

**Proposal and Statement of Qualifications for
Sacramento County Delta Legacy
Communities Flood Risk Reduction
Feasibility Studies**

SACRAMENTO COUNTY DEPARTMENT OF WATER RESOURCES



Submitted by

GEI Consultants, Inc.
2868 Prospect Park Drive, Suite 400
Rancho Cordova, CA 95670
T: 916.631.4500
F: 916.631.4501

November 18, 2016

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Mr. George H. Booth, PE, CFM
Senior Civil Engineer
Sacramento County Department of Water Resources
827 7th Street, Room 301
Sacramento, CA 95814

Consulting
Engineers and
Scientists

**Subject: Proposal and Statement of Qualifications – Sacramento County Delta Legacy
Communities Flood Risk Reduction Feasibility Studies**

Dear Mr. Booth:

GEI Consultants, Inc. (GEI) appreciates the opportunity to submit our Proposal and Statement of Qualifications for Sacramento County's Delta Legacy Communities Flood Risk Reduction Feasibility Studies. We look forward to the prospect of providing professional services required to support Sacramento County's efforts of achieving a 100-year level of flood protection for some of the County's Delta Legacy Communities where possible, and substantially reducing the risk to flooding in others, consistent with funding available from the Department of Water Resources (DWR) Small Communities Flood Risk Reduction Program.

GEI has assembled a team of local experts for the North Delta Legacy Communities inclusive of MBK Engineers, Blackburn Consulting, DCC Engineering, KSN Engineering, and Foster Morrison. All but Blackburn are active with Sacramento County's current efforts developing Flood Emergency Action Plans (EAPs) for each of the Reclamation Districts (RDs) in the North Delta communities. MBK Engineers and HDR were key participants and authors of the Lower Sacramento/North Delta Regional Flood Management Plan (RFMP) which is inclusive of all the Delta Legacy Communities in Sacramento County, namely Hood, Courtland, Locke, Walnut Grove, Ryde and Isleton. Both MBK and HDR have also been very active participants and leaders in the Agricultural Floodplain Ordinance Task Force (AFOTF) that is identifying non-structural solutions, inclusive of changes to the NFIP to benefit agricultural communities in the floodplain, particularly in California. It is anticipated the AFOTF recommendations can be applied to the Sacramento County Delta Legacy Communities and surrounding agricultural lands to reduce flood insurance costs and increase the ability to cost effectively construct, or improve, agricultural structures in the floodplain.

GEI has developed a clear understanding of the study challenges and Sacramento County's goals and objectives to implement flood risk reduction solutions (structural and non-structural) for each of the noted communities. This was done while collectively developing the County's EAPs and assisting the RDs and the County in formulating the feasibility grant applications recently submitted to DWR. Sacramento County is seeking a consultant team to conduct thorough feasibility studies ultimately leading to locally preferred alternatives that can be reasonably implemented with nominal local funds leveraged with higher DWR cost-sharing opportunities. Sacramento County is looking for a consultant team with the following attributes and qualifications:

- Very experienced with flood management feasibility studies, consistent with the Guidelines and PSP for the DWR Small Communities Flood Risk Reduction Program, assuring full

reimbursement to the County for all work performed during the course of the 12-month study period of the feasibility studies.

- Well versed in working with local RDs, various stakeholders and the levee systems in the North Delta regulated by the Central Valley Flood Protection Board and the U.S. Army Corps of Engineers (USACE);
- Extensive knowledge of the Central Valley Flood Protection Plan (CVFPP), the Central Valley Hydrology Study (CVHS), the Central Valley Floodplain Evaluation and Delineation (CVFED) modeling tools, and the DWR Non-Urban Levee Evaluations (NULE) investigations specific to Sacramento County's immediate needs.

GEI has been in the forefront assisting local flood control interests such as the Yuba County Water Agency, Three Rivers Levee Improvement Authority, SAFCA, and others with flood management feasibility studies before and after the passage of the California Flood Control Bond Act of 2006.

GEI's successful feasibility evaluations for local agencies combined with the extensive CVFPP work experience gives GEI a unique understanding and a perspective of both local and state agencies and provides Sacramento County with a consultant team that is extremely qualified for the feasibility studies at-hand, and ultimately for project implementation. The additional benefits that GEI brings to Sacramento County include:

- A Proven Project Manager – Jeffrey Twitchell has extensive experience in managing multi-objective and multi-discipline flood control projects throughout Northern California that seek flood risk reduction measures and multi-objective benefits.
- Experienced Team Leaders – Graham Bradner, Chris Ferrari, Vance Howard, and Leo Winternitz all of GEI, who have extensive project management experience and expert technical knowledge in their fields of science, engineering, and stakeholder facilitation. They will lead teams of experienced professionals including others from MBK, KSN, DCC, HDR, Blackburn, who have worked together on flood control projects throughout the north state and Delta.
- Commitment to Sacramento County and Delta RDs – Each member of our team is committed to working closely and collaboratively with Sacramento County staff and stakeholders, inclusive of the RDs, to successfully complete the feasibility studies project.

We hope that you will find our team composition, qualifications, and approach compelling. We appreciate the opportunity to be considered for this important project. If you have any questions about our proposal and qualifications or require additional information, please contact Jeffrey Twitchell at 916.631.4555, jtwitchell@geiconsultants.com.

Sincerely,

GEI Consultants, Inc.



Jeffrey Twitchell, PE
Senior Consultant, Project Manager



Bill Bennett, PE, GE
Vice President, QA/QC Manager

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1. PROJECT UNDERSTANDING, OBJECTIVES AND APPROACH

1.1 PROJECT UNDERSTANDING AND OBJECTIVES

The Sacramento County Department of Water Resources is about to embark on a structured feasibility planning process to identify preferred alternatives (structural and non-structural) to reduce the risk of flooding to the Sacramento County Delta Legacy Communities of Hood, Courtland, Locke, Walnut Grove, Ryde and Isleton, all located within the Primary Zone of the Legal Delta. Sacramento County, with assistance from GEI Team members, recently filed six separate grant applications to ask for grant funds (up to \$500,000.00 per community) from the California Department of Water Resources (DWR) under their Small Community Flood Risk Reduction Program (SCFRRP). GEI is aware project funding for commencing the feasibility studies is largely contingent upon Sacramento County receiving the noted grant funds from DWR. Sacramento County has also expressed a desire to include other adjoining communities such as Point Pleasant and Oxbow Marina into the feasibility study matrix, but has acknowledged that the adjoining communities are not likely eligible for funding under the current DWR SCFRRP funding mechanism. However, the GEI Team believes some of the non-structural solutions identified for the Delta legacy Communities maybe very applicable and transferable to reduce flood risks in the communities of Point Pleasant and Oxbow Marina.

GEI is fully aware of the preference of the County's and the RD's encompassing the Delta Legacy Communities to secure a 100-year level of flood protection for each of the noted communities, including some agricultural areas adjoining the communities. Obtaining a 100-year level of flood protection for each of the small communities protected by the State Plan of Flood Control (SPFC) levee system is also one of the key goals identified by DWR and the Central Valley Flood Protection Board (CVFPB) in the latest 2012 Central Valley Flood Protection Plan (CVFPP). However, it is probably not cost effective for the RD's to assess their landowners to obtain a 100-yr level of flood protection for each community. Exceptions may include a couple of the smaller communities that have relatively short length perimeter levees such as portions of Walnut Grove (East) and Locke.

Feasibility studies will need to evaluate both structural and non-structural alternatives and solutions as identified in the Lower Sacramento/North Delta Regional Flood Management Plan (RFMP) and as appropriately outlined in the scope of work in the County's DWR SCFRRP grant applications and in the County's current request for consultant proposals. More importantly, GEI understands that the County is looking for a consultant Team that will work with the communities affected by the preferred alternative(s) to ensure the feasibility studies will not sit on the shelf, but will allow and encourage timely implementation to occur. This can be accomplished by strategically aligning each community for potential funding mechanisms, including funding sources that may come from potential beneficiaries identified by the Delta Protection Commission that may include Caltrans, linear infrastructure utilities, and Delta water exporters. Additional outside funding sources may need to be identified during the feasibility studies if each of the communities are to thrive in the future in the "Delta as a Place".

GEI also understands that the DWR SCFRRP funding will not likely be available until spring of 2017. DWR will require completion of the feasibility studies within 12 months of the County signing a reimbursement funding agreement. To complete the feasibility studies in a timely fashion and position the County for subsequent implementation grants tentatively scheduled for 2018 GEI has assembled a team with local expertise and knowledge specific to the North Delta, inclusive of the flood protection system, its regional stakeholders, and larger state-wide benefits and beneficiaries for reducing flood risks to the Delta Legacy Communities in Sacramento County.

1.2 OVERALL PROJECT APPROACH

GEI, with assistance and input from MBK Engineers, KSN, DCC, and Foster-Morrison, is currently under contract with Sacramento County to develop Flood Emergency Safety Plans (ESPs) for all of the key Reclamation Districts (RDs) encompassing the noted Delta Legacy Communities. This places GEI and its supporting cast of Delta-centric subconsultants in an excellent position to readily assist Sacramento County with the flood risk reduction feasibility study planning process. As such, GEI proposes to be the lead consultant on all six of the feasibility study investigations contemplated and outlined in the County's recent grant applications. GEI also believes it can offer some scale of economy to the County and each of the Delta Legacy Communities by grouping a number of the study investigations together as well as potentially combining stakeholder outreach efforts and meetings for adjoining communities.

The GEI Team would build on its existing knowledge and relationships with stakeholders in the Delta to advance the feasibility investigations, namely with key community members, RDs and their respective board members and engineers, and key agencies with a stake in funding and/or prioritizing flood risk reduction measures in the North Delta. The key agencies include, but are not limited to, the Delta Protection Commission (DPC), the Delta Stewardship Council (DSC), the Delta Conservancy, the CVFPB, DWR, and indirect beneficiaries that may include linear infrastructure owners and out-of-Delta interests identified in the DPC's Flood Risk Management Assessment District Feasibility Study.

With direct experience from similar ongoing projects for communities throughout the Central Valley, including the development for the Lower Sacramento/North Delta Regional Flood Management Plan (RFMP), members of the GEI Team have a unique understanding of the challenges in reducing flood risk for small communities and providing relief from some of the National Flood Insurance Program's (NFIP's) requirements. The team would start by leveraging existing programs and planning tools to maximize the resources available to investigate actions that can be taken to reduce the flood risk for the Delta Legacy Communities. These programs include DWR's Non-Urban Levee Evaluation Program (NULE), DWR's RFMP 2 Program, DWR's CVHS and CVFED modeling tools, and DWR's Basinwide Feasibility Study. Working with the County, we propose to initiate the study by meeting with key local residents and interest groups to educate them on the scope of the study and seek their input on structural and nonstructural alternatives to reduce flood risks to the Delta Legacy Communities protected by both SPFC levee and non-project levees. The goal of this effort will be to build consensus and community buy-in for the process and ultimately support for the recommended actions.

After initiating and developing a public engagement process, inclusive of at least two public meetings for each community, the team will conduct a multi-criteria analysis of all potential alternatives. Alternatives would include those identified for each Delta Legacy Community in the Lower Sacramento/North RFMP. The Team will ultimately recommend one alternative specific for each individual Delta Legacy Community which may be a mix of structural and nonstructural actions to effectively implement and reduce flood risks. They will also investigate the potential to integrate features that will make the project multi-objective in an effort to attract as many funding sources as possible. Throughout this process the team would maintain coordination with interested agencies and stakeholders identified in the County's grant applications, including but not limited to the local residences, RDs, agricultural landowners, businesses, the DPC, DSC, the Delta Conservancy, the Central Valley Flood Protection Board, and DWR. Potential financial partners may include third party beneficiaries such as Caltrans, utilities within the Delta, and Delta exporters recently identified in the DPC's Delta Flood Risk Management Assessment District Feasibility Study.

2. FIRM QUALIFICATIONS

2.1 INTRODUCTION TO THE GEI PROJECT TEAM AND KEY ROLES

GEI will serve as the prime contractor and lead the GEI Team consisting of seasoned and proven professionals of all the necessary disciplines for each of Sacramento County's Delta Legacy Communities flood risk reduction feasibility studies. GEI is very well versed and experienced in effectively carrying out many similar feasibility-level, multi-benefit, flood risk reduction projects of similar size and complexity in Northern California, including the Sacramento-San Joaquin Valley and in the San Francisco Bay Area.

GEI has assisted several local agencies, inclusive of SAFCA, Three Rivers Levee Improvement District, Yuba County Water Agency and others, including California DWR with the initial 2012 Central Valley Flood Protection Plan (CVFPP) and its current feasibility study investigations supporting the 2017 CVFPP. GEI has interfaced with several local government entities, namely cities, counties, and local flood control districts throughout Northern California in connection the CVFPP 2017 update, Regional Flood Management Plans (RFMPs), and California's Flood Future Report for the Statewide Flood Management Plan (SFMP). GEI also continues to assist several flood control agencies in developing flood risk reduction programs, inclusive of preparing feasibility studies, preparing final CEQA/NEPA planning documents, final plans and specifications, providing construction over-sight and developing final levee certifications in accordance with 44 CFR 65.10. GEI has been very successful in implementing levee remediation projects in Northern California offering improved flood protection, and where applicable multi-benefits for protect communities located behind levees.

GEI has also been very successful in securing in excess of \$100M in DWR funds from Propositions 13, 1E, and 84 for local flood projects and technical levee evaluations through DWR's Early Implementation Program (EIP), Urban Flood Risk Reduction (UFRR) program, and Local Levee Evaluation Program (LLAP).

For the Sacramento County SCFRRP feasibility studies of the Delta Legacy Communities GEI has assembled a team of specialized and seasoned individuals with focused expertise and dedicated capacity. Key sub-consultant GEI Team members include:

- MBK Engineers for local expertise and institutional knowledge as engineers and Hydrologic and Hydraulic (H&H) experts for Reclamations Districts protecting the communities of Courtland, Walnut Grove (West) and Ryde (namely RDs 755, 551 and 3)
- DCC Engineering for their local knowledge as RD engineers protecting the communities of Walnut Grove (East) and Isleton (namely RDs 554, 556, and Brannan Andrus Levee Maintenance District)
- KSN for their institutional knowledge as RD engineers for the Tyler Island (RD 563) portion of Walnut Grove (East) and for the neighboring RDs south and east of Isleton
- Foster Morrison for: (1) their current activities in assisting Sacramento County and GEI with developing an updating Local Hazard Mitigation Plans (LHMPs) and Flood Emergency Safety Plans (ESPs) for the Delta RDs; and (2) their expertise utilizing the GIS-based flood loss assessment tool, Hazus, developed by FEMA
- HDR Engineering for their active roles in: (1) the Agricultural Floodplain Ordinance Task Force (AFOTF) to identify changes and potential reductions the NFIP insurance costs to potentially benefit the agricultural Delta Legacy communities in Sacramento County; and (2) the development of the Lower Sacramento/North Delta RFMP, considered an element of the pending 2017 Central Valley Flood Protection Plan (CVFPP)

- Robert Lokteff of Blackburn Consulting to provide supplemental geotechnical evaluations and testing services to assist the GEI Team with the assessment of existing levee conditions and identify potential solutions to improve the levee systems up to a 100-year level of flood protection
- John Raney, with Raney and Associates, to provide ongoing geotechnical assistance to DCC Engineering/RD 554 for Walnut Grove (East) and to Lower Andrus Island for the community of Isleton

GEI has partnered with all of the above fore-mentioned consulting firms in the past on similar flood risk reduction projects, with the exception of John Raney who as noted above, has worked closely with DCC engineering on the geotechnical evaluations for the levee system(s) protecting portions of the communities of Walnut Grove (East) and Isleton. GEI is currently working with MBK Engineers, DCC Engineers, Foster Morrison, and KSN on the County's Flood Emergency Safety Plans (ESPs), and updates to the County's LHMPs. GEI and HDR are also supporting MBK Engineers with Yolo County's concurrent DWR SCFRRP feasibility study efforts, inclusive of the only other Delta Legacy Community protected by the SPFC levee system, namely Clarksburg.

Provided below are brief profiles of each of the GEI Team consulting firms and the roles that key individuals in each of the firms will provide in connection with the subject studies to be performed for each of the Delta Legacy Communities in Sacramento County .

GEI Consultants, Inc.



