third, previous risk and uncertainty analyses have shown that in order to achieve a 90% conditional non-exceedence probability (assurance) for the 0.5% (200-yr event), less than three feet of freeboard is required, which is a result of the action of the Fremont Weir discussed above. As part of the Common Features GRR, the levee raise increment will be evaluated to determine the federal interest. Regardless of the outcome of that study, (whether the Corps plan calls for a shorter or higher levee than the SAFCA plan) the plan actually being put in place is the SAFCA plan. The Corps study will serve to recommend what share of the SAFCA project the federal government will participate in.

Action Required: This discussion needs to be added to the INTERIM GRR.

Action Taken: Revisions to Section 4-1, Description of the Tentatively Selected Plan, subsection c., SAFCA Implementation of NLIP has been revised to include the discussion above.

HQUSACE Assessment: The concern is resolved in the Final Report.

10. Adequacy of SAFCA Modeling for Hydraulic Impact Evaluation: In Section 4-13 Hydraulic Impact Evaluation by SAFCA. This section needs additional clarification about why SAFCA's modeling for the Corps approval of the Sec 408 permit was acceptable to the Corps permitting but was not acceptable to the Corps for its project decision-making.

SPK Response: Concur. The hydraulic modeling developed for the Comprehensive Study was based upon NGVD 29 rather than the NAVD 88 datum. As indicated in the discussion of risk and uncertainty, this results in additional uncertainty in the stage/frequency relationship. The District is presently in the process of updating and refining the hydraulic models, which will be used to confirm/refine the system analysis of hydraulic impacts as part of the GRR. Although the Corps accepted SAFCA modeling for the Section 408 permit analysis, it was determined at that time that neither the SAFCA nor the Corps modeling was acceptable for optimizing the levee height or for project decision-making purposes. This is because the issues associated with the vertical datum could potentially affect the optimized levee height. Modeling used by SAFCA under the Section 408 approval was used as a means to compare without and with-project conditions only, and not for optimizing a specific levee height. In the SAFCA Section 408 analysis, the existing top of levee and the proposed top of levee were known with certainty using recent survey information in the NAVD88 vertical datum. The critical output for a Section 408 analysis is the relative difference in performance. It is the relative difference that helps determine if a project causes a significant impact. It was determined at the time of SAFCA's Section 408 analysis that the modeling used to perform the analysis was adequate for making a comparison and determining the relative difference. Though the model could potentially have datum issues, those issues are the same in both without- and with-project conditions models and are not critical in making a

relative difference determination. In addition, a sensitivity analysis was conducted by SAFCA on the potential error associated with vertical datum. This was reviewed by the Corps and provided further reasoning for the Corps to accept SAFCA's 408 analysis.

While the design top of levee was known with certainty under the Section 408 analysis, it must be determined in the Corps decision making process. In this PAC report, because there is uncertainty about the vertical datum used in the hydraulic model, there is associated uncertainty in the n-year frequency estimates of water surface elevations. Therefore, while it appears as if raises are in the Federal interest, the amount of raise cannot be optimized. The optimization of levee raise height is a relatively refined analysis that compares the economic performance of various increments of levee raise. The cost increase in each additional levee raise increment is expected to be relatively subtle, based on the general understanding that a significant amount of the cost of raising a levee is associated with fixed type expenses such as mobilization and real estate acquisition, that are relatively insensitive to the amount of levee raising to occur. As a result, it becomes critically important to accurately assess the benefits provided by each increment of levee raise, which are also expected to differ subtly. This requires a higher order of accuracy from the hydraulic modeling that determines the benefits of each levee raise increment. The hydraulic modeling conducted is not up to the task of supporting the economic evaluation of raise increments because the vertical datum error uncertainty in it severely undermines the ability to confidently determine the federal interest in raising the levees.

For the follow-on GRR, the model will be converted to the NAVD 88 vertical datum, and the amount of raise will be optimized. At that point, a definitive analysis of hydraulic impacts due to these raises will be made, and any needed mitigation determined. In addition to the vertical datum issue, the upstream levee performance issue must be resolved in the future Common Features GRR study in order to be able to optimize the levee height. While a simple assumption of no upstream levee failures was appropriate for the Section 408 analysis to determine hydraulic impact and for decision-making up to the top of levee as part of this document, this assumption could have direct bearing on the optimization of the levee height. This issue remains unresolved and must also be worked out before levee raise can be optimized for the Natomas Basin.

Action Required: The discussion will be added to Section 4-13.

HQUSACE Assessment: The concern is resolved in the Final Report Section 4-13, Hydraulic Impact Evaluation.

11. EO 11988 Compliance: Section 4-15 Question 5 is inconclusive in the way that it answers the question "if the action is likely to induce development the base flood plain, determine if a practicable non-flood plain alternative for the development exists." Recommend using discussion from the AFB and additional discussion about whether a non-flood plain alternative exists for the Natomas Basin and why. Also who substantiates that we have complied with EO 11988? Did the District OC determine this?

SPK Response: The following has been added to the discussion of Question 5:

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“As described in Section 3-4 above, Measures Dropped from Consideration, the analyses of various non-floodplain alternatives led to the conclusion that the best way to address flood risk management in the Natomas Basin is to improve the Natomas levees. Therefore, a practicable non-floodplain alternative does not exist.”

The District Commander, who signs the feasibility report, substantiates compliance with EO 11988 following coordination with all appropriate technical professionals.

Action Required / Taken: Revision of Section 4-15.

HQUSACE Assessment: The concern is resolved in the Final Report Section 4-15.

12. Scope of work for the IEPR Comments: What is the status and schedule for completion? Was the Risk Management PCX consulted for the IEPR? Has the PCX been involved in review of the Draft Report?

SPK Response: The IEPR team reviewed the F3 Documentation (March 2009) and the Draft Report and Draft EIS/EIR. SPK will receive the final IEPR report on 3 September. Battelle has provided us a draft report, but there may be changes based on their review of public comments (public comments due on 16 August). After we receive the final IEPR report by 3 September, we look review the comments to determine nothing else significant was added, then we meet with the IEPR Team in early September to hold the conference. A representative from the Flood Risk Management Center of Expertise developed the SOW, manages the IEPR contract, and coordinates with the PDT and Battelle during the review process.

Action Required / Taken: Complete IEPR.

HQUSACE Assessment: The concern is resolved in the IEPR Draft Report that was completed for the CWRB and Finalized with the Chiefs Report.

13. 902 Limit: It is unclear whether the plan being recommended establishes a separate 902 limit for the work at Natomas Basin or not. Please clarify based on previous discussion with OWPR.

SPK Response: Concur. Chapter 7 contains modified text describing recommendations for setting the 902 limit.

HQUSACE Assessment: Chapter 7 describes what the existing 902 limit for the Common Features project is and recommends what it should be increased to assuming the Common Features project authorization is modified by Congress to include the recommended plan for the Natomas Basin. The increase in the recommended 902 limit has changed since the public release version of the report because the cost estimate has recently been completed and certified.

Action Required / Taken: Modify all cost tables in the report and recommendations text in Chapter 7 with results of the certified cost estimate.

HQUSACE Assessment: The concern is resolved in the Final Report Chapter 7

14. Documenting Other Social Effects: Recommend that the ‘other social effects’ benefits category discussion developed after the release of the Draft Report to the public be added to the residual risk section of the final report.

SPK Response: Concur. Section 2-3, Problems and Opportunities has been extensively revised to add the following:

- a) A discussion and a figure concerning the floodplains that occur in the Natomas Basin for various frequency floods.
- b) A discussion and a figure concerning critical infrastructure located in the Natomas Basin.
- c) A discussion about inundation times and rescue areas has been added.
- d) Estimates of potential loss of life in the rescue areas and the evacuation areas.
- e) Section 3-5, Array of Natomas Alternatives, has been extensive. It was revised to include:
- f) A discussion of the effects of a levee failure at Reach I.
- g) A discussion of evacuation times in the event of a failure at Reach I.
- h) A discussion of critical infrastructure affected by a failure of the levee at Reach I.
- i) A discussion and a figure concerning flood depths resulting from a levee failure at Reach I.

Additionally, a discussion of post-flood reoccupation of the Natomas Basin has been added to Section 4-11, Residual Risk.

Action Required / Taken: The corrections have been made.

HQUSACE Assessment: The concern is resolved in the Final Report Sections 2-3, 3-5, and 4-11.

15. Section 104 Credit Eligibility: It is understood that the non-Federal sponsor has requested and received approval for Section 104 credit eligibility for work performed on the Natomas levees. A portion of that credit-eligible work includes seepage and stability work that is being recommended in this Interim GRR. Per ER 1165-2-29, General Credit for Flood Control, the work eligible for credit will be explicitly addressed in recommendations to Congress. The Final Interim GRR must include this information, which will serve to support similar language in the Chief’s Report to Congress.

SPK Response: Concur. A new table has been added to Chapter 5, Section 5-3, Credit Provisions that details the reach where SAFCA work has been done, the features involved, and the status of the work. Additionally, an extensive discussion of credit has been added to Chapter 7, Recommendations.

Action Required: Revisions to Chapters 5 and 7 noted above in a new Table 5-3 in Chapter 5, Section 5-3, and new discussion of crediting in Chapter 7.

HQUSACE Assessment: The concern is partially resolved in the Draft Report. The draft Chiefs Report section 104 credits need to be updated to reflect current projects that will be constructed or under construction by the time of the Chiefs Report is finalized.

District Response: Concur.

Action Taken: Regarding the 5.3 mile versus 5.5 miles, the draft Chief's Report has been modified to show 5.3 miles so as to be consistent with the final Natomas PAC document. Regarding the 7.7 miles, this has been separated in the draft Chief's Report to reflect that 4.0 miles is currently being constructed and 3.7 miles is currently under consideration for 104 credit eligibility under the Phase 4a package. There is now consistency on what is reported in the final Interim GRR section 5-3 and the draft Chief's Report.

SPK Response: The \$387 figure is correct because phases 1, 2, and 3 have been 1) approved under 408, 2) approved under 104, 3) awarded for construction, and 4) construction completed on much of it. On the Reach D (Natomas Cross Canal), the approvals cover 5.3 miles of levee improvements. On Reach C (the upper Sacramento River), the approvals cover 4.9 miles of levee improvements. On Reach B (the middle Sacramento River), the approvals cover 4.9 miles of levee improvements; the 3.7 miles discussed above is part of the 408/104 request package for phase 4a which will be to HQ shortly to evaluate for approval and is the remaining portion giving the 7.7 miles incorrectly reported in the draft Chief's Report as being approved. But, assuming approval of phase 4a occurs, the \$387M figure will have to be increased by \$132M.

Action Required: The draft Chief's Report has been modified to be consistent with the final Natomas Interim GRR document.

"A Section 104 eligibility request for NLIP Phase 3 was approved on May 4, 2010 for an estimated cost of \$181,800,000. This work, which includes modifying 6.2 miles of the Natomas East Main Drain Canal west levee, 3.2 miles of the Pleasant Grove Creek Canal west levee, and 5.9 miles of the Sacramento River east levee, has not been initiated as of this writing. In addition, the CVFPB and SAFCA have submitted another Section 104 credit eligibility request for Phase 4A for an estimated cost of \$132,000,000. This work consisting of modifying 3.5 miles of the Sacramento River east levee and several relocation and mitigation features, has not been initiated.

Table 5-3 summarizes the project features constructed or under construction, covered by the approved Section 104 credit eligibility requests."

The crediting section from the Interim GRR was rewritten to make it clearer. The revised paragraphs in question are below.

"The CVFPB and SAFCA have submitted requests for credit under Section 104 for 3 phases of their NLIP project. All of the requests have been approved. Section 104 eligibility requests for NLIP Phases 1, 2, and 3 were approved on 19 July 2007, 7 April 2009, and 4 May 2010, respectively, for estimated costs of \$35,400,000, \$170,000,000, and \$181,830,000. NLIP Phase 1 work included construction of a seepage cutoff wall through the south levee of the Natomas Cross Canal beginning at the confluence of the

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Sacramento River, and extending upstream approximately 12,500 feet. NLIP Phase 2 included work along the Natomas Cross Canal, Sacramento River east levee, and relocation and mitigation features. NLIP Phase 3 work includes modifying 6.2 miles of the Natomas East Main Drain Canal west levee, 3.2 miles of the Pleasant Grove Creek Canal west levee, and 5.9 miles of the Sacramento River east levee.

In addition, the CVFPB and SAFCA have submitted a Section 104 credit eligibility request for Phase 4A with an estimated cost of \$132,000,000. Credit eligibility for this work has not yet been approved. The work, consisting of modifying 3.5 miles of the Sacramento River east levee and several relocation and mitigation features, has not been initiated.”

HQUSACE Assessment: The concern is resolved in the December Chief’s Report and Final Report Chapter 5 that have been updated to reflect current activity.

F. RESOLUTION OF CONCERNS IDENTIFIED DURING REVIEW OF THE DRAFT FINAL REPORT DATED AUGUST 2010 IN PREPARATION FOR THE CWRB AND THE BASIS OF THE CONDITIONAL CWRB APPROVAL

1. Distinguish Cost Sharing for the Recommended Natomas Federal Plan From the Natomas SAFCA Plan under Section 408: In Section 4-1 discuss any modification to existing levees and interior drainage in context of the federal decision and the Natomas Levee Improvement Program under Section 408. Note any actions taken separately are not included in the recommended plan and not included in the cost sharing. Add graphic from CWRB showing resolution of cost sharing issues by describing how adjacent levee design does not include any increments cost shared due to levee raises or the vegetation variance due to vegetation being left in place creating a sacrificial zone for the existing levee. Link this discussion to the SAFCA Implementation of NLIP identified in the EIS.

SPK Response: Concur.

Action Required/Taken: Section 4-1 was modified to discuss existing levees and interior drainage in the context of the federal decision. The graphic developed for the CWRB has been included. The discussion is now linked to the SAFCA Implementation of NLIP identified in the EIS. Chapter 4, Section 4-1, now contains the following:

“While SAFCA’s NLIP plan includes raising the levee, the raise increment is not included in the Recommended Plan. Therefore, the costs of the additional work undertaken by SAFCA are not included in the amount to be cost shared. As part of the upcoming Common Features GRR, the levee raise increment will be evaluated to determine the federal interest. Regardless of the outcome of that study (whether the Corps plan calls for a shorter or higher levee than the SAFCA plan), the plan actually being put in place is the SAFCA plan. The Corps study will serve to recommend what share of the SAFCA project the federal government will participate in.

“NLIP plan components are being developed in phases. The first phases, 1 through 4a, are being implemented by SAFCA as portions of the NLIP with approval by the Corps in accordance with Section 408. The description below does not include the raises being implemented by SAFCA. However, a full description of SAFCA’s planned work can be found in the FEIS/EIR.”

Figure 4-1 below shows the levee cross-section, and what part of it is constitutes the Recommended Plan, and what part is not included in it.

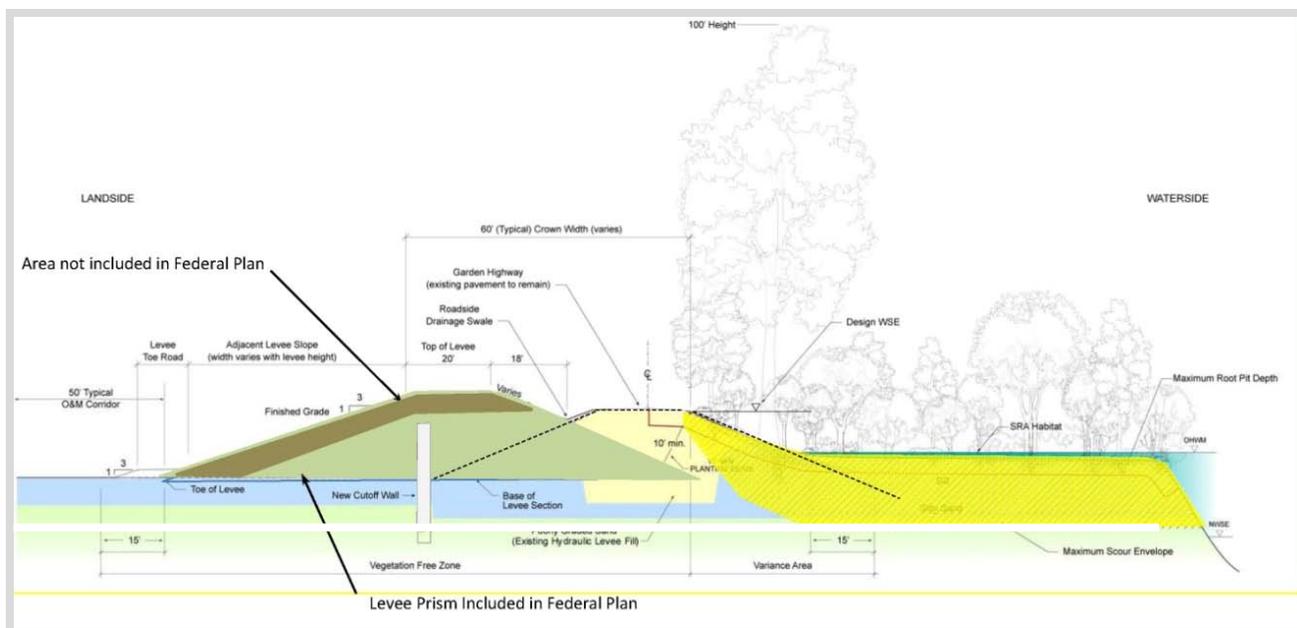


Figure 4-1. Levee Cross-Section Showing Federal Plan

HQUSACE Assessment: The concern is resolved in the Final Report. See attached Figure 4-1.

2. Compliance with Environmental Requirements: Table 4-7 on page 4-36 shows the status of compliance with environmental requirements. Most items are shown with a status of partial compliance- in progress. Typically, a final report would have more of the items with a status of full compliance, although some may require further coordination or PED level details to fully comply. Please review the table to assure that it reflects the current status and provide any updates as needed.

SPK Response: Concur.

Action Required / Taken: Revisions to Table 5-7.

HQUSACE Assessment: The concern is resolved in the Final Report Table 5-7.

3. Project Cost and Schedule Risk Analysis Report: The report shows contingency factors for NED and LPP at 80% confidence level as follows:

	NED	LPP
Project Cost Contingency	31.42%	31.48%
Schedule Duration Contingency	23.86%	23.86%
Total Contingency	55.28%	55.34%

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However, the calculation of Total Project Cost stated in the report appear to include only the project cost contingency (31.42%) and (31.48%) for both plans. The Total Project Cost could be underestimated due to incorrect contingency factors. Please explain the rationale for excluding the schedule duration contingency in the calculation.

SPK Response: Do not concur. Project Cost contingencies (31.42% NED and 31.48% LPP) should not be combined with schedule duration contingencies (23.86% NED and 23.86% LPP). All risk associated with the project cost contingencies for NED and LPP was accounted for. Schedule duration contingency percentages only pertained to schedule, not cost. To avoid the misunderstanding of combining the two sets of percentages, with Walla Walla concurrence, revisions has been made to the project schedule risk topic on page 10 of the Risk Report. The reference of schedule duration in terms of percentages was removed so to avoid combining the Cost contingencies percentages with the Schedule duration contingencies.

Action Required: Revision to page 10 paragraphs 2 and 3 and Table 4. This provides clarification between cost contingency and Schedule contingency.

HQUSACE Assessment: The concern is resolved in the Final Report Table 5-7 Page 10, paragraphs 2 and 3, and Table 4.

4. Contingency Factors: The contingency factors shown on the TPCS is not consistent with the contingency factors stated in the cost risk analysis report. The contingency factors shown on the TPCS average from 14% to 44% for the different features of the project. Please explain why.

SPK Response: For information only. The CSRA report contingencies documented are weighted contingencies for the total project. Risk evaluation was performed on the various accounts and reaches. Each feature account carries its own level of risk, and as a result, its own contingency percentage. This is the reason the contingencies on the TPCS range from 14% to 44%. The results are reflected for each individual accounts. The resultant contingencies are roll-up of all the feature-level contingencies included in the Total Project Cost Summary sheet. For instance, the contingency for the 01 account was developed by real estate -- and all other features were analyzed according to the level of uncertainty and risk involved with the specific type of work. The total of all contingencies as compared to the price-level total of all accounts rolls up to 31.42% and 31.48% for the NED and the LPP plans, respectively.

Action Required: None.

HQUSACE Assessment: The concern is resolved.

G. RESOLUTION OF CWRB CONCERNS IDENTIFIED ON THE FINAL INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT DATED AUGUST 2010

On 27 September 2010, a CWRB was held. The Board voted to give the report conditional approval to release the report for State and Agency Review. The approval was conditional upon making the changes to the report that were recorded in the Draft PGM prior to the CWRB with text that was reviewed and approved for a revised Final Report by HQUSACE. Those changes are documented in the resolution of comments in the section above on the resolution of issues completed in the Final Report.

Those changes were made after the CWRB to the August Draft Final Report and the report was released to State and Agency Review. The 30-day review period ended on 22 November 2010.

During the S&A review, the District updated all costs and benefits to October 2010 levels. Due to the number of updates, not the significance, a Final Report dated December 2010 was published that included all of the previous changes included prior to the S&A release August Draft Final Report as well as the updated October 2010 costs and benefits.

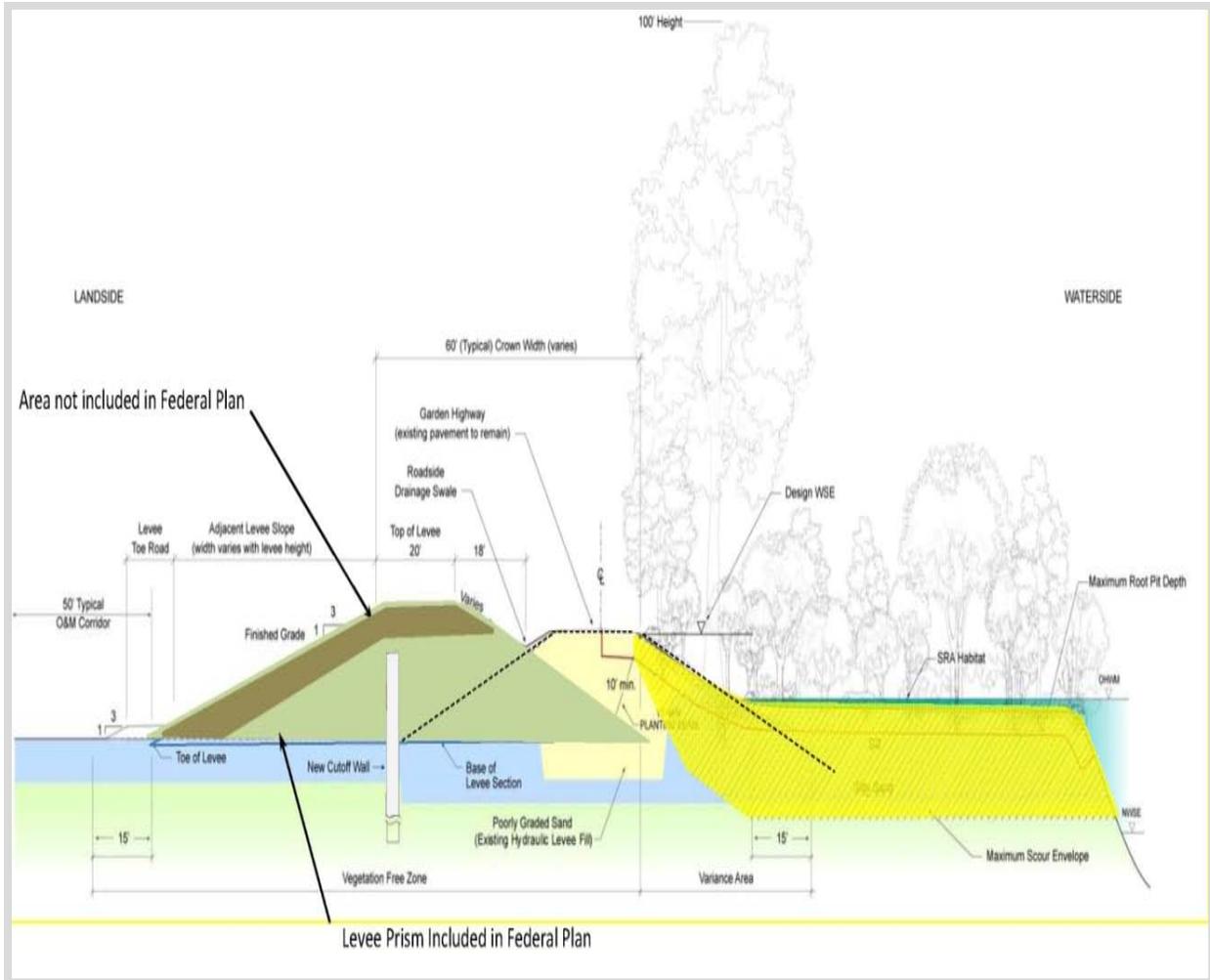


Figure 4-1. Levee Cross-Section Showing Federal Plan