

Road to a Chief's Report: American River Watershed (Common Features) Project, Natomas Basin, Sacramento and Sutter Counties, California

By Alicia Kirchner and members of the Project Delivery Team

In December 2010, a Chief's Report was signed for the Natomas Basin Project in Sacramento, California. This was the most recent in a chain of events aimed toward reducing the risk of flooding to the greater Sacramento region. Flood management in the area comes through a combination of storage and conveyance, and Congress has authorized improvements to various project features over the past 20 years. Investigations continue to explore further reduction of flood risk, and the Natomas Post Authorization Change (PCA)/Interim General Re-evaluation Report (GRR) is vital to reducing flood risk to the Sacramento region.

The Natomas Basin is surrounded by a 42-mile existing perimeter levee system, and lies just north of downtown Sacramento. The system was originally constructed in the early 1900s, and has over time been improved by both the State and local entities and USACE. The most recent levee improvements were authorized in the mid- and late-1990's. However, sustained high flows in 1997 triggered extensive geotechnical investigations into deep levee underseepage issues. The results of those investigations were alarming, and USACE initiated a reevaluation study. The study progressed; but eventually took a back seat to the District's investigation of Folsom Dam, which is located upstream along the American River.

In 2008, the Natomas Basin investigation resumed in earnest and the Feasibility Scoping Meeting was held in March 2009. Updated estimates of the potential for levee failure were daunting: the Natomas Basin went from an estimated 1 in 100 chance of flooding to a 1 in 3 chance of flooding in any given year. Future without-project damages from a single flood event could total \$7 billion and flood depths were estimated at 25 feet. The pressure was on: 80,000 people living in the Natomas Basin needed their risk of flooding reduced as soon as possible. Congresswoman Doris Matsui

appealed to USACE to complete a decision document in 2010.

"There were some high-level discussions and then the commitment was made: USACE would produce a Chief's Report by the end of 2010," said Kris Mullins, Sacramento District Deputy for Programs and Project Management Division.

In order to meet the deadline, Sacramento District co-located the Project Development Team (PDT) and rushed to assign necessary resources. Dave McDaniel, Chief of the recently created Common Features Program Office said, "The new office and co-located staff greatly improved the collaborative process that led to the Chief's Report."

In answering the call for resource support, the Great Lakes and Ohio River Division and Louisville District offered Ms. Jane Ruhl to be the lead planner. Ms. Ruhl's experience as both a planner and as a geotechnical engineer has really been the right combination to lead this planning study, and came at a time when Sacramento District planners were swamped. Ms. Ruhl spends on average two weeks per month in Sacramento. "Working virtually across three time zones has been challenging at times, but the team has been very supportive. Sacramento has become a second home to me, and the Sacramento District is a big part of my Corps family," said Ms. Ruhl.

While the District worked to ramp up for the effort, the Sacramento Area Flood Control Agency (SAFCA) started to pursue advance efforts with support from the State of California through its Early Implementation Program, a grant program to reduce flood risk.

SAFCA and the District processed several requests for permission to alter a Federal levee ([33 USC 408](#)) and for consideration of credit for advance local work ([Section 104 of WRDA 1986](#)). "The USACE team really worked as

seamlessly as possible with the sponsors to make the 104 and 408 approvals happen in time for planned construction. Sometimes just in time,” said Karen Berresford, South Pacific Division District Support Team (SPD DST) lead. Schedules would slip and then be crashed to meet construction deadlines. According to Claire Marie Turner, Sacramento District’s Section 408 Project Manager, “All-in-all, four 408/104 packages were processed in 36 months. Through this process we have greatly improved our agency expertise in these requirements.”

Colonel Bill Leady, the then and soon returning Sacramento District Engineer, summed it up: “Our partners in this project, SAFCA and the State of California, have taken the concept of shared responsibly to heart and have already invested more than \$350 million to move this project forward.”

The PDT tackled a number of challenges as part of the investigation. They worked with the Planning Center of Expertise (PCX) for Flood Risk Management (FRM) to launch the first Type I Independent External Peer Review (IEPR) for a FRM investigation post-issuance of [EC 1165-2-209](#).

The PDT addressed emerging policy requiring evaluation of risk from a systems perspective, and relied on the expertise from the [Hydrologic Engineering Center](#) (HEC) to provide input on unique approaches and tools. Modeling the future without-project condition was difficult, because the established system-based risk tools did not adequately account for engineering assumptions, ultimately pushing the limitations of the existing HEC-Flood Damage Reduction Analysis (HEC-FDA) software. Developing methods for measuring project performance that were not dependent on the completion of a complex system model would have delayed the project. The PDT developed their own model and methodologies to rationally describe damages and project performance. These approaches, in combination with the continued coordination with the PCX, HEC, as well as with the [Institute for Water Resources](#) at Fort Belvoir, Virginia, and USACE Headquarters led to model approval and successful technical

review. The consensus is that our tools need to continue to evolve to support investigations in a system-wide context.

Compliance with [Engineer Technical Letter \(ETL\) 1110-2-571](#) was also a challenge. The Natomas Basin is home to several endangered and threatened species and vegetation provides critical habitat to these species. “SAFCA worked hard to find a way ahead to make levee improvements which the U.S. Fish and Wildlife and the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service could support,” says Liz Holland, Environmental lead for the investigation. “The recommended project minimizes removal of waterside habitat and provides opportunities for on-site mitigation.”

There is no doubt that early, robust collaboration with resource agencies enabled early implementation of the environmental requirements, thus facilitating approval of what otherwise could have been a deal breaker with our partner resource agencies. Pursuing a parallel effort to develop levee vegetation policy while developing an interim recommendation on an accelerated schedule was tough.

Because of the nature of the floodplain and development pressures, compliance with [Executive Order 11988](#) was an area of scrutiny during reviews; fundamentally, since the recommended plan will not in-and-of-itself provide more than an estimated project performance increase of a 1 in 67 year chance of levee failure, the project was determined to be compliant with the Executive Order. Discussing that issue with the vertical team and partners really enhanced the risk communication policy understanding related to residual risk and EO 11988.

Since the investigation was limited to addressing issues with the existing levees of the Natomas Basin, there remains a relatively high residual risk. To address this, the District is conducting a larger General Re-evaluation Report for the greater Sacramento area to investigate reduction of residual risk of flooding to the region, including Natomas. The State of California is

also working to reduce residual risk to urbanized areas and passed legislation in pursuit of this goal. This legislation requires development of a system-wide flood management plan for California's Central Valley, issuance of flood awareness mapping and notifications to property owners, modification of building codes, and other measures. Additionally, SAFCA has a multi-pronged strategy to manage residual flood risk that includes assessment fees for development and regional flood warning and response plans for its area.

At the Civil Works Review Board (CWRB) on 27 September 2010, then Sacramento District Engineer Colonel Bill Leady presented the highlights of the investigation and made his recommendation to the Board. Dr. Christine Altendorf, Director of Programs with South Pacific Division, represented the Division Commander, and endorsed the recommended plan. The plan, which has now been partially constructed by SAFCA, consists of a combination of measures, including a new levee adjacent to existing levees and fixing the existing levee in place. A seepage cutoff wall and seepage berm would be used alternately along the levee, depending on site conditions.

The recommended plan, if authorized, will reduce risk of flooding from a 1 in 3 chance to a 1 in 67 chance; estimated annual damages would be reduced from \$462 million to \$19 million. The recommended plan maximizes net benefits and has a benefit-to-cost ratio of 6.5-to-1. The total project cost is estimated to be \$1.1 billion.

A key aspect of the plan is that it neither advances nor precludes alternatives for a more comprehensive solution for the future. Finding the balance between delivering an accelerated, interim recommendation, based on constrained project goals and objectives, while not being pre-decisional for future recommendations, was paramount.

Further, application of this interim reporting strategy fit fully within the established planning procedures. In this case, it was reasonable to focus early on a "no regrets" type project, while continuing to investigate a complementary,

broader regional solution. The Civil Works Review Board approved the report for final public and agency review. The Chief's Report was subsequently signed on 30 December 2010.

A lesson learned? District and Division leadership, key staff and sponsors should be prepared to spend time at headquarters shortly before the CWRB to ensure that all parties are ready.

"We worked with the Office of Water Project Review reviewers and followed Scott Nicholson and Ken Zwickl (South Pacific Division Regional Integration Team (RIT) Senior Water Resources Planner) review lead's, guidance." said Ms. Alicia Kirchner, Chief of Planning Division in Sacramento. "Some of us went to Headquarters for the pre-op and stayed through for the CWRB, and some team members stayed in Sacramento to make last minute refinements to the material." Districts and MSC's should plan for that time and cost.

Many people pulled together to make the investigation, CWRB, and Chief's Report happen. Biweekly vertical calls enhanced coordination. "Karen (Berresford, SPD DST lead) and Ken Zwickl with the RIT were instrumental in keeping communication flowing," said Jane Ruhl.

The Agency Technical Review (ATR) and Independent External Peer Review (IEPR) teams were very responsive, as was the Cost Engineering Directory of Expertise at Walla Walla District. It was also very helpful to watch the Louisiana Coastal CWRB, held the month prior, and to review the recent Surf City CWRB material.

The Next steps? The Chief's Report and supporting documentation are currently under review by the Assistant Secretary of the Army (CW) and the Office of Management and Budget. After all that, it's really about authorization and appropriations, construction and continuing to identify solutions for managing the residual flood risk in the Natomas Basin as well as for the greater Sacramento area.

Alicia Kirchner is Chief of the Planning Division in the Sacramento District office of the U.S. Army Corps of Engineers. Members of the Project Delivery Team included Dan Tibbitts, Jane Ruhl, Elizabeth Holland, Dave McDaniel, Andrew Muha, Timi Shimabukuro, Erik Gomez, Billy Fakes, Ethan Thompson, Mike Kynett, Laurie Parker and George Heubeck.