GEI Consultants, Inc. is a geotechnical, water resources engineering, and environmental consulting firm with 37 offices and a collective staff of over 725 employees located throughout the United States. For more than 40 years, GEI has provided its clients with a wide range of geotechnical and civil engineering services including planning, feasibility study investigations, design, and construction management services for water resources, flood control and multi-objective projects.

GEI has professional engineers, scientists, and practitioners in Northern California who focus on flood management planning and engineering. Previous to joining GEI, several key leaders of the firm have held chief and deputy director positions at DWR in the areas of dam safety, flood management, and local assistance. Two members of the firm serve on the National Committee on Levee Safety. Since 2008, GEI's flood management planners have been the prime consultants in developing and implementing the Flood Emergency Response and FloodSAFE California programs at the local and state-wide levels. GEI has also been a key consultant to DWR in connection with advancing DWR's Urban and Non-Urban Levee Evaluation (ULE/NULE) programs for significant portions of the Sacramento River Basin.

GEI will provide the team's project manager, task order leaders, technical experts, and support staff. **Jeffrey E. Twitchell, PE** will serve as the Team's Project Manager and the Team's lead for structural solutions. **Naser Bateni, PE**, a senior flood management planner, will serve as principal-in-charge. **Bill Bennett, PE, GE**, who worked with Jeffrey Twitchell in developing the current Delta Flood Emergency Preparedness, Response and Recovery Plan for DWR, will serve as QA/QC reviewer of key feasibility study deliverables to Sacramento County. **Graham Bradner, PG, CEG, CHg, PMP** will lead all geotechnical evaluations for the SPFC levees and non-project levees for each of the Delta Legacy communities with support from Blackburn Consultants and John Raney. **Chris Ferrari, PE**, with his extensive knowledge of the DWR CVFED and CVHS programs and recent levee breach mapping for the County's RDs, inclusive of the Delta Legacy Communities, will lead the hydraulic and hydrologic investigations and interior drainage investigations for the

each of the feasibility studies, supported by Don Trieu and others at MBK Engineers. **Cindy Davis** will lead GEI's environmental group of two dozen staff at GEI's Rancho Cordova office for the assessment of environmental constraints and opportunities, and **Vance Howard** will investigate and identify multi-benefit, eco-system opportunities for each of the County's Delta Legacy Communities. **Leo Winternitz**, formerly with the Nature Conservancy and the Sacramento Water Forum will lead the applicable stakeholder and public outreach efforts with the County, including support from Janine Foster and RD representatives.

In addition to the core leadership, GEI will provide expert engineering and planning staff for the Team in disciplines such as cost estimates associated with structural and non-structural solutions, development and screening of alternatives, prioritization and phasing of selected solutions, identification of financial constraints and development of financial plans, and preparation of the draft and final feasibility studies. GEI will also provide support staff for CADD, GIS, Quality Assurance/Quality Control, as well as report production/editing of public documents and "favorable public transparency and branding" of the County's Delta Legacy Community feasibility studies.

GEI Office Locations:

- 2868 Prospect Park Drive, Suite 400, Rancho Cordova, CA 95670, 916.631.4500
- 180 Grand Avenue, Suite 1410, Oakland, CA 94612, 510.350.2900



Based in Sacramento, MBK Engineers has provided clients with complete engineering and consulting services in the areas of flood control, water rights, water resource planning, and environmental documentation since 1967. MBK Engineers represents several RDs throughout the Delta, including the RDs providing flood protection to the Delta Legacy Communities of Courtland, Walnut Gove (West) and Ryde. In addition to representing numerous RDs MBK Engineers is also assisting regional flood control agencies such as SAFCA, WSAFCA, Three River Levee Authority (TRLIA), the City of Woodland, and Yolo County with flood risk reduction programs and projects. MBK also teamed with HDR during the development of the Lower Sacramento/North Delta RFMP. MBK is owned by its employees who have a personal connection to their clients and the communities in which they operate.

Key team members from MBK Engineers include: **Gilbert Cosio, PE**, who is the District Engineer for several RDs, including where Courtland, Walnut Grove (West) and Ryde are located, and as such, Gilbert will be the GEI Team lead for these noted Delta Legacy Communities. **Ric Reinhardt, PE**, a former Corps of Engineers project planner, who has become one of the region's leading flood control project managers, and leading manager of the Agricultural Floodplain Ordinance Task Force (AFOTF), will be the GEI Team for non-structural solutions that will identify changes to the NFIP that may include reduction of flood insurance costs that may benefit the Delta Legacy Communities and adjoining agricultural communities. Also with MBK is **Don Trieu, PE**, who has expertise associated with hydrologic and hydraulic evaluations and floodplain mapping of the areas throughout the north Delta and easterly within the communities of Elk Grove and Point Pleasant. Don Trieu will provide assistance and valued input to Chris Ferrari and others for the applicable hydrologic and hydraulic investigations associated with the feasibility studies. **Michael Moncrief, PE**, and **Larry Dacus, PE**, formerly with the Corps of Engineers, will both provide assistance to the Team developing, screening, and prioritizing alternatives for the Delta Legacy Communities, particularly for Courtland, Walnut Grove (West), and Ryde.



With offices in Stockton and West Sacramento, KSN has provided clients with engineering consulting services particularly in the areas of

flood control and planning. KSN represents several RDs throughout the Delta, including the RD providing flood protection to the portion of the Delta Legacy Community of Walnut Grove (East) located on Tyler Island (namely RD 563) and the RDs located south and easterly of Isleton and Brannan Andrus Island. **Chris Neudeck, PE**, with support from **Bill Darsie**, and **Erik Almaas, PE**, will provide valued input and direction on potential alternatives and solutions to the Tyler Island (RD 563) portion of Walnut Grove (East) and evaluation of alternatives for the Delta legacy Community of Isleton.



With its single office located in Walnut Grove, DCC Engineers provides engineering services to RD 554 (Walnut Grove (East), and RDs 556 ,407, 317, and the Brannan Andrus Levee District that collectively offer flood protection to the Delta Legacy Community of Isleton. As District Engineer for Walnut Grove (East) and Isleton, **Gil Labrie, AIA**, architect, with support from **Emily Pappalardo**, **Ben Neely, PE**, and **Javier Medina** will provide valued input and direction on potential alternatives and solutions to the RD 554 portion of Walnut Grove (East) and alternatives for the Delta legacy Community of Isleton.



Foster Morrison Consulting, Ltd. (Foster Morrison) is an emergency management consulting firm with staff expertise and experience encompassing all aspects of FEMA programs – from disaster preparedness to mitigation and grant applications to post-disaster response and recovery. Specializing in Hazard Mitigation and CRS Planning, Foster Morrison develops hazard mitigation plans and plan updates that meet the requirements of the Disaster Mitigation Act (DMA) of 2000 as well as the planning requirements of the Flood Mitigation Assistance (FMA) program and the National Flood Insurance Program’s (NFIP) Community Rating System (CRS). Their focus is developing FEMA-approved, customized mitigation plans for communities that enable participating jurisdictions to be eligible for FEMA mitigation funds, and include comprehensive mitigation and risk reduction strategies designed to reduce hazard-related losses, enhance community capabilities, and make a community better able to respond and recover when disasters occur. Foster Morrison staff have been working together as a planning team for the last eight years developing hazard mitigation plans for clients around the country, including **current work with Sacramento County in updating Local Hazard Mitigation Plans (LHMPs) for the RDs in the County where Delta Legacy Communities are located.** Key geographic areas of expertise include California, Colorado, and Mississippi.

The risk assessment is the fundamental basis of mitigation planning and establishes the foundation for the development and selection of risk-based mitigation strategies. Foster Morrison staff experience with risk assessments includes:

Foster Morris staff have conducted flood risk assessments as part of state, and local hazard mitigation planning. Their staff experience with risk assessments includes:

- Creating and analyzing GIS-based risk assessments for floods, and other natural and man-made hazards
- Developing vulnerability analysis methods using GIS: centroid method, proportionate division, Microsoft Access queries, raster analysis, and annualized loss calculations to support detailed damage/loss estimates by jurisdiction
- Experience with Level 1 and 2 **Hazus** analysis that are very applicable to the Sacramento County Delta Legacy Communities. Hazus is tool designed by FEMA to produce loss estimates for use by federal, state, and local governments in planning for risk mitigation, emergency preparedness, response, and recovery. Hazus utilizes a model to analyze risk associated with certain natural

hazards such as floods, earthquake and hurricanes. For floods, Hazus uses a GIS platform to map and display flood hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Foster Morrison staff have also used Hazus to estimate the impacts of floods on populations, critical facilities, and infrastructure located in or near flood zones.

Foster Morrison also offers services related to stakeholder outreach and community engagement. Foster Morrison’s approach is to leverage and build upon existing community outreach and public involvement methods. Effective stakeholder engagement activities include web-based mechanisms, such as the development of webpages, surveys and the use of social media, but these are not a substitute for face to face meetings held throughout key project phases and decision points. Foster Morrison has already been actively engaged in the Sacramento County and Delta community through their ongoing work developing the 2016 Sacramento County LHMP Update that included participation by Delta communities and multiple RDs. This recent Delta area experience, including stakeholder and community engagement meetings, will bring this project local knowledge, continuity, and established relationships. Understanding the issues and long-term desires of the local community will assist the project team in developing reasonable risk reduction alternatives that consider local community goals and that are achievable and acceptable to all agency and community stakeholders.

Jeanine Foster, JD, at Foster Morrison will provide valued assistance to Leo Winternitz and others at GEI with stakeholder outreach and community engagement, particularly as a continuation and extension of her current activities for the 2016 Sacramento County LHMP update for the County’s Delta Legacy Communities. **Jeanine Foster, JD**, with assistance **Chris Morrison, CFM**, will also work with GEI and the County in utilizing Hazus to identify the potential flood hazard damages for each of the Delta Legacy Communities; and **Alejandro Gutierrez** will provide assistance in conducting the GIS-based analyses, including Hazus.

 HDR, founded in 1917, with more than 500 staff in Northern California, has become a leader in flood risk reduction design and planning projects related to levee improvements and floodplain management. HDR offers a full range of services, including levee inspection, geotechnical investigations and analyses, the design of levee rehabilitation measures, engineering during construction, balancing environmental priorities with public safety, and emergency flood fighting support during high water events. HDR offers Sacramento County key staff, such as **Tom Chapman, PE**, former Commander for the Sacramento District of USACE; **Rod Mayer, PE**, member of the National Committee on Levee Safety and former FloodSAFE Executive for DWR and an active member of the Agricultural Floodplain Ordinance Task Force (AFOTF) tasked with identifying changes in the NFIP that may be beneficial to the Delta Legacy Communities; and **Jafar Faghieh, PE**, a senior flood control planner who locally has assisted WSAFCA with the Lower Sacramento/North Delta RFMP, and DWR with advancing the Sacramento River Basinwide Feasibility Study associated with the 2017 CVFPP. These key individuals will add great value for Sacramento County to find creative solutions that can be agreed upon by DWR, CVFPB, USACE, and FEMA. Additionally, as part of the Lower Sacramento/Delta North RFMP team HDR has a good understanding of the flood issues in Sacramento County and is ready to work as part of the dedicated GEI team committed to put Sacramento County communities first in line for the next round of implementation funding.



Founded in 1998, Blackburn Consulting (BCI) provides geotechnical/environmental consulting, materials testing, and construction management services from offices in West Sacramento, Auburn, and Fresno, California. BCI concentrates on public sector projects including levees and dams. BCI’s unique commitment to public sector projects results in an

up-to-date knowledge of state and local agency requirements, which leads to efficient analysis, less review time, and practical solutions. BCI has a staff of over 45 including civil engineers, geotechnical engineers, geologists, engineering geologists, construction managers, inspectors, material testers, field and laboratory technicians, drafters, and support staff.

Robert Lokteff, CE, GE, a senior project manager and principal geotechnical engineer with BCI will provide assistance to Graham Bradner of GEI in conducting levee evaluations and also coordinate with **John Raney, PE, GE** of Raney and Associates and Gil Labrie in reviewing and advancing ongoing levee evaluations associated the perimeter levees of RD 554 - Walnut Grove (East) and Isleton.

2.2 STAFFING ORGANIZATION AND QUALIFICATIONS

On the following page we have provided a discipline matrix (**Table 1**) of our entire team of 30+ professionals that will be assigned to the Delta Legacy Communities Flood Risk Feasibility Studies, inclusive of their years of experience, percent availability for the project, and their disciplines of expertise. Their specific roles for the Flood Risk Reduction Feasibility Studies are also identified in our Team Organizational Chart (**Figure 1**), following Table 1. In addition, the qualifications, accomplishments, and roles of our 10 key team leaders are briefly highlighted below in bio summaries. Full page resumes of our entire professional support staff, inclusive of all subconsultants are included in **Section 5 – Resumes of the GEI Project Team**.

2.3 KEY TEAM BIO SUMMARIES



Jeffrey E Twitchell, PE, a senior engineering consultant with GEI, will serve as project manager for the Delta Legacy Communities Flood Risk Reduction Feasibility Studies. Mr. Twitchell has been responsible for numerous feasibility projects involving the rehabilitation or replacement of flood control infrastructure, particularly projects seeking more sustainable operations and ecosystem restoration opportunities. He has directed conceptual feasibility and planning studies, engineering design plans and construction implementation plans. He has had exemplarily experience in the leadership of multidisciplinary teams of engineers, scientists, resource permitting specialists, and has a strong technical background with emphasis on solving problems and reducing costs. Mr. Twitchell successfully completed the Star Bend Levee Setback Levee in Sutter County, a multiple objective, integrated flood management project that significantly reduced flood risk and created sustainable floodplain ecosystem benefits. This project is located in the 15-mile Feather River Corridor Management Area that is a model for of the Conservation Strategy of the Central Valley Flood Protection Plan for improving flood protection while enhancing ecosystem values of the natural floodplains of the Central Valley.

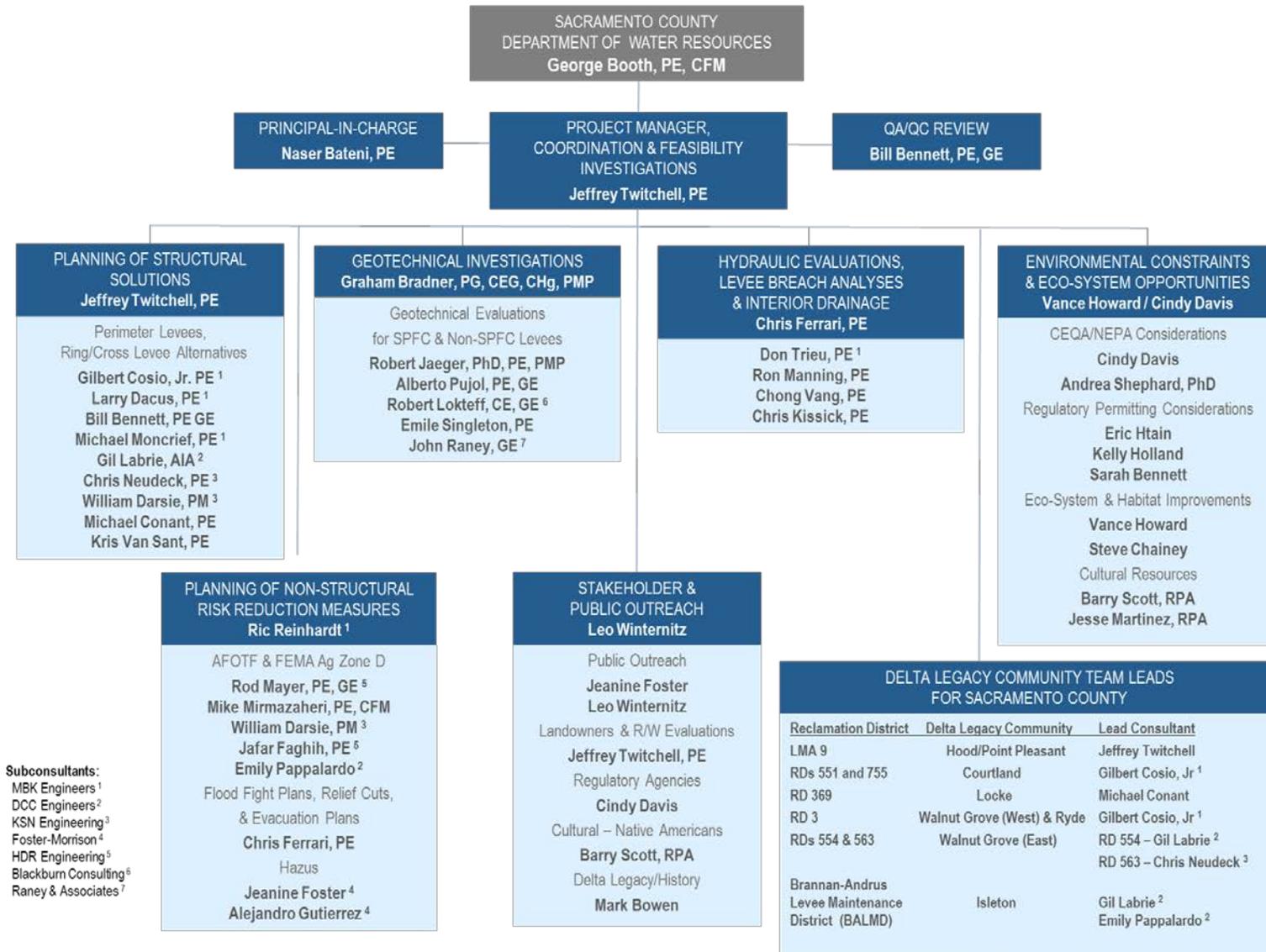


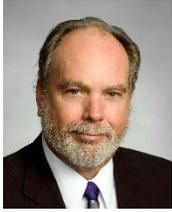
Naser Batani, PE, a senior principal engineering consultant and Vice-President who directs the planning and water management group in GEI's west region will serve as the principal-in-charge for the Delta Legacy Communities Flood Risk Reduction Feasibility Studies. With his extensive experience in water resources and flood control planning (including over 25 years with DWR) Mr. Batani will provide valuable insight and direction to the feasibility study particularly how it relates the DWR Small Communities Flood Risk Reduction Program (SCFRRP), Regional Flood Management Plans (RFMPs) and the larger 2017 CVFPP update. Mr. Batani is a strategic policy advisor to DWR on various flood risk reduction programs and also played a significant role in assisting DWR with the development of DWR's Guidance for Development of a State-led Feasibility Study, inclusive of its five-step planning process.

TABLE 1. PROJECT TEAM DISCIPLINE MATRIX

GEI Team Personnel for Sacramento County Delta Legacy Communities Flood Risk Reduction Feasibility Studies	Years of Experience	% Availability for Sacramento County Feasibility Studies	Flood Control Feasibility Studies	Multiple Objective Projects, Planning	Geotechnical Evaluations	Hydrologic & Hydraulic Modeling	Environmental Constraint/ Opportunities & ESA	Eco-Restoration/Habitat Enhancement	Cultural Resources	Stakeholder Outreach	Non-Structural Flood Control Measures	Hazus
Principal-in-Charge												
Naser Baleni, PE	38	15	✓	✓		✓				✓	✓	
Project Management, Coordination & Feasibility Investigations												
Jeffrey Twitchell, PE	36	60	✓	✓		✓		✓		✓	✓	✓
QA/QC Review												
Bill Bennett, PE, GE	41	15	✓	✓	✓					✓		
Planning of Structural Solutions												
Gilbert Cosio, Jr., PE	28	20	✓	✓		✓		✓		✓	✓	
Larry Dacus, PE	15	25	✓	✓		✓				✓	✓	
Michael Moncrief, PE	11	20	✓	✓								
Gil Labrie, AIA	17	20	✓	✓						✓	✓	
Chris Neudeck, PE	32	10	✓	✓						✓	✓	
Michael Conant, PE	13	35	✓	✓						✓	✓	
Kris Van Sant, PE	4	25	✓	✓	✓							
Geotechnical Investigations												
Graham Bradner, PG, CEG, CHg, PMP	25	25	✓	✓	✓					✓	✓	
Robert Jaeger, PhD, PE, PMP	6	25	✓	✓	✓							
Alberto Pujol, PE, GE	36	15	✓	✓	✓					✓		
Robert Lokleff, CE, GE	26	20	✓	✓	✓					✓	✓	
Emilie Singleton, PE	8	25	✓	✓	✓							
John Raney, GE	40	15	✓	✓	✓							
Hydraulic Evaluations, Levee Breach Analyses & Interior Drainage												
Chris Ferrari, PE	26	25	✓	✓		✓		✓		✓	✓	
Don Trieu, PE		20	✓	✓		✓				✓	✓	
Ron Manning, PE	8	20	✓	✓		✓					✓	
Chong Vang, PE	10	20	✓	✓		✓					✓	
Chris Kissick, PE			✓	✓		✓					✓	✓
Environmental Constraints & Eco-System Opportunities												
Vance Howard	13	30	✓	✓		✓	✓	✓		✓	✓	
Cindy Davis			✓	✓			✓	✓	✓	✓		
Andrea Shephard, PhD	22	20	✓	✓			✓	✓	✓	✓		
Eric Htain	16	20	✓	✓			✓	✓		✓		
Kelly Holland	20	20	✓	✓			✓	✓		✓		
Sarah Bennett	10	25	✓	✓			✓	✓		✓		
Steve Chainey			✓	✓			✓	✓		✓		
Barry Scott, RPA	30	20	✓	✓			✓	✓	✓	✓		
Jesse Martínez, RPA	18	15	✓	✓			✓	✓	✓	✓		
Planning of Non-Structural Risk Reduction Measures												
Ric Reinhardt	20	20	✓	✓		✓				✓	✓	
Rod Mayer, PE, GE	38	20	✓	✓		✓				✓	✓	
Mike Mirmazaheri, PE, CFM	35	25	✓	✓						✓	✓	
Jafar Faghii, PE	16	20	✓	✓						✓	✓	
Emily Pappalardo	10	25	✓	✓						✓	✓	
Jeanine Foster	28	20	✓							✓	✓	✓
Alejandro Gutierrez	15	20	✓								✓	✓
Stakeholder & Public Outreach												
Leo Winternitz	38	20	✓	✓			✓	✓		✓	✓	
Mark Bowen	20	15	✓	✓			✓		✓	✓		

FIGURE 1. TEAM ORGANIZATION CHART





Bill Bennett, PE, GE, a senior engineering consultant and Vice President with GEI, will serve as the QA/QC manager for the Delta Legacy Communities Flood Risk Reduction Feasibility Studies. Mr. Bennett has spent four decades in water resource planning and dam engineering for public and private organizations and has served as project manager on various flood emergency response activities and other flood management programs and projects. He has extensive experience in collaborative planning and guiding stakeholder groups to decisions on shared resources. Additionally, Mr. Bennett has substantial dam and levee safety work experience to offer the project team. Mr. Bennett has been very active in assisting DWR with their Flood Emergency Response Program, and has worked with Mr. Twitchell on DWR's Delta Flood Emergency and Recovery Plan. His experience will be valuable in connection with the feasibility study investigation team and identification of both structural and non-structural flood risk reduction measures for the Sacramento County Delta Legacy Communities.



Graham Bradner, PG, CEG, Chg, PMP, is a professional geologist and consulting geotechnical engineer with GEI and will serve as the Geotechnical investigation lead for the Delta Legacy Communities Flood Risk Reduction Feasibility Studies. His background includes expertise in subsurface exploration, subsurface and aquifer characterization, relief well and extraction well design, and geotechnical modeling. Mr. Bradner has extensive knowledge of geotechnical drilling techniques, and is also experienced with geophysical data interpretation, and geomorphologic and geologic interpretation of subsurface conditions, which he routinely applies to levee remediation projects.

Mr. Bradner and his support staff has assisted DWR in connection with conducting several hundred miles of geotechnical investigations and levee evaluations for DWR's Non-Urban Levee Evaluation (NULE) and Urban Levee Evaluations. Mr. Bradner has also worked with Mr. Twitchell in supporting local flood control entities, namely in Alameda County, Marin County, Kings River, Ventura County and others in securing in excess of \$30M grant funds and conducting detailed geotechnical investigations for several miles of levees under the state-wide DWR Local Levee Assistance Program.



Chris Ferrari, PE, a senior hydrologic and hydraulic consulting engineering with GEI, will serve as the technical lead for all the instream hydrologic and hydraulic evaluations and interior drainage evaluations utilizing the latest hydraulic modeling tools and methodologies available via the DWR CVHS and CVFED models. Chris Ferrari has 25 years of comprehensive experience in both the public and private sectors conducting hydrologic and hydraulic investigations, most recently for the City/County of Sacramento. Prior to joining GEI two years ago, Mr. Ferrari was a project manager at Wood Rodgers under contract with DWR developing the supporting terrain and hydraulic CVFED models. Since joining GEI, Mr. Ferrari has continued to support DWR in connection with advancing the CVFED models and conducting detailed hydraulic tradeoff analyses as part of DWR's five-step feasibility investigations for the Sacramento Basinwide Feasibility Study in support of the 2017 CVFPP. Mr. Ferrari and his team of hydraulic and hydrologic experts have direct access and input to the CVFED CVHS models that are currently in draft form but accessible for the project evaluations. Mr. Ferrari's experience includes storm water master planning, detailed drainage evaluations for highways, channel evaluations and pump designs, bridges and culvert evaluations including scour, and design of underground drainage systems for several master plan developments.



Vance Howard, a senior restoration ecologist with GEI will serve as the environmental constraints and opportunities lead for the project. Mr. Howard is a project manager who specializes in planning, design, and implementation of restoration and mitigation projects in riparian, wetland, grassland, oak woodland, and forested habitats, including project

adjoin flood control levees. He specializes in projects that integrate ecosystem restoration and natural resource management with flood protection, recreation, and urban planning. Mr. Howard has worked on numerous projects with DWR, SAFCA, and California State Parks, including past and current projects with GEI's engineers. He has prepared habitat conservation and mitigation strategies, construction plans and specifications, watershed management plans, CDFW wildlife area land management plans, and long term management plans for wetland, woodland, and grassland mitigation projects, environmental constraints reports, and EIR analysis for habitat restoration projects. He also has on-the-ground experience implementing habitat restoration, streambed realignment, biotechnical erosion control, and landform restoration projects in California. Mr. Howard is a strategic planning process leader, skilled meeting facilitator and graphic recorder, and habitat restoration construction manager that will be of significant value to the Delta Legacy Communities Flood Risk Reduction Feasibility Studies.



Cindy Davis, a senior regulatory specialist and project manager/director with over 21 years of experience leading natural resources projects will serve as the environmental constraints lead for the project. She has a long and successful track record of securing permits and other regulatory approvals for local jurisdictions and state agencies. Her project management experience includes directing projects pertaining to restoration; flood control and water storage; infrastructure; government buildings; and transportation. She is proficient in ESA and CESA compliance with considerable experience in Section 7

consultations. Ms. Davis has extensive experience in USACE wetland regulations and the permitting process pursuant to Section 404 and 401 of CWA. She has developed positive and productive relationships with the representatives of regulatory agencies (e.g., USACE, CDFW, USFWS, and RWQCB) to facilitate permit acquisition. She has experience conducting numerous field surveys and assessing impacts on biological resources for CEQA/NEPA documents and statutory compliance. Her experience includes resource inventories, wetland delineations, preconstruction surveys, habitat evaluations, and baseline



Leo Winternitz, a senior professional scientist with GEI, will be the stakeholder and public outreach lead for the Delta Legacy Communities Flood Risk Reduction Feasibility Studies. Mr. Winternitz most recently worked for the Nature Conservancy as its Delta Program Director and Senior Advisor and served as the Deputy Director for the CALFED Bay-Delta Program, which focuses on water and environmental management activities in the Sacramento-San Joaquin Bay-Delta Estuary. He also served as Executive Director for the Sacramento Water Forum, a diverse group of 40 stakeholder

organizations representing local businesses, agriculture, citizens groups, environmentalists, and water managers who have collaboratively negotiated a regional water supply and environmental protection agreement through the year 2030. He currently serves as a Director and is a past President of the American River Parkway Foundation, an organization that promotes environmental health and stewardship of the 23-mile long American River Parkway. Mr. Winternitz is also currently serving as a co-chair to a court mandated order to develop a collaborative science adaptive management program that addresses specific issues related to fish entrainment and survival at the South Delta water export facilities.



Mike Mirmazaheri, PE, CFM, a senior engineering consultant with GEI will assist Ric Reinhardt of MBK Engineers and Rod Mayer of HDR in developing non-structural risk reduction measures for the Delta Legacy Communities Flood Risk Reduction Feasibility Studies. Mr. Mirmazaheri has more than three decades of engineering and project management experience focused on flood control and water resources planning and management with over 20 years of flood control experience working for DWR. He is well versed in the latest FEMA regulations and its Community Rating System (CRS). He has recently been working with small communities in the Sacramento-San Joaquin Delta in reducing the risks to flooding by developing flood emergency preparedness, response and recovery plans for communities located on leveed islands within Sacramento County. His areas of expertise also include strategic planning, policy guidance, and preparation of planning documents, flood emergency and flood management reports.



Ric Reinhardt, PE, a principal engineer at MBK Engineers will be the lead planner of the non-structural risk reduction measures for the Delta Legacy Communities Flood Risk Reduction Feasibility Studies. Mr. Reinhardt has over 22 years of engineering and project management experience focused on flood risk reduction projects in Northern California, most recently for SAFCA, WSAFCA, TRLIA, and the Cities of Woodland and Wheatland. Mr. Reinhardt was the program manager for the Lower Sacramento/North Delta TRLIA RFMP and is currently active with implementing flood risk reduction elements in the Yolo Bypass. Mr. Reinhardt is also a leading member of the Agricultural Floodplain Ordinance Task Force (AFOTF) charged with identifying changes to the NFIP to benefit agricultural communities such as the Delta Legacy Communities. The AFOTF is attempting to develop reductions to flood insurance costs and increase the ability to cost effectively construct, or improve, agricultural structures in the residual agricultural floodplains, particularly for communities in the Sacramento Valley and north Delta.

3 PROJECT SCOPING, SCHEDULING, AND COST ESTIMATES

Included below in Section 3.1 is the GEI Team's scope of work identified within Sacramento County's grant applications for all six feasibility studies associated with the Delta Legacy Communities located in Sacramento. The GEI Team does not propose any substantial changes to the scopes of work outlined in the County's grant applications and simply offers an added discussion below on how the GEI Team proposes to conduct key elements of the studies for as many communities that are awarded grant funds by DWR.

Included in Section 3.2 is a project schedule (nearly identical to the schedule identified in the County's grant applications) that is universal for any one or all six of the Sacramento County Delta Legacy Community Feasibility Studies. It is estimated that it will take approximately 12 months to complete all of the studies upon Sacramento County entering into grant reimbursement agreements with DWR.

Included in Section 3.3 is an anticipated budget for conducting each individual small community feasibility study (not to exceed \$500,000.00 per community) and a total overall budget for the six cumulative studies in the event all six communities are awarded DWR SCFRRP grants.

3.1 PROJECT SCOPE AND TASKS

Members of the GEI Team provided assistance to Sacramento County in developing draft scopes and budgets envisioned for each of the six Delta Legacy Community SCFRRP grant applications recently submitted to DWR. It is envisioned that these scopes of work can serve as the basis of Sacramento County opening discussions with DWR prior to entering into formal grant funding reimbursement agreements for each of the six communities. Ultimately the scopes of work will be refined as suggested in Tasks 1.1 and 1.2 of the grant applications, with the final scopes serving as the basis for work to be conducted by Sacramento County allowing for full reimbursement of all work performed.

Without running the risk of being redundant of the identified scopes of work included in the County's draft applications, this subsection is intended to provide Sacramento County with GEI Team's approach for conducting some key tasks of the feasibility studies requested by Sacramento County, the Delta Legacy Communities, and the supporting Reclamation Districts (RDs).

3.1.1 Task 1: Project Management, Coordination, and Outreach

As indicated in Subtasks 1.1 and 1.2 of the County's grant applications, the GEI Team proposes to collectively meet with Sacramento County and DWR to refine the limits of the project areas and the detailed scopes of work identified for each of the Delta Legacy Communities considered for DWR grant funding. The GEI Team also believes that it is equally important to reach out and receive input and review from the RDs representing each of the communities early in the study process before or during Task 5 which includes formulation of alternatives. This would take place to ensure that the scope of work is representative of the communities and the RDs' specific study interests while staying consistent with the scope of the DWR SCFRRP grant funding program to ensure all work is 100 percent reimbursable by DWR. Consistent with the intentions of Subtask 1.4 – Stakeholder Outreach and Coordination, the GEI Team believes the communities and their respective RDs should play a role in the final scoping to ensure early buy-in and consensus of the feasibility study objectives, goals, and eventual identification and implementation of preferred alternatives. As indicated in the project schedule, GEI envisions one stakeholder meeting at the early onset of the study to ensure there is some consensus of the study limits and scope for each separate feasibility study.

Consistent with the scope of work identified in the County's grant applications, the GEI Team concurs with the need to also conduct public workshops with the stakeholders during the formulation/selection of project

alternatives and to solicit comments on the draft feasibility studies prior to finalization. The GEI Team recognizes that each community will have its own unique set of structural and non-structural alternatives, but will look to offer some economies of scale to potentially consolidate the outreach meetings with two or more communities at once, or have consecutive meetings at common venues that are convenient for two or more communities.

The GEI Team, inclusive of MBK, DCC, KSN, and Foster Morrison, proposes to build upon its current working relationships associated with the County's current efforts developing Flood Emergency Safety Plans (ESPs) for each of the RDs, inclusive of the Delta Legacy Communities in each of the RDs. The GEI Team proposes to utilize the RDs' local representatives, including the RDs' board members and the RDs' district engineers who contain a lot of the institutional knowledge of the performance of the flood control system(s). GEI will also leverage its strong working relationships with key stakeholder agencies in the Delta, namely the Delta Protection Commission (DPC), the Delta Conservancy, the Delta Stewardship Council (DSC), the CVFPB, and CDFW.

GEI, with its extensive experience in successfully assisting other local flood control agencies with DWR reimbursement programs, can also provide significant assistance to Sacramento County in filing comprehensive progress reports to DWR to ensure timely reimbursements from DWR.

3.1.2 Task 2: Identification of Problems and Opportunities, including Multi-Benefits

The GEI Team will work with the County and RDs in identifying the most vulnerable areas of the perimeter levee system(s) that pose the greatest risk to the Delta Legacy Communities. Some of these areas have already been identified in the DWR Non-Urban Levee Evaluation (NULE) investigations and have been identified as serious or critical sites susceptible to erosion, stability or seepage failures. GEI's geotechnical team will attempt to determine the likelihood of failure (low, moderate, or high) and the cumulative probability of failure at the 100-year Water Surface Elevation (WSE) for the most vulnerable locations as well as for the locations directly adjacent to the small communities that would have the greatest flooding consequences. These initial analyses would provide input to the portions of the perimeter levee systems that would likely require the most attention and potential structural remediation/improvements to reduce flood risks. These same areas may also require a closer review relative to the biological and environmental constraints and opportunities that may exist along the most critical sections of the perimeter levee systems.

GEI's environmental team would conduct biological reconnaissance surveys and cultural resources record searches to identify where key constraints and/or opportunities may exist within or adjacent to the Delta Legacy Communities, including multi-benefits and eco-system restoration opportunities that may lead to additional cost-sharing partners. GEI's environmental team can offer some scales of economies to the County if it can collectively conduct the surveys and record searches for as many as six Delta Legacy Communities at once in the early stages of the feasibility studies.

3.1.3 Task 3: Identify Greatest Sources, Extent and Timing of Flooding

As an extension of the current levee breach/inundation analyses being conducted by GEI and MBK for the ESPs for each of the Delta RDs in Sacramento County, the GEI Team proposes to conduct levee breach analyses for the non-project levee/embankment systems along the east side of the Delta, namely for the select Delta Legacy Communities of Hood, Courtland, Locke and Walnut Grove (East). These breach analyses would determine the timing and depth of flooding from levee/embankment breaches occurring from the east (Stone Lakes, Snodgrass Slough, and the Mokelumne/Cosumnes Rivers). These sources of flooding are significant but secondary to the primary sources of flooding along the main stem and distributaries of

Sacramento River in the North Delta. The GEI team would conduct these supplemental breach analyses utilizing the same tools and methodology adopted for the County's ESPs. The ESPs could also be updated with the supplemental information. The evaluations would further assist with determining and quantifying the current flood risks and damages proposed in Task 4 below.

3.1.4 Task4: Quantify Current Flood Risks and Damages

The GET Team will use the best available data and tools from DWR (including CVFED, CVHS, NULE investigations) and from the RDs (including the County's ESP technical information) to determine the current level of flood protection offered by each of the levee segments, and the probability of levee failure at the 100-year Water Surface Elevation (WSE). This information, combined with the time and duration of potential flood depths, will be input by the GEI Team, namely Foster Morrison, into the Hazus flood damage assessment tool to quantify flood damages for each community that could occur under current conditions. The baseline conditions and potential damages could then be used to determine the measurable reduction in flood damages under future conditions with incremental improvements to the flood protection system(s) protecting each of the small communities. As noted in the County's scope of work, the comparison of existing flood damage risks to the potential reduction of flood damage risks would assist the County and stakeholders in the comparison and screening of project alternatives for implementation.

3.1.5 Task 5: Formulation of Structural and Non-Structural Alternatives

The formulation of alternatives (structural and non-structural) needs to be responsive to the goals and objectives of the feasibility studies established in Task 1 with the County and DWR. The GEI Team proposes to reconfirm these same goals and objectives with the stakeholders during the formulation process as some of the alternatives identified in the Lower Sacramento/North Delta RFMP and the 2012 CVFPP have not been well received, inclusive of ring levees and non-structural solutions of elevating structures. The GEI Team proposes to have workshops with the small community representatives to identify all conceivable structural alternatives for reducing flood risks that may approach or lead to securing a 100-year level of flood protection. Non-structural alternatives will be develop for all communities, inclusive of those that may achieve a 100-year level of flood protection.

The Delta Legacy Communities located within the larger agricultural RDs containing tens of miles of perimeter levees, such as Courtland in RDs 551 and 755, Walnut Grove (West) and Ryde in RD 3, and Isleton on the Brannan-Andrus Tract, will be severely challenged to obtain a 100-year level of protection if several miles of levee systems require remediation improvements and/or ring levee systems are developed. It is highly unlikely that perimeter levee solutions will be cost effective, thus the GEI Team proposes to limit geotechnical evaluations on the larger perimeter levee systems to where there are known serious or critical conditions exist posing the greatest risks to flooding the small communities. The DWR SCFRRP has limited funds to conduct geotechnical evaluations and GEI proposes for the communities in the larger RD basins to investigate only the segments of levee/embankments that are known to be the most susceptible to failure and the levee segments directly fronting the small communities. By evaluating these selected segments of levees, the County and the RDs may be able to quickly assess, prioritize and develop implementable alternatives to remediate the levee segments that pose the greatest risk to flooding the small communities.

In contrast, where the small community of Locke and significant portions Walnut Grove (East) are encompassed by relatively small perimeter levee systems totaling four miles or less, it may be advisable to have in-kind NULE Phase 2 evaluations conducted wherever there are present geotechnical gaps so these same communities will have a greater assessment and accompanying cost estimates to determine how much remediation is needed in each levee segment to obtain a 100-year level of flood protection. These

geotechnical evaluations will help place these smaller communities and RDs on a shorter list for subsequent implementation funding if detailed engineering for the entire smaller perimeter levee systems could commence immediately upon completion of the feasibility study.

Although the geotechnical evaluations noted above could be one of the more costly components of formulating and evaluating alternatives, they will provide new data and information that is not currently available to help formulate, advance and select structural alternatives that may substantially reduce the risk to flooding.

The approach to formulating non-structural alternatives will be relative consistent for each of the communities, allowing the GEI Team to offer some scales of economy when formulating solutions for as many as six small communities. A greater emphasis of non-structural solutions will be placed upon those communities that may have larger challenges in achieving a 100-year level of flood protection. The non-structural alternatives identified in the County's draft applications and RFP include improving FEMA mapping procedures, such as Zone D, and developing solutions in response to the rising NFIP flood insurance rates. The GEI Team, containing leaders of the Agricultural Floodplain Ordinance Task Force (AFOTF), namely Ric Reinhardt from MBK Engineers and Rod Mayer from HDR, will provide Sacramento County and its Delta Legacy Communities with the current insights to the changes in the NFIP to potentially reduce flood insurance costs and increase the ability to construct or improve agricultural structures in the floodplain. The GEI Team also sees value in identifying potential downstream relief cuts in the perimeter levee systems in response to potential levee breaches if the relief cuts can also lower the effective FEMA Base Flood Elevations (BFE).

The GEI Team's approach to identifying as many funding sources as reasonably possible includes identification and integration of multi-objective features. Members of the GEI Team have helped the County identify a number of potential multiple objective features in Section 5.1 of all the County's grant applications, with the Isleton grant application being an exception. In addition to identifying local multi-objectives to attract regional funding sources, the GEI Team also suggests the County follow the latest developments with the Delta Protection Commission (DPC) Subcommittee on the Delta Flood Risk Management Assessment District Feasibility Study. This current study that suggests statewide interests such as Delta water exporters, linear utilities, and Caltrans (for State Scenic Route 160) may also be considered as beneficiaries of flood risk reduction improvements and could possibly participate as a cost-share partner. This is consistent with preserving the "Delta as a Place" that has statewide significance.

3.1.6 Tasks 6 and 7: Evaluation and Selection of Structural and Non-Structural Alternatives, Including Multiple Objectives/Benefits

Section 3.2 of this proposal package includes a project schedule that indicates the GEI Team's concurrence with the County's grant application packages to have stakeholder and public outreach meetings during the formulation and selection process of project alternatives. This is necessary to ensure full public engagement and eventual support for the final alternative solutions selected for implementation.

Consistent with the County's scope of work the GEI Team's approach to evaluating and selecting structural alternatives will be to evaluate them on equal footing to determine which alternative(s) are most cost-effective for reducing flood risks. Each alternative will also be evaluated to determine which have the greatest opportunities for achieving multi-benefits, and/or ecosystem restoration enhancements to potentially reduce the local cost-share requirements. Each alternative will also be evaluated in terms of securing subsequent CEQA and regulatory permit approvals which can be problematic in the North Delta with the presence and

potential disturbance of sensitive species and associated habitats. The environmental biological reconnaissance surveys and cultural resources record searches conducted in Task 2 will also serve as environmental constraints and opportunities analyses to help evaluate and select preferred structural alternatives.

Evaluation and selection of structural alternatives are anticipated to be more problematic than the selection of non-structural alternatives, as the structural alternatives also include the larger element of cost estimating and identifying larger funding/financing elements required for implementation.

The identification and selection of combined structural and non-structural alternatives will be shared with the small community stakeholders and their representative RDs prior to formulating final solutions for inclusion into the final feasibility studies.

3.1.7 Tasks 8 and 9: Project Implementation Phasing, and Preparation of Financing Plans for Implementation

The GEI Team proposes to position the Sacramento County Delta Legacy Communities as high priority communities to the front of the line to receive subsequent funding from DWR and other cost-sharing partners with “no-regrets” project alternatives and solutions. This is consistent with the overall project goals and objectives. The project solutions should be readily obtainable for implementation and consistent with the 2012-2017 CVFPP State System-wide Investment Approach (SSIA), and the Lower Sacramento/North Delta RFMP. The GEI Team will identify and prioritize preferred project elements that can be implemented in both near- and long-term funding cycles offered by DWR and other cost-sharing partners, and will be compatible with the financial limitations afforded by each Delta Legacy Community, and adjoining agricultural interests. The financial plans developed for each Delta Legacy Community to reduce flood risks will identify the funding limitations of each community, several of which are considered Disadvantaged Communities (DAC) as defined by DWR, with little capability of funding any substantial structural improvements.

As suggested in the County’s proposed scope of work, the financial plans would include identification of funding mechanisms proposed to implement key flood risk reduction elements, the quantification of needed revenues, and any associated financing recommendations for project implementation. The recommendations would likely include strategies for securing additional state funding and any multi-benefit features that could be identified and integrated into the project that could increase state cost-sharing and/or secure third party financing. As previously noted, the Small Delta Legacy Communities and the County may also consider following the latest developments with the Delta Protection Commission (DPC) Subcommittee on the Delta Flood Risk Management Assessment District Feasibility Study indicating that there may other state-wide beneficiaries of flood risk reduction improvements by the Delta Legacy Communities and RDs in the North Delta.

3.1.8 Tasks 10-12: Develop Draft and Final Feasibility Study Reports with Stakeholder Input and Review

The GEI Team will begin development of the draft feasibility studies commencing with technical memorandums developed in Tasks 2 through 5. These memorandums will consist of:

- Quantifying potential flood risks and damages,
- Conducting geotechnical evaluations and identifying current levels of flood protection offered by the current levee/embankment systems,
- Preparing findings of the biological resource reconnaissance surveys and cultural resources record searches, and

- Documenting opportunities for pursuing multi-benefits that may attract additional funding opportunities for implementation.

The draft feasibility studies will identify all the Alternatives (structural and non-structural) that are under consideration for implementation, or were considered, but discounted in favor of other favorable alternatives. The draft feasibility studies will also include cost estimates and screening of alternatives in support of most structural solutions identified, and will include an exhaustive list of non-structural measures that the GEI Team will develop with the County, communities, and the RDs. The non-structural measures will also include input from the Agricultural Floodplain Ordinance Task Force (AFOTF) with members on the GEI Team identifying changes to the NFIP that may be beneficial to the Delta Legacy Communities and adjoining agricultural communities in the residual floodplains. As indicated in the County's proposed scope of work, the draft feasibility studies would also include a strategic permitting plan and a draft CEQA Check List of structural solutions identified for implementation, including multiple objective elements.

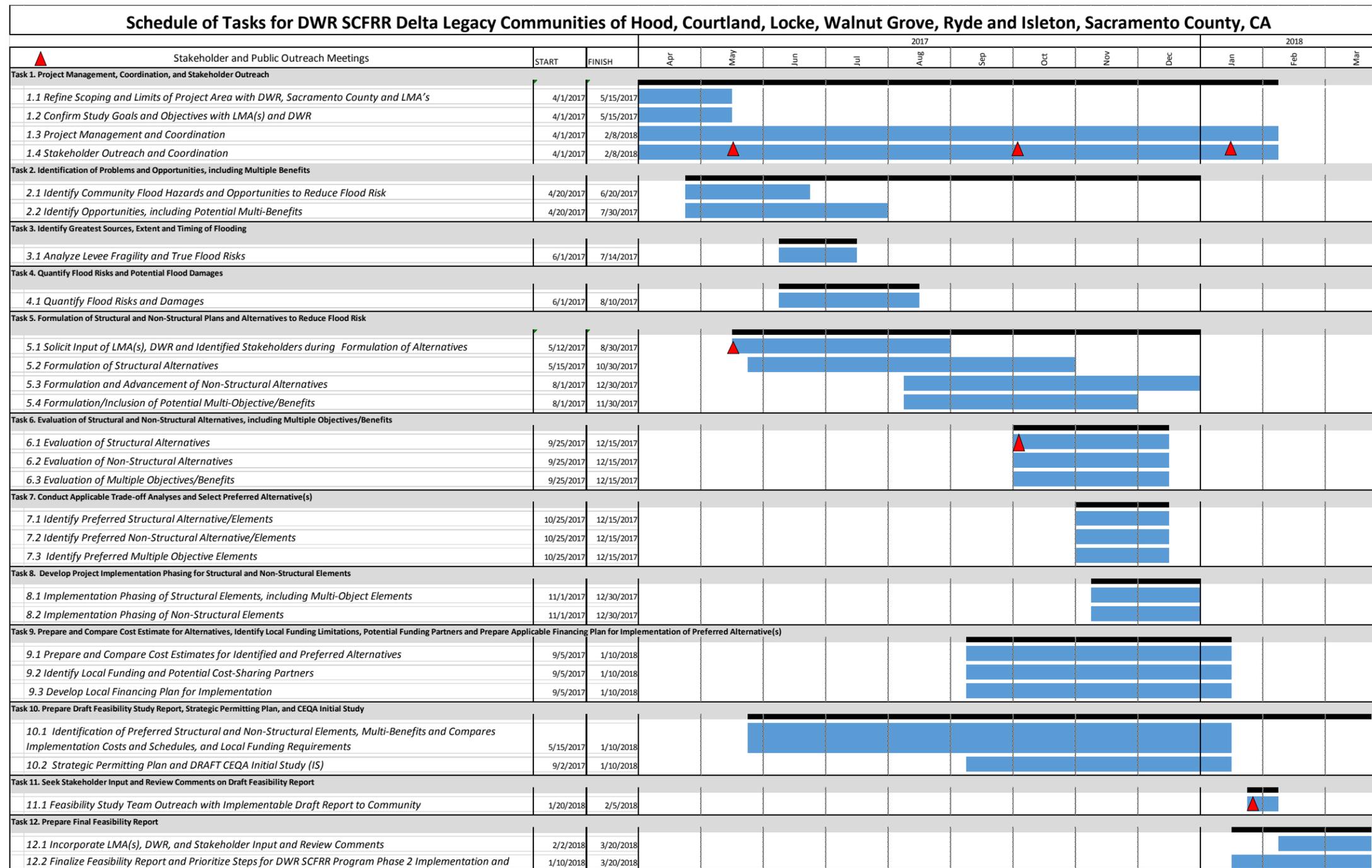
The draft feasibility studies for each of the Delta Legacy Communities would be developed and shared with communities and the associated stakeholders to seek input and review comments via a public outreach meeting prior to finalizing the feasibility reports.

The final feasibility reports would incorporate comments received on the draft reports during the public review period and public outreach meeting(s). The final reports would develop prioritization steps for implementing near- and long-term structural and non-structural solutions to reducing flood risks. As stated in the County's scope of work, the final feasibility study would also develop recommendations to secure applicable DWR SCFRRP Phase 2 implementation grant funds and other funding sources that may be available to offset local cost-share requirements.

3.2 PROJECT SCHEDULE

Members of the GEI Team assisted Sacramento County in developing the detailed project schedules for each of Delta Legacy Community grant applications recently submitted to DWR. Five of the six schedules include identification of each major task and sub-task envisioned for each of the Delta Legacy Communities. Included on the following page is a detailed project schedule (**Figure 2**) that is adaptable for any one or the collective host of the six Sacramento County Delta Legacy Communities that may be eligible to receive grant funding from the DWR SCFRRP during the spring of 2017. It is anticipated that DWR would like to see the studies completed within 12 months of entering into a reimbursement funding agreement, indicating the studies will be likely conducted April 2017 through March 2018. GEI is well prepared and positioned to be the County's lead consultant for the noted feasibility studies and is confident the assembled GEI Team has the capacity to conduct the studies as indicated in the discipline matrix provided in Section 2.2 (**Table 1**).

FIGURE 2. PROJECT SCHEDULE OF TASKS FOR SACRAMENTO COUNTY DELTA LEGACY COMMUNITY FEASIBILITY STUDIES



3.3 PROJECT COST ESTIMATES AND GEI TEAM RATE SHEETS

3.1.1 Feasibility Study Cost Estimates

In response to the DWR grant funding limitations of \$500,000 per community requiring no matching funds by either the County or by the Delta Legacy Communities, (but allow 50% cost-sharing for funds expended above (\$500,000), the GEI Team has structured commensurate scopes of work and budgets for each study and Delta Legacy Community at or below the \$500,000 threshold. The itemized costs for each task and each community are provided in **Table 2** on the following page. The combined study for the two Delta Legacy Communities of Walnut Grove (West) and Ryde within RD 3 on Grand Island is currently estimated by to be less than \$700,000. The project cost estimates summarized on the following page already include some economies of scale when combining all or most of the communities together for Sacramento County. The total project budget would be less than \$3.2 million if all the Delta Legacy Communities are awarded DWR SCFRRP grants.

3.3.2 GEI Project Team Rate Sheets

GEI has provided rate sheets for all of the GEI Team, inclusive of the subconsultant team members on the following pages.

TABLE 2. PROJECT COST ESTIMATE

Sacramento County Delta Legacy Community Flood Risk Reduction Feasibility Studies 2017-2018									
Summary of Estimated Costs for All Sacramento County Delta Legacy Communities - Prepared by GEI Consultants									
Task	TASK ID	TASK DESCRIPTION	TOTAL BUDGET	Courtland	Hood	Locke	Walnut Grove (East)	Walnut Grove (West) and Ryde	Isleton
Task 1. Project Management, Coordination, and Stakeholder Outreach	1.1	Sacramento County and LMA's							
	1.2	Confirm Study Goals and Objectives with LMA(s) and DWR							
	1.3	Project Management and Coordination							
	1.4	Stakeholder Outreach and Coordination							
		Total- Task 1	\$215,181.22	\$34,686.00	\$32,699.20	\$24,037.60	\$41,445.00	\$48,620.82	\$33,692.60
Task 2. Identification of Problems and Opportunities, including Multiple Benefits	2.1	Identify Community Flooding Problems and Issues, and Challenges to Remedy Flooding Risks Refinement							
	2.2	Identify Opportunities, including Potential Multi-Benefits							
		Total- Task 2	\$239,212.50	\$40,705.00	\$36,680.40	\$27,897.60	\$40,721.00	\$54,515.80	\$38,692.70
Task 3. Identify Greatest Sources, Extent and Timing of Flooding	3.1	Update/Finalize Sacramento County 2016 OES Flood Inundation Levee Breach Analyses							
		Total- Task 3	\$101,887.90	\$23,403.00	\$16,579.80	\$10,640.80	\$5,552.00	\$25,720.90	\$19,991.40
Task 4. Quantify Flood Risks and Potential Flood Damages	4.1	Quantify Current Flood Risks and Damages							
	4.2	Identify Future Risk Conditions, Including Adjustments for Climate change							
		Total- Task 4	\$77,675.56	\$10,415.00	\$14,083.80	\$9,820.00	\$13,515.00	\$17,592.36	\$12,249.40
Task 5. Formulation of Structural and Non-Structural Plans and Alternatives to Reduce Flood Risk	5.1	Solicit Input of LMA(s), DWR and Identified Stakeholders during Formulation of Alternatives							
	5.2	Formulation of Structural Alternatives							
	5.3	Formulation and Advancement of Non-Structural Alternatives							
	5.4	Formulation/Inclusion of Potential Multi-Objective/Benefits							
		Total- Task 5	\$922,908.37	\$126,134.33	\$163,947.67	\$209,192.20	\$70,315.00	\$208,278.17	\$145,041.00
Task 6. Evaluation of Structural and Non-Structural Alternatives, including Multiple Objectives	6.1	Evaluation of Structural Alternatives							
	6.2	Evaluation of Non-Structural Alternatives							
	6.3	Evaluation of Multiple Objectives/Benefits							
		Total- Task 6	\$640,881.34	\$97,870.00	\$91,135.00	\$103,284.00	\$154,181.00	\$99,908.84	\$94,502.50
Task 7. Conduct Applicable Trade-off Analyses and Select Preferred Alternative(s)	7.1	Identify Preferred Structural Alternative/Elements							
	7.2	Identify Preferred Non-Structural Alternative/Elements							
	7.3	Identify Preferred Multiple Objective Elements							
		Total- Task 7	\$115,887.20	\$19,738.00	\$16,437.00	\$12,037.60	\$19,832.00	\$29,755.10	\$18,087.50
Task 8. Develop Project Implementation Phasing for Structural and Non-Structural Elements	8.1	Implementation Phasing of Structural Elements, including Multi-Object Elements							
	8.2	Implementation Phasing of Non-Structural Elements							
		Total- Task 8	\$74,740.09	\$14,301.00	\$8,909.10	\$7,358.40	\$13,265.00	\$19,301.54	\$11,605.05
Task 9. Prepare and Compare Cost Estimate for Alternatives, Identify Local Funding Limitations, and Prepare Applicable Financing Plan	9.1	Prepare and Compare Cost Estimates for Identified and Preferred Alternatives							
	9.2	Identify Local Funding and Potential Cost-Sharing Partners							
	9.3	Develop Local Financing Plan for Implementation							
		Total- Task 9	\$278,278.11	\$45,245.00	\$41,711.10	\$35,514.40	\$49,393.00	\$62,936.56	\$43,478.05
Task 10. Prepare Draft Feasibility Study Report	10.1	Includes Identification of Preferred Structural and Non-Structural Elements, Multi-Benefits and Compares Implementation Costs and Schedules, and Local Funding Requirements							
	10.2	Includes Strategic Permitting Plan and DRAFT CEQA Initial Study (IS)							
		Total- Task 10	\$317,354.52	\$54,870.00	\$46,728.60	\$33,501.60	\$53,298.00	\$78,157.02	\$50,799.30
Task 11. Seek Stakeholder Input and Review Comments	11.1	Present Draft Feasibility Study Report to LMA(s), DWR and Identified Stakeholders							
		Total- Task 11	\$41,446.31	\$7,172.00	\$5,622.30	\$5,397.60	\$8,624.00	\$8,233.26	\$6,397.15
Task 12. Prepare Final Feasibility Report	12.1	Incorporate LMA(s), DWR, and Stakeholder Input and Review Comments							
	12.2	Finalize Feasibility Report and Prioritize Steps for DWR SCFRR Program Phase 2 Implementation and Funding							
		Total- Task 12	\$170,958.33	\$25,198.00	\$25,423.50	\$20,559.20	\$29,491.00	\$44,975.88	\$25,310.75
TOTALS:			\$3,196,411.45	\$499,737.33	\$499,957.47	\$499,241.00	\$499,632.00	\$697,996.25	\$499,847.40



FEE SCHEDULE AND PAYMENT TERMS

Project: Sacramento County Delta Legacy Communities Flood Risk Reduction Feasibility Studies

FEE SCHEDULE

<u>Personnel Category</u>	<u>Hourly Billing Rate</u> \$ per hour
Staff Professional – Grade 1	\$ 110
Staff Professional – Grade 2	\$ 121
Project Professional – Grade 3	\$ 133
Project Professional – Grade 4	\$ 149
Senior Professional – Grade 5	\$ 176
Senior Professional – Grade 6	\$ 200
Senior Professional – Grade 7	\$ 238
Senior Consultant – Grade 8	\$ 266
Senior Consultant – Grade 9	\$ 329
Senior Principal – Grade 10	\$ 329

Senior CADD Drafter and Designer	\$ 133
CADD Drafter / Designer and Senior Technician	\$ 121
Technician, Word Processor, Administrative Staff	\$ 99
Office Aide	\$ 77

These rates are billed for both regular and overtime hours in all categories. Rates will increase up to 5% annually, at GEI's option, for all contracts that extend beyond twelve (12) months after the date of the contract. Rates for Deposition and Testimony are increased 1.5 times.

OTHER PROJECT COSTS

Subconsultants, Subcontractors and Other Project Expenses - All costs for subconsultants, subcontractors and other project expenses will be billed at cost plus a 15% service charge. Examples of such expenses ordinarily charged to projects are subcontractors; subconsultants: chemical laboratory charges; rented or leased field and laboratory equipment; outside printing and reproduction; communications and mailing charges; reproduction expenses; shipping costs for samples and equipment; disposal of samples; rental vehicles; fares for travel on public carriers; special fees for insurance certificates, permits, licenses, etc.; fees for restoration of paving or land due to field exploration, etc.; state sales and use taxes and state taxes on GEI fees.

Billing Rates for Specialized Technical Computer Programs – Computer usage for specialized technical programs will be billed at a flat rate of \$10.00 per hour in addition to the labor required to operate the computer.

Field and Laboratory Equipment Billing Rates – GEI-owned field and laboratory equipment such as pumps, sampling equipment, monitoring instrumentation, field density equipment, portable gas chromatographs, etc. will be billed at a daily, weekly, or monthly rate, as needed for the project. Expendable supplies are billed at a unit rate.

Transportation and Subsistence - Automobile expenses for GEI or employee owned cars will be charged at the rate per mile set by the Internal Revenue Service for tax purposes plus tolls and parking charges or at a day rate negotiated for each project. When required for a project, four-wheel drive vehicles owned by GEI or the employees will be billed at a daily rate appropriate for those vehicles. Per diem living costs for personnel on assignment away from their home office will be negotiated for each project.

PAYMENT TERMS

Invoices will be submitted monthly or upon completion of a specified scope of service, as described in the accompanying contract (proposal, project, or agreement document that is signed and dated by GEI and CLIENT).

Payment is due upon receipt of the invoice. Interest will accrue at the rate of 1% of the invoice amount per month, for amounts that remain unpaid more than 30 days after the invoice date. All payments will be made by either check or electronic transfer to the address specified by GEI and will include reference to GEI's invoice number.

SCHEDULE OF FEES

1. Standard Fees:

	<u>Per Hour</u>
Principal	\$200–260
Supervising Engineer	170–230
Project Manager	160–230
Senior Engineer	140–210
Engineer/Hydrologist	120–180
GIS Professional	120–180
Water Resources Associate	100–160
Assistant Engineer	100–150
Prevailing Rate Surveyor, Chief of Party	161
Prevailing Rate Surveyor, Rodman/Chainman	146
GIS Specialist	80–140
Technician/Drafter	80–140
Junior Engineer	75–110
Engineering Aide	50–80
Technical Editor	50–125
3-Man Survey Crew	250
2-Man Survey Crew	220

2. Time spent in appearances at courts or quasi-judicial State or Federal boards and commissions is billed at \$450 per hour for principals and supervising engineers, \$400 per hour for registered engineer staff, and \$250 per hour for other staff.
3. Automobile mileage is billed at the Federal reimbursement rate. Local mileage (less than 20 miles) will not be billed.
4. All other direct non-salary expense, including transportation and subsistence, long-distance telephone charges, commercial printing, reproduction costs, and similar out-of-pocket expenses are billed at actual cost plus a service charge of 10%. Use of GPS equipment is billed at \$50 per hour. Use of MBK owned boat will be billed at \$100/day. Professional services provided by others billed through MBK at cost plus a service charge of 5%–15%.
5. Billings will be made monthly and payment will be due within 45 days. Accounts not paid within 90 days of presentation will bear interest at the rate of 1½% per month or fraction thereof from the billing date unless other arrangements are made in advance.
6. If accounts are not paid within 90 days of presentation, the firm may retain an attorney to obtain payment. In the event that it does so and payment of all or part of the account is thereafter obtained, reasonable attorney’s fees and other costs incurred to obtain such payment shall also be paid, or if payment is obtained by Judgment, shall be awarded as part of the Judgment.



**EXHIBIT 1
Rate Schedule**

Professional Fees:	<u>Hourly Rate</u>
Managing Principal	\$ 165.00
Senior Engineer or Project Engineer	\$ 100.00
Project Lead or Senior Technician	\$ 95.00
Intermediate Engineer	\$ 85.00
Intermediate Technician	\$ 75.00
Drafting Technician Services	\$ 65.00
Permitting Administrator	\$ 100.00
Administrative Assistant	\$ 65.00
Clerical Assistant	\$ 55.00
Two-man Land Survey Crew	\$ 200.00

Outside Consultants and Contract Labor: Cost plus 10%

Reimbursable Expenses: Reimbursable expenses include, but are not limited to, the following:

1. Mileage : IRS-approved reimbursement rate as of invoice date 2016 = \$0.54/mile
2. Parking fees. Cost +10%
3. Fees paid for securing approval of authorities having jurisdiction over the project (application fees, review fees, permit fees). Cost
4. Equipment cost recovery: Truck \$100 per day
..... Survey Total Station \$50 per day
5. Reproductions, film and photo developing. Cost +10%
6. Communications, postage, shipping, handling. Cost +10%
7. Equipment rentals. Cost +10%
8. Expense of any additional insurance coverage or limits including professional liability insurance requested by the District in excess of that normally carried. Cost
9. In-office printing (Rates assume 20lb. white multipurpose paper. Additional charges for speciality papers.)
 - Large format black and white copies or plots \$0.75 per sq. ft.
 - Standard copies: see table

<u>Black & White</u>		<u>Color</u>	
8.5x11	\$0.08 per side	8.5x11	\$0.50 per side
8.5x14	\$0.12 per side	8.5x14	\$0.75 per side
11x17	\$0.15 per side	11x17	\$1.00 per side

Initial _____



Stephen K. Sinnock, P.E.
Christopher H. Neudeck, P.E.
Neal T. Colwell, P.E.
Barry O'Regan, P.E.

**2016 / 2017 FEE SCHEDULE
PREVAILING WAGE PROJECTS
Effective July 1, 2016**

Position	Rate
Principal Engineer	\$ 235.00
Associate Engineer	\$ 205.00
Senior Engineer	\$ 180.00
Engineer	\$ 160.00
Junior Engineer	\$ 130.00
Senior Surveyor	\$ 185.00
Surveyor	\$ 155.00
Assistant Surveyor	\$ 135.00
Field Crew-One Man & Vehicle	\$ 185.00
Field Crew-Two Man & Vehicle	\$ 280.00
Inspector	\$ 145.00
Inspector & Vehicle	\$ 170.00
Senior Project Manager	\$ 205.00
Project Manager	\$ 175.00
Assistant Project Manager	\$ 155.00
Grant Manager	\$ 135.00
GIS/CAD Technician III	\$ 130.00
GIS/CAD Technician II	\$ 110.00
GIS/CAD Technician I	\$ 90.00
Project Accountant	\$ 130.00
Administrative III	\$ 98.00
Administrative II	\$ 83.00
Administrative I	\$ 68.00

Equipment	Hourly Rate
3D Print Cloud Work Station	\$ 25.00
GPS Receivers-Per Receiver Per Hour	\$ 25.00
Robotic Total Station	\$ 35.00
HDS Scanner	\$ 150.00
Boat	\$ 55.00

Expenses	
Auto Mileage per current Federal Rates	
Special Consultants	Cost Plus 10%
Reimbursable Expenses	Cost Plus 10%
(Printing, Photos, Copies, Travel, Telephone, Fax, Survey Materials, etc.)	

Additional charges may apply for overtime services.

Fees are due and payable within 30 days from the date of billing. Fees past due may be subject to a finance charge computed on the basis of 1 1/2% of the unpaid balance per month.

Hourly rates are subject to review and adjustment July 1st of each year.

Corporate Office: 711 N Pershing Avenue | Stockton, CA 95203 | 209-946-0268 | www.ksninc.com
West Sacramento: 1355 Halyard Drive, Suite 100 | West Sacramento, CA 95691 | 916-403-5900



Foster Morrison Rate Sheet – 2016

Staff	Rate
Foster – Project Manager/Senior Planner	\$140.00
Morrison – Lead Planner/Technical Editor	\$120.00
Gutierrez – GIS Analyst	\$100.00
OTHER DIRECT EXPENSES	
CLIENT agrees to reimburse Foster Morrison for all other direct expenses incurred at the following rates	
Travel Expenses: Transportation (mileage, air travel, car rental, etc.); lodging, meals, & incidental expenses (per diem)	Cost
Subcontract Expenses: Supplies or services furnished to Foster Morrison in support of project activities by any supplier or firm, except temporary agency or consultant staff charged at above hourly rates	Cost
Direct Expenses: Other expenses in support of project activities	Cost



HDR ENGINEERING, INC.
RATE SCHEDULE
January to December 2017

Sacramento County Delta Communities Flood Risk Reduction Feasibility Study

Principal In Charge	\$	305.00
Project Manager	\$	300.00
Senior Technical Review	\$	290.00
Senior Policy Advisor	\$	290.00
Senior Planner	\$	240.00
Staff Planner	\$	185.00
Junior Planner	\$	145.00
Senior Environmental Planner	\$	240.00
Staff Environmental Planner	\$	185.00
Junior Environmental Planner	\$	145.00
Senior Civil Engineer	\$	240.00
Staff Civil Engineer	\$	185.00
Junior Civil Engineer	\$	145.00
Senior Geotechnical	\$	260.00
Staff Geotechnical	\$	185.00
Junior Geotechnical	\$	145.00
Senior CADD	\$	150.00
Staff CADD	\$	135.00
GIS Tech	\$	115.00
Project Coordinator	\$	95.00
Project Accountant	\$	135.00
Admin/Clerical	\$	80.00

Hourly billing rates are for Year 2017 and are effective from January 1, 2017, through December 31, 2017. Rates are subject to change after December 31, 2017. HDR Engineering, Inc., (HDR) will invoice by HDR standard employee hourly billing rate for services provided. The billing rates cover payroll cost, employee benefits, and HDR overhead and profit.

EXPENSES

In-House Expenses

Vehicle Mileage (per mile)	Current Federal Travel Regulation (FTR)
Black/White Photocopies (per copy)	\$0.05 to \$0.09
Color Copy (per copy)	\$0.15 to \$0.30
Bond Plotting - Black & White (per square foot)	\$0.15
Bond Plotting - Color (per square foot)	\$0.90

Please Note: Subconsultants are charged with a five percent markup.

hdrinc.com

Auburn Main Office:
 11521 Blocker Drive, Suite 110
 Auburn, CA 95603
 (530) 887-1494 Fax (530) 887-1495



www.blackburnconsulting.com

Modesto Office:
 1016 12th Street
 Modesto, CA 95354
 (209) 522-6273

West Sacramento Office:
 2491 Boatman Avenue
 West Sacramento, CA 95691
 (916) 375-8706 Fax (916) 375-8709

Fresno Office:
 360 W. Bedford Avenue, Suite 101
 Fresno, CA 93711
 (559) 438-8411

2016 SCHEDULE OF FEES & SERVICES

Geotechnical ▪ Geo-Environmental ▪ Construction Services ▪ Forensics

PROFESSIONAL HOURLY RATES:

Project Engineer/Geologist I	\$132	CAD/GIS	\$124
Project Engineer/Geologist II	\$142	Lab Aide	\$77
Senior Engineer/Geologist	\$158	Lab Manager	\$132
Project Manager	\$178	Technician Manager	\$132
Senior Project Manager	\$200	Clerical	\$73
Principal	\$226	Project Assistant	\$96
Senior Principal	\$252	Senior Administrative	\$132
Expert Testimony & Deposition	\$420		

SPECIAL INSPECTION PERSONNEL HOURLY RATES:

	Non-Prevailing Wage	Prevailing Wage
Group 1 <i>ASNT Level II-III, DSA Shotcrete, Lead Inspector, NICET Level IV</i>	\$129	\$156
Group 2 <i>AWS-CWI, ICC Certified Structural Inspector, NICET Level III, Shear Wall/Floor System Inspector, Building/Construction Inspector</i>	\$129	\$150
Group 3 <i>Soils/Asphalt, Earthwork Grading, Excavation and Backfill, NICET Level II</i>	\$108	\$128
Group 4 <i>ACI, ICC Fireproofing, NICET Level I, Proofload Testing, Torque Testing</i>	\$108	\$128

MINIMUM BASIC CHARGES:

Outside Equipment & Services	Cost plus 20%
Vehicle Charge	\$8.00 per hour or \$0.85 per mile
Per Diem	Location specific, minimum \$125 per night
Technician Services	Charge includes time from office and return to office, minimum charge - 2 hours
Overtime	Over 8 hours: 1.5 x Hourly Rate Before 7:00am or after 4:00pm: 1.5 x Hourly Rate Rush Charge (less than 24 hours notice): 1.5 x Hourly Rate Saturday: 1.5 x Hourly Rate (minimum: 4 hr. increments) Sunday & Holiday: 2.0 x Hourly Rate (minimum: 4 hr increments)
Report Copies	4 Report copies provided
Additional Report Copies	\$100 for binding up to 50 pages, plus postage

EQUIPMENT: (personnel not included)

Hand Sampling Equipment	\$237 / Day	Double Ring Infiltrometer Equipment	\$278 / Day
Nuclear Moisture/Density Testing	\$14 / Test	Liquid Level Equipment	\$232 / Day
6" Sand Cone Testing	\$36 / Test	Pachometer	\$118 / Day
12" Sand Cone Testing	\$180 / Test	Rock Point Load Test Equipment	\$118 / Day
Coring Bit Charge	\$36 / Core	Roto Hammer	\$113 / Day
Coring Machine	\$227 / Day	Schmidt Hammer	\$93 / Day
Dynamic Cone Penetrometer	\$258 / Day	Torque Wrench	\$57 / Day
Electrical Resistivity Equipment	\$227 / Day	Seismic Refraction:12 Channel	\$443 / Day
Generator	\$57 / Day	Traffic Control/Safety	\$278 / Day
Groundwater Level Indicator	\$57 / Day	Concrete Vapor Emission Test Kit	\$24 / Ea
Inclinometer Survey Equipment	\$567 / Day	pH Test Strip Package	\$46 / Ea

Revised 11-09-15

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Auburn, CA 95603
(530) 887-1494 Fax (530) 887-1495



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(916) 375-8706 Fax (916) 375-8709

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2016 LABORATORY FEE SCHEDULE

Geotechnical ▪ Geo-Environmental ▪ Construction Services ▪ Forensics

Page 1 of 2

SOIL CLASSIFICATION		
#200 Sieve Wash	ASTM D1140	\$113
Sieve Analysis to #200	ASTM D6913, CAL 202	\$175
Standard Hydrometer with Sieve Analysis	ASTM D422	\$345
Plasticity Index	ASTM D4318	\$252
Specific Gravity - Soils	AASHTO T100	\$108
MOISTURE / DENSITY		
Moisture Content	ASTM D2216, CAL 226	\$41
Moisture/Density		\$77
SOIL COMPACTION		
Standard Proctor (4" or 6" mold)	ASTM D698	\$314
Modified Proctor (4" or 6" mold)	ASTM D1557	\$314
California Impact	CAL 216	\$314
Check Point (Standard or Modified)		\$144
VOLUME CHANGE		
One-Dimensional Consolidation (6 load increments, includes 2 time rate curves and 2 rebound decrements)	ASTM D2435	\$494
Additional Load or Rebound Decrement		\$33/ea
Additional Time Rate Curves		\$108/ea
Expansion Index	ASTM D4829	\$258
Settlement Swell	ASTM D4546	\$155
STRENGTH		
Unconfined Compression	ASTM D2166	\$144
Compression, Rock <i>Prep & Photos included</i>	ASTM D7012	\$273
Rock Point Load (up to six points)	ASTM D5731	\$67
Compression Test of Cored Concrete Spec.		\$77
California Bearing Ratio (CBR), with curve	ASTM D1883	\$783
California Bearing Ratio (CBR), without curve	ASTM D1883	\$469
Resistance Value	CAL 301, ASTM D2844	\$340
Direct Shear: (per point)		
Undisturbed	ASTM D3080	\$196
Remolded	ASTM D3080	\$252
Triaxial Compression: (per point) Photos of failure upon request		
Undrained, Unconsolidated w/out Pore Pressure	ASTM D2850	\$175
Consolidated, Undrained w/ Pore Pressure Measurements	ASTM D4767	\$515
Consolidated, Drained		\$742
Consolidated, Undrained, no Pore Pressure Measurements		\$288
Specimen Remolding		\$113

Blackburn Consulting

Revised 11-09-15

CORROSIVITY ANALYSIS		
Corrosion Analysis Package	CAL 643, 417, 422	\$319
<i>Includes Soil Resistivity, Soil pH, Sulfates / Chlorides. Minimum size is 1,000 grams</i>		
pH	CTM643	\$41
Resistivity	CTM643	\$134
PERMEABILITY		
Flex-wall Permeability	ASTM D5084	
<i>Either Constant head or Falling Head / rising Tail Water. Method depends on soil type</i>		
Each Additional Effective Stress		\$453
Specimen Remodeling		\$113
TREATED SOIL TESTS		
% Lime for Stabilization - per point (%)	ASTM D6276	\$124
pH of Soil	CTM643	\$41
Modified Proctor	ASTM D1557	\$376
Unconfined Compression Test	ASTM D5102	\$211
One Dimensional Swell	ASTM D4546	\$211
AGGREGATES		
Bulk Specific Gravity - Course & Fine Aggregate	ASTM C127 & 128, CAL 206, 207	\$108
Coarse Durability	CAL 229	\$185
Fine Durability	CAL 229	\$185
Sand Equivalent	CAL 217, ASTM D2419	\$129
Cleanness Value	CAL 227	\$175
Moisture Content	CAL 226/370	\$98
Percent of Crushed Particles (per size fraction)	CAL 205	\$165
Fine Aggregate Angularity	AASHTO T304, Method A	\$165
Flat and Elongated Particles (per size)	AASHTO D 4791	\$165
Combined Grading 1" through no. 200	CAL 201/202	\$175
Bin Grading (First 2 Bins)	CAL 201/202	\$175
Each Bin Thereafter		\$67
LP-9 (RAP) Burn	LP-9, CT382	\$108
ASPHALT		
Bulk Specific Gravity - Compacted Hot Mix Asphalt	CAL 308	\$52
Theoretical Max Specific Gravity (Rice)	CAL 309	\$191
LTMD (Set of 5)	CAL 375	\$381
Binder Content		
Ignition Oven Correction Factor	CAL 382	\$324
Ignition Oven	CAL 382	\$191
Solvent	AASHTO T164	\$242
Stability (Set of 3)	CAL 366	\$340
Void Content		
With Stability and Rice	CAL 367	\$36
CONCRETE & MASONRY		
Concrete Compression Test 6" x 12" or 4" x 8"	ASTM C39	\$36
Masonry or Grout Compression		\$52

Other Tests Quoted Upon Request

4. PROJECT DESCRIPTIONS, REFERENCES, AND CLIENTS

We have provided several client references and project descriptions on the following pages that highlight our team's experience on similar projects.

4.1 GEI CONSULTANTS, INC.

Emergency Safety Plans, Sacramento, California

Sacramento County OES

Sacramento County (County) hired GEI to prepare Flood Emergency Safety Plans (ESPs) for 18 of its Reclamation Districts located in the Sacramento Delta. The County was able to fund the project through a grant from the State of California Department of Water Resources (DWR). The goal of the ESPs is to reduce flood risks by improving the local flood emergency preparedness and to satisfy the requirements of the Central Valley Flood Protection Act of 2008 and California Water Code Section 9650 (AB156).

The eighteen ESPs address flood preparedness, levee patrols, flood fight, evacuation procedures, floodwater removal and related subjects. The ESPs also provide guidance to implement the Safety Emergency Management Systems (SEMS), National Incident Management System (NIMS) and the Incident Command Systems (ICS) to improve communication between agencies during an emergency. When used in conjunction with the California Emergency Plan and other local emergency plans, SEMS, NIMS, and ICS will facilitate multi-agency and multi-jurisdictional coordination, particularly among the Districts, local governments, and state agencies in flood emergency operations.

GEI utilized the Sacramento River system hydraulic models developed by the DWR to provide mapping to show the projected flood depth and flood wave timing if a levee protecting the reclamation districts were to fail. The hypothetical levee failure results from the flood mapping provides each of the districts the recommended evacuation routes to the surrounding communities of Antioch, Galt, Lodi, Rio Vista, Sacramento and Stockton. In addition, the documents provide the following information:

- A flood preparedness plan that includes storage of materials that can be used to reinforce or protect a levee when a risk of failure exists
- A levee patrol plan for high water situations
- A flood fight plan for the period before state or federal agencies assume control over the flood fight
- An evacuation plan that includes a system for adequately warning the general public in the event of a levee failure, and a plan for the evacuation of every affected school, residential care facility for the elderly, and long-term health care facility
- A floodwater removal plan



REFERENCE
Roger Ince, Project Manager
Sacramento County OEC
916.874.4670

PROJECT COMPLETED
2015-Ongoing

GEI PROJECT FEE
\$850,000

KEY ELEMENTS
Program management
Emergency safety plans
Hydraulic modeling
Hypothetical levee failures
Flood mapping
Evacuation mapping
Topographic data
Outreach

2012 Central Valley Flood Protection Plan, California

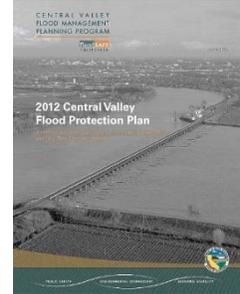
California Department of Water Resources

The Central Valley Flood Protection Plan (Plan), prepared by the California Department of Water Resources (DWR) and adopted by the Central Valley Flood Protection Board (CVFPB) in June 2012, was developed to provide a comprehensive, system-wide response to the threat of flooding while improving environmental quality and reducing maintenance costs of the State Plan of Flood Control facilities.

The proposed investment of \$17 billion over the next few decades to improve the Central Valley flood protective infrastructure, operations, maintenance, flood emergency response programs, and environmental stewardship will yield far greater dividends in terms of public safety, regional long-term prosperity and economic growth, and well-being.

GEI was included as a team member in Plan development. GEI began participating in the development of the strategies for the CVFPP around January 2011, and their role increased through the remaining one and one-half years through Plan adoption by the CVFPB in June 2012. Members of the GEI Team provided strategic planning support and developed the four approaches considered in the Plan, and prepared the engineering cost estimating methodology for evaluating and comparing the State System-wide Investment Approach (SSIA) to the other approaches. Additionally, GEI provided graphics, GIS, outreach, and coordination support for project briefings and meetings.

GEI assisted DWR with development of near-term and long-term implementation and resource planning strategies to best match anticipated funding streams.



REFERENCE

Jeremy Arrich, DFM
FloodSAFE PM, DWR
916.574.2550

PROJECT COMPLETED

2012

GEI PROJECT FEE

\$1,000,000

KEY ELEMENTS

- Feasibility evaluation
- Alternatives evaluation
- Geotechnical investigations
- Seepage analysis
- Stability analysis
- Embankment design
- Foundation improvement
- Well design and installation
- Plans and specifications
- Construction management
- Environmental mitigation

Star Bend Setback Levee, Sutter County, California *Levee District No. 1*

The Lower Feather River West Levee at Star Bend south of Yuba City had a long history of seepage and stability issues and also presented a hydraulic impediment to convey large flood flows through the Lower Feather River Corridor.

The multi-objective project with a new setback levee at Star Bend eliminated the hydraulic impediment, reduced flood flow levels, solved the seepage and stability problems and created the opportunity to restore over 50 acres of the natural floodplain ecosystem to native riparian habitat adjacent to CDFW's O'Conner Lakes Wildlife Unit.

GEI staff served as LD1's District Engineer during the feasibility evaluations, permitting and construction of the Star Bend Setback Levee. GEI staff served as the Project Manager on the successful EIP Proposition 13 and 1E/84 grant applications for funding, conducted hydraulic modeling investigations, secured timely and favorable Section 408 project approvals from the USACE, CVFPB and other regulatory agencies. Staff also managed the development and processing of the CEQA documentation.

The Star Bend Setback Project, initially budgeted over \$20.5 million was successful closed out by LD1 at less than \$15 million with the state funding approximately \$12 million.

The enlarged floodplain at the Star Bend setback levee served as an area for on-site mitigation and advanced mitigation for the Sutter Butte Flood Control Agency 41-mile-long Feather River West Levee Rehabilitation Project (FRWLRP).

INNOVATIONS AND NOTABLE OUTCOMES

The Project Manager, Jeffrey Twitchell, PE, was successful in securing approvals from the USACE and the CVFPB to allow a simultaneous degradation of the former levee system while constructing the new setback levee, resulting in significant cost-savings to Levee District One of Sutter County and DWR.

The Star Bend Project was the first DWR EIP project requiring a Section 408 USACE approval that was successfully closed out, accepted and certified as complete by DWR.

The project also served as a catalyst for LD1 and SBFCA to formulate its larger flood protection basin plan to secure 200-year level of flood protection for Yuba City and other communities within the Sutter Basin between Thermalito and Star Bend.



REFERENCE

Bill Hampton (former Manager
Levee District One)
530.743.8197 or 530.673.2454

PROJECT COMPLETED

2007-2012

GEI PROJECT FEE

\$517,000

KEY ELEMENTS

Feasibility study
Section 408 permitting
Project management
Planning and engineering
Construction oversight
Early Implementation Plan grant
funding

Feather River Levee Repairs and Setback Levee, Yuba County, California *Three Rivers Levee Improvement Authority*

The Phase 4 Feather River Levee Repair Project corrected under- and through-seepage deficiencies in 13 miles of existing left bank levee of the Feather River and lower Yuba River.

The Feather River Levee Repair Project corrects under- and through-seepage deficiencies in 13 miles of existing left bank levee of the Feather River and lower Yuba River. The objectives of the project were to increase the flood protection provided by the levee and to help secure FEMA certification. Completed in 2010, it will provide Reclamation District 784 with a 200-year-level flood protection.

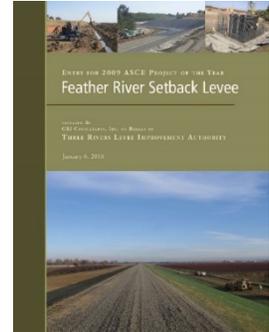
GEI performed a feasibility study of levee strengthening and replacement alternatives, and detailed design for levee strengthening measures that include the construction of slurry cutoff walls, seepage berms, and relief wells. Project issues include the characterization and analysis of an aged, heterogeneous and poorly constructed levee embankment on a foundation composed of highly-variable, soft and pervious streambed deposits, and meeting an accelerated schedule driven by the need to achieve the flood protection objectives as soon as possible and at minimal cost to the landowners.

GEI also performed geotechnical investigations, preliminary engineering, final engineering, environmental permitting, and support of rights-of-way acquisition on an accelerated schedule.

The levee is part of the Sacramento River Flood Control Project. GEI coordinated closely with the Department of Water Resources, the Central Valley Flood Protection Board, the U.S. Army Corps of Engineers, and Reclamation District 784 to complete this project. The project required close coordination with USACE on design and construction, and with the levee certification process.

PROJECT AWARDS

The Feather River Setback Levee Project received the ASCE Sacramento Section 2009 Flood Control Project of the Year Award for Design and Construction Management.



REFERENCE

Paul Brunner, Executive Director
Three Rivers Levee Improvement
Authority
530.749.7841

PROJECT COMPLETED 2009

GEI PROJECT FEE \$22,600,000

KEY ELEMENTS

- Feasibility evaluation
- Alternatives evaluation
- Geotechnical investigations
- Seepage analysis
- Stability analysis
- Embankment design
- Foundation improvement
- Well design and installation
- Plans and specifications
- Construction management
- Environmental mitigation

Yuba-Feather Supplemental Flood Control Program, Yuba County, California
Yuba County Water Agency

GEI has provided consulting services to the Yuba County Water Agency for over 25 years. Services have included operations studies for water supply, flood control, power generation, and feasibility studies for flood control projects.

Expanded studies for flood control began in 1997 following the “Country Club Lane” Feather River levee break. With feasibility study grants from the Water Act of 2000, a comprehensive feasibility study was conducted for the Yuba-Feather Supplemental Flood Control Project.

Major elements of the feasibility study included the following:

- Emergency reoperation of Thermalito Afterbay
- Controlled surcharge of Lake Oroville
- Increased spillway capacity at New Bullards Bar Reservoir
- Tailwater depression at New Colgate Powerhouse
- Setback levees on the Feather River above and below Star Bend
- Forecast-Coordinated Operations of Lake Oroville and New Bullards Bar Reservoir

GEI prepared preliminary designs and cost estimates for an additional outlet at New Bullards Bar Dam, including subsurface explorations, and laboratory testing of soil and rock samples obtained from drill holes. Preliminary designs for setback levees included 10 drill holes with laboratory testing of soil samples. Final design, including plans and specifications, was completed for the New Colgate Powerhouse Tailwater Depression element.

For the entire duration of this flood control work GEI was Program Manager for YCWA and worked closely with subconsultants on the GEI Team, as well as with the Department of Water Resources (DWR) on grant administration. To assure a well-coordinated project, GEI also cultivated institutional relationships with the California Department of Fish and Wildlife, the U.S. Army Corps of Engineers, California Reclamation Board, and the Yuba-Feather Work Group.



REFERENCE

Curt Akins, General Manager,
Yuba County Water Agency
530.741.6278

PROJECT COMPLETED

2008

GEI PROJECT FEE

\$172,679

KEY ELEMENTS

Program management
Feasibility studies
Flood control studies
EIR support
Preliminary and final designs
Forecast-Coordinated reservoir
operations
Land acquisition and
management planning
Drilling and soil testing
Levee evaluations for CVFPB and
USACE levees
Flood management feasibility
studies

4.2 MBK ENGINEERS AND HDR ENGINEERING



2012 Central Valley Flood Protection Plan, California *California Department of Water Resources*

The initial CVFPP, prepared by DWR and adopted by CVFPB in June 2012, was developed to provide a comprehensive, systemwide response to the threat of flooding within the Central Valley while improving environmental quality and reducing maintenance costs. MBK, HDR, and GEI are subcontractors assisting DWR with the 2017 CVFPP and are currently tasked with leading the BWFS efforts for the 2017 CVFPP update. Our team members continue to provide strategic planning support and developed the four approaches considered in the CVFPP, and also prepared the engineering cost estimating methodology for evaluating and comparing the state systemwide investment approach to the other approaches.

Members of our team continue to assist DWR with development of near-term and long-term implementation and resource planning strategies of the 2017 CVFPP to best match anticipated funding streams, including current and ongoing programs such as the Urban, Small Communities, and the Non-Urban Flood Risk Management Program.

- Experience in preparing flood management feasibility studies
- Experience working on levees regulated by the CVFPB and the USACE
- Knowledge of the CVFPP, Lower Sacramento River/Delta North RFMP, and Sacramento River BWFS

Wheatland Bear River North Levee Rehabilitation Project, Wheatland, California *Reclamation District 2103*

The Bear River North Levee Rehabilitation Project provided levee repairs to 5.5 miles of the Bear River right bank (north) levee in RD 2103, protecting the City of Wheatland. The wall ranging in depth from 27 to 76 feet, a small 100-foot section of stability berm reconstruction of 150 feet of levee to remediate excessive rodent burrows, and two erosion sites totaling approximately 800 feet in length corrected through bank reconstruction, rock slope protection, and environmental features, such as native vegetation plantings and in-stream woody debris. The project included numerous permits, including CVFPB encroachment permits, Federal Section 404 and Section 7 ESA consultations, a California Section 1600 Streambed Alteration Agreement, and 401 Water Quality Certification; and it included compensatory mitigation for impacts to Valley Elderberry Longhorn Beetles. The project was designed to the 200-year water surface elevation and funded through Proposition 1E at a cost of \$20 million. It was completed in 2010 and certified to FEMA in February 2011.

- Experience in preparing flood management feasibility studies
- Experience working on levees regulated by the CVFPB and the USACE
- Knowledge of the CVFPP, Lower Sacramento River/Delta North RFMP, and Sacramento River BWFS

Colusa Drain Flood Reduction Project, Colusa County, California *County of Colusa*

HDR is developing a feasibility and CEQA evaluation in order to provide 100-year level of flood protection on the west side of the City of Colusa. The feasibility study will evaluate alternatives that propose constructing a ring levee to connect the existing Phase 1 Powell Slough levee and the northern end of the

State Plan of Flood Control levee to provide flood damage reduction from the Colusa Basin Drain. The feasibility study includes geotechnical, hydrologic, and hydraulic analyses of the different levee alignments to determine the costs and benefits of constructing the ring levee to meet FEMA criteria. Analysis will also be conducted in order to prepare the appropriate CEQA documents. MBK and GEI are key members of the project team providing hydraulics and hydrology and geotechnical expertise.

- Experience in preparing flood management feasibility studies
- Experience working on levees regulated by the CVFPB and the USACE
- Knowledge of the CVFPP, Lower Sacramento River/Delta North RFMP, and Sacramento River BWFS

Initial Levee Investigation, Oroville, California

City of Oroville

The City of Oroville (City) is seeking FEMA accreditation for the levee on the south (left) bank of the Feather River adjacent to the City. To help the City towards this goal, our team prepared an Initial Levee Assessment Report (2012) for approximately 1.2 miles of the existing levee located adjacent to downtown Oroville. The purpose of the Initial Levee Assessment Report was to provide the City with technical findings that describe the existing condition of the project levee reach, and that specifically characterize it with regard to the levee certification requirements of the NFIP, as described in part 44 of the Code of Federal Regulation, Section 65.10. This assessment includes a definition of the required levee height relative to the 100-year water surface elevations in the Feather River, as defined by MBK's hydraulic model. The assessment also provides an evaluation of seepage, stability, erosion conditions, seismic vulnerability, a structural encroachment and utility inventory, and an evaluation of the existing Operation and Maintenance Plan.

- Experience in preparing flood management feasibility studies
- Experience working on levees regulated by the CVFPB and the USACE
- Knowledge of the CVFPP, Lower Sacramento River/Delta North RFMP, and Sacramento River BWFS

Urban and Non-Urban Levee Evaluation Program, Statewide

California Department of Water Resources

DWR has been engaged in an unprecedented effort to comprehensively evaluate 350 miles of urban levees (i.e., levees that protect at least 10,000 people) and 1,250 miles of non-urban levees (i.e., levees that protect less than 10,000 people, inclusive of small communities) located within the Central Valley.

The evaluations were conducted through the ULE and NULE projects, respectively, using a multi-firm consulting team, which includes both HDR and GEI. The evaluation of current system performance included an estimate of the risk of levee failure by determining whether they meet defined geotechnical criteria. The scope also included identifying remedial measures, including cost estimates, to meet those desired geotechnical criteria. Our team will leverage this data to help reduce program costs for Yolo County.

4.3 DCC ENGINEERS



DCC Engineers – Water Related or Dependent Design, Permitting and Coordination with Special Consideration to Address Environmental Issues

BALMD Emergency Erosion Repair - Project design, surveying, engineering design, construction contract management and administration, and environmental compliance coordination and oversight for \$19 million emergency erosion repair effort addressing 13 sights and over a mile of waterside levee slope.

Leatherman-Evermon Property - Extensive efforts regarding levee erosion control and property entitlement issues. Coordination with State Lands, Fish and Game, US Fish and Wildlife Service, USACE, State and Local Reclamation, and the Regional Water Quality Control Board.

M&T Statan Ranch - Channel island stabilization and habitat mitigation effort in conjunction with the California Dept. of Fish and Game pilot program. Program called for the installation of floating barriers and detached rock prisms to provide erosion protection in conjunction with habitat enhancement. 11,000 cubic yards of rip-rap affecting 1.5 miles of channel were placed. The project involved close coordination with State Lands and the Department of Water Resources, San Joaquin County.

Salisbury Island - Permit processing for rip-rap placement on a private island within USACE jurisdiction. Coordination with USACE, Regional Water Quality Control Board, Fish and Game, and State Lands Commission.

Village West Marina - Maintenance dredging permit processing for a privately owned marina harbor to restore the basin to permitted depths. Includes coordination of materials testing and assistance with securing on-land disposal site.

Municipal Structures and Public Facilities

City of Isleton - Assist the City with various projects to both rehabilitate and enhance the Isleton community and public services. Many of these projects were completed with California

Development Block Grant funding and involved coordination with agencies for permit compliance.

- City Hall Addition and Modular Buildings for City and Fire Departments - Design through construction documents for the placement of modular buildings with facade build-out to accommodate City services. Includes site surveying, planning and improvement design, construction surveying and grade staking, preparation of construction drawings and specifications, assistance with bidding process and construction monitoring.
- River Front Enhancement and Public Access Improvement Project (River Walk) – Design through construction documents, budgeting, and grant funding services to develop the City’s waterway to allow public access and recreation. Design calls for promenades, fishing accesses, restrooms, parking, and docking facilities.

Walnut Grove Homeowners and Merchants Association (WGHMA) - Assist the WGHMA with various efforts to enhance and revitalize the Walnut Grove Community.

- East Walnut Grove Water System - Preliminary investigation of water system and design analysis for upgrade and development of integrated system with the Walnut Grove Water System. Site surveying, coordination with the WGHMA and the Sacramento Housing and Community Redevelopment Block Grant Program staff (CRBG).

4.4 KSN ENGINEERING



KSN Project Work Experience with Reclamation Districts in Sacramento-San Joaquin Delta

KSN has been serving as District Engineer for many of the Reclamation Districts in the Sacramento-San Joaquin Delta since the mid 1950's, and KSN currently represent in excess of 30 Reclamation Districts and local flood control agencies. KSN's experience includes handling all aspects of district engineering including:

- Designing, bidding, and supervision of construction projects;
- Overseeing and directing of maintenance for levees, pump stations and drainage systems;
- Processing and obtaining permits from State and Federal regulatory agencies;
- Preparing Engineer's reports, and conducting Proposition 218 ballot proceedings
- Preparing and processing annual assessment rolls
- Administering the Delta Levees Subvention Grant Program including the Subventions and Special Projects portion of the program;
- Leading flood fight activities; and
- Developing flood preparedness plans and preparing flood contingency mapping.

In addition to KSN's civil engineering design expertise, KSN also has an exceptional survey department that is familiar with regional survey control networks and flood control related surveying. KSN has many years of experience surveying and mapping property and topographic and bathymetric conditions related to reclamation district levees and facilities.

KSN is uniquely qualified in the area of urban flood protection. KSN has extensive experience with FEMA's levee accreditation procedures, as well as the State's latest 200-year flood policies including the development and implementation of the Urban Levee Design Criteria (ULDC) and the Urban Level of Protection (ULOP).

4.6 BLACKBURN CONSULTING

Feather River West Levee Rehabilitation, Sutter County, California *Sutter Butte Flood Control Agency*



BCI has completed subsurface exploration, laboratory tests, engineering analysis and multiple reports that include findings, conclusions and recommendations for potential borrow sites, seepage mitigation, slope stability mitigation and settlement mitigation. BCI has reviewed over a hundred existing boring logs and over a thousand laboratory test results and performed statistical analysis to determine design parameters for various soil conditions. Detailed excel spreadsheets were utilized to plot laboratory and blow count results to produce a variety of scatter graphs allowing us to determine values for design. BCI has followed current design criteria required by the US Army Corps of Engineers and California Department of Water Resources. BCI has consistently met the project deliverable schedules and budgets for the phases to date.

BCI is providing Quality Assurance Materials Testing and Inspection services for the Feather River West Levee Rehabilitation Project areas B, C, and D. The scope of the project includes correction of levee slope geometry, installation of shallow and deep cutoff walls, reconstruction of pump stations and canals, embankment construction, levee patrol roads, and access ramps. BCI is currently performing all aspects of quality assurance relating to embankment fill, levee clay core, pipe removal and realignments, pump station realignments, open trench soil bentonite and deep mix method cutoff walls, and borrow site analysis, relief well repair, and levee road reconstruction. BCI setup and maintains a fully functioning USACE certified laboratory at the project site to expedite laboratory analysis and turnaround time of results.



Non-Urban Levee Project, Colusa and Yolo Counties, California *California Department of Water Resources*

BCI served on three teams that evaluated levee conditions under the Non-Urban Levee Evaluation (NULE) program for the California Department of Water Resources (DWR). For this program, BCI evaluated approximately 100 miles of levee along the Sacramento River (Knights Landing to Colusa) and the Colusa Basin Drain to determine whether they met defined geotechnical criteria, and, where necessary, to identify remedial measures necessary to meet geotechnical criteria. Services included:

- Document compilation, research, and review,
- Interviews of individuals familiar with the levees,
- Review of levee conditions Site visits to assess levee conditions?")
- Subsurface investigation,
- Laboratory testing, and
- Levee stability evaluation.



BCI's evaluation included an estimate of the risk of levee failure, a discussion of the inspection and review performed, and recommendations regarding levee integrity/adequacy and future work activities.

Star Bend Setback Levee, Sutter County, California
Levee District No. 1 of Sutter County

The Star Bend Setback Levee project involved 3,600 lineal feet of new levee construction along the west side of the Feather River in Sutter County. The project increased flood protection on both sides of the river, and mitigated significant seepage issues under the existing levee. The levee is about 24 feet tall and 20 feet wide at the crest, with side slopes of 3:1 (horizontal to vertical).



BCI completed a subsurface investigation along the proposed levee alignment, performed laboratory testing, and prepared a report containing geotechnical findings and design recommendations. BCI performed finite element seepage analysis, slope stability analysis, and settlement analysis for the new levee. BCI's report included recommendations for seepage mitigation options including a slurry cut-off wall, seepage berm, and pressure relief wells in accordance with USACE design criteria. BCI also provided geotechnical oversight during construction.

5. RESUMES OF GEI PROJECT TEAM

Naser J. Bateni, P.E.

Project Role: Principal-in-Charge, Senior Vice President



Naser Bateni is a senior principal and a senior Vice President at GEI and directs the Planning and Water Management Group in the West Region. He has focused on water resources planning and water management for more than 38 years, in both public and private organizations. His areas of expertise include strategic planning, water policy, planning for major surface and groundwater infrastructure, flood management, flood emergency response, integrated water management, conjunctive management of surface and groundwater resources, groundwater management planning, and reservoir operations.

Prior to joining GEI in 2002, Mr. Bateni served as Chief of Planning and Local Assistance at the California Department of Water Resources, where he managed water resources planning programs and directed staff in the planning of major water supply infrastructure. He developed the Integrated Storage Investigations Program, which consists of surface storage, groundwater conjunctive management, and fish passage programs. He also directed and managed the loan and grant programs that assisted local water agencies to implement water conservation, groundwater storage and recharge, watershed and river restoration, and local water supply projects. His career at DWR also included 11 years of experience in flood operations and the Division of Flood Management, where he developed the California Data Exchange Center.

EDUCATION

M.S., Water Resources, University of California Davis
B.S., Irrigation Engineering, University of Tabriz

EXPERIENCE IN THE INDUSTRY

38 years

EXPERIENCE WITH GEI

10 years

REGISTRATIONS AND LICENSES

Professional Civil Engineer, CA No. 36128

RELEVANT PROJECT EXPERIENCE

Flood Emergency Response (FloodER) Program, California Dept. of Water Resources, Sacramento, CA.

Program manager leading a multi-firm consulting team that is assisting DWR in a variety of activities, including developing integrated flood emergency response plans in accordance with the FloodSAFE California initiative; reviewing current reservoir operations, flood monitoring, forecasting, and warning systems; analyses of climate change, climate data collection and precipitation forecasting; reservoir operations and river forecasting; developing a Flood Emergency Response Information System; preparing local emergency preparedness and flood response plans; conducting flood fight training and flood emergency exercises; developing DWR emergency operations and preparedness plan, and Delta Emergency Operations Preparedness Plan and associated projects; and assisting with program briefings, coordinating meetings, and overseeing development briefing materials and brochures. Also developed a Forecast-Coordinated Operations program to provide a coordinated management of reservoir operations of the San Joaquin River system reservoirs.

FloodSAFE California Program Management, California Department of Water Resources, Sacramento, CA.

As Program Manager, is leading a multi-firm team that is providing DWR with expertise in strategic program planning and implementation, including technical engineering and environmental program planning and management, program partnership, program tracking and reporting, policy development activities, and communication and outreach activities on an as-needed basis for the FloodSAFE Program. One of the key elements of this program is to successfully integrate and coordinate all FloodSAFE programs and projects as a multi-billion dollar initiative.

Statewide Integrated Flood Management, California Department of Water Resources, Statewide, CA.

Planning Task Order Manager for this project under the FloodSAFE California initiative. The project includes providing multidisciplinary planning, engineering, and facilitation support services to prepare the Central Valley Flood Protection Plan including the State Plan of Flood Control for the Central Valley and related activities. The

SPFC-CV includes those facilities within the Sacramento and San Joaquin River watersheds which cover 40 percent of the state.

Engineering Services for Floodplain Management, California Department of Water Resources, Sacramento, CA. GEI is part of a multi-firm team assisting with activities in support of the National Flood Insurance Program and DWR's Floodplain Management Programs. The firm is also performing detailed, awareness, and alluvial fan floodplain mapping studies and community floodplain management support activities. As part of a multi-firm team, is providing engineering support services for floodplain management; specifically, developing strategies for implementation of flood management programs and preparing the draft "Hydrologic and Hydraulic Modeling Studies and Floodplain Mapping."

Forecast-Coordinated Operations Program, Yuba County Water Agency, Marysville, CA. As Project Manager, oversaw the development of this pilot program which was to coordinate the operations of Lake Oroville and New Bullards Bar during major flooding events. Using 5-day forecasts of inflow to the reservoirs, peak flows in the Yuba, Feather, and Sacramento rivers can be reduced by coordinating timed release of water from the reservoirs.

EXPERIENCE WHILE AT CALIFORNIA DEPARTMENT OF WATER RESOURCES

Flood Management. Served 11 years with DWR Division of Flood Management where he designed and implemented the California Data Exchange Center, a hub for collection and exchange of flood and water supply information in California. Prepared flood and water supply forecasts and operated the State-Federal Flood Operations Center.

Water Management and Policy Development (Chief of the Division of Planning and Local Assistance). Responsible for the implementation of 30 programs with an annual budget of over \$250 million. Planned, organized, controlled, and directed the activities of a multidisciplinary staff of over 400. Responsibilities included:

- Management and policy direction for the Division of Planning and Local Assistance including four remote district offices.
- Directed staff in the planning for the development of five major surface water supply infrastructures including the preparation of environmental documentation, permits, feasibility studies, and public involvement processes for all the related facilities. The facilities include conveyance, river diversions, fish screens, dams, power plants, power generators, roads, and recreation.
- Directed a surface and groundwater conjunctive management program by developing cooperative relationships with over 30 water agencies throughout California. In cooperation with local agencies, contributed to the development of major groundwater storage and conjunctive use projects.
- Directed and managed a loan and grant program to assist local water agencies to implement water conservation, groundwater storage and recharge, watershed and river restoration, and local water supply projects. Over \$150 million was granted to local agencies for these projects in 2002.
- Directed activities of the California Water Plan Update. This plan evaluates future urban, agricultural, and environmental water demands and sets the tone and policy for California's future investment on water projects and water management issues.

Directed DWR local assistance programs including financial and technical assistance to local agencies and the general public. Assisted local agencies during flood and drought periods and other emergencies and collected, compiled, and distributed water data throughout California

Jeffrey E. Twitchell, P.E

Project Role: Project Manager & Coordinator of Feasibility Investigations

Jeff Twitchell has over 37 years of project engineering and project management experience in the areas of flood control planning, feasibility studies, design, environmental permitting, constructing and maintaining flood control and water resource facilities in Northern California. Mr. Twitchell is experienced in coordinating with regulatory agencies, flood control districts, water supply agencies, at the local, state, and federal levels. Mr. Twitchell has secured several USACE Section 404 permits, Section 104 and 408 Approvals, and CVFPB permits for levee improvements and encroachments. Mr. Twitchell has been assisting DWR as a lead consultant with strategic planning and technical oversight to develop flood emergency response facilities and programs within the Sacramento San Joaquin Delta in connection with its Delta Flood Emergency Preparedness, Response and Recovery Program.

Mr. Twitchell has been an active participant in the California DWR FloodSAFE Early Implementation Program (EIP) and Local Levee Assistance Program (LLAP) grant and reimbursement programs under State Propositions 1E and 84, and an active member of the DWR FloodSAFE Urban Levee Design Criteria (ULDC) Work Group, a member of the Lower Feather River Corridor Management Plan Work Group, and a key consultant providing input to the 2017 Central Valley Flood Protection Plan (CVFPP). He has served as a project designer and resident engineer on a wide variety of public works and private development projects, including eco-restoration projects.

PROJECT EXPERIENCE

California DWR Delta Flood Emergency Preparedness Response and Recovery Program - Funded by DWR Proposition 1E. Program Manager currently assisting DWR with feasibility investigations, planning, purchasing, and developing emergency response facility sites in the Sacramento-San Joaquin Delta. Currently providing DWR guidance and documents in support of developing incident command facilities and emergency supply/transfer facilities.

Developed emergency supply and repair contracts and specifications to accommodate potential catastrophic levee and channel repairs in the Delta. Also assisted DWR with developing and implementing its Delta Flood Emergency Preparedness and Response Management Plan, and conducted Feasibility Studies for DWR's Delta Transfer Facilities.

Currently assisting DWR with the development of a prototype real-time flood emergency response and recovery modeling tool for predicting water quality conditions, and prioritizing emergency response and recovery actions following catastrophic flood events in the Sacramento - San Joaquin Delta. The Delta - Emergency Response Tool (Delta ERT) will allow DWR staff to more accurately estimate the time for the Delta to recover from the intrusion of salt water with or without installing strategically placed temporary barriers in the Delta.

California DWR FloodSAFE Channel Capacity Atlas. Currently developing Channel Capacity Atlas for State Plan of Flood Control (SPFC) channels within the Sacramento River Flood Control Project (SRFCP). The Atlas compares the USACE 1957 design flows and profiles to the current conveyance conditions and the 100- and 200-year flows utilizing the latest CVFED hydraulic models and CVHS hydrology. Also preparing technical memorandum outlining the O&M obligations and challenges of DWR maintaining the SPFC channels to the flows outlined in the USACE design and profile documents and O&M manuals.



EDUCATION

B.S., Civil Engineering, California State University, Chico

EXPERIENCE IN THE INDUSTRY

37 years

EXPERIENCE WITH GEI

7 years

REGISTRATIONS AND LICENSES

Registered Professional Engineer, CA No. 33653

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers
Flood Management Association

SUCCESSFUL DWR FLOOD GRANT APPLICATIONS/PROJECTS (PROPS 13, 1E, and 84)

Early Implementation Projects: \$16M
Local Levee Assistance Program: \$25M

California Central Valley Flood Protection Plan (CVFPP) 2017 Update. Project senior consultant assisting DWR staff in advancing feasibility study investigations for improving and modifying State Plan of Flood Control (SPFC) levee and bypass systems within the Sacramento, Feather, Yuba, and American River Basins, including the North Delta. Conducting alternatives analyses for improving flood protection levels and reducing the flood risks to areas protected by SPFC levees managed by DWR and the CVFPB. Assisting DWR with the formulation and evaluation of State System Wide Improvements and integrating them with Regional Flood Management Plans (RFMPs), and ecosystem elements within DWR's Conservation Strategy for the CVFPP 2017 Update.

California DWR Statewide Flood Management Program (SFMP). Team Leader. Project consultant team leader assisted DWR staff and CH2MHill in gathering flood risk information and identification of Integrated Flood Management (IFM) projects for the five northerly counties in California, namely Humboldt, Del Norte, Siskiyou, Modoc and Lassen Counties. Met with all five counties and their key flood control agencies, inclusive of cities, flood control districts and Native American Tribes to ascertain where the greatest risks to flooding exist and how the separate regions prepare, respond and recover from flooding events. Inquired about applicable IRWMP activities, and provided updates and summaries of applicable DWR funding programs available to the local flood control agencies. Also provided sample IFM projects for consideration by local agencies, and assistance to other DWR team leaders inquiring about DWR funding programs and IFM opportunities throughout the State.

Sacramento Area Flood Control Agency (SAFCA) and Three Rivers Levee Improvement Authority (TRLIA) Levee Improvement Projects, Yuba County, California. As a subconsultant of HDR Engineering for SAFCA and TRLIA, provided assistance to design and construction teams, responsible for acquiring all Central Valley Flood Protection Board Permits and selective CDFW and USACE approvals for levee modifications on the Sacramento River Pocket and Little Pocket levees, and the Yuba, Bear, and Feather River levee systems. Project improvements along the east levees of the Sacramento River included construction of deep soil mixing (DSM) cut-off walls to protect existing residential areas from under-seepage. Levee improvements on the Yuba River included deep slurry wall cut-off walls and seepage berms to eliminate under and through seepage; Bear River and Western Pacific Interceptor Canal levee improvements include a new two-mile long set-back levee, new pump station and through-levee drainage improvements, freeboard improvements and isolated bank stabilization improvements.

District Engineer and Project Manager for Levee District No. 1 (LD 1) of Sutter County Star Bend Set-Back Levee on Lower Feather River, Sutter County, California. LD 1 District Engineer and project manager for feasibility study investigations, design documents, construction activities and full administration of DWR Proposition 1E/84 Early Implementation Program (EIP) grants in the amount of \$20.5 million. The successful EIP project reduced flood stage levels in the Lower Feather River Basin and has provided regional flood control and eco-restoration Integrated Flood Management (IFM) benefits.

Final acceptance of the Star Bend Setback Levee by DWR and USACE included development of a formal Flood Safety and Preparedness Plan for the entire LD 1 levee system (Unit No. 144 of the Sacramento River Flood Control Project). The Flood Safety Plan was adopted by LD 1, Sutter County, and Yuba City in April of 2011 and supplemented in July 2012 to show conformance with the state's Annual Flood Risk Notification Program and the federal Periodic Levee Inspection Reports pursuant to the State Flood Control Assembly Bills 5 and 156, and the USACE's Policy Guidance Letter (PGL) 52.

Responsible for preparation and administration of Proposition 13 and 1E Grant Applications for the project initially estimated at \$20.8 million. The Project was successfully completion for less than \$15 million with the state funding approximately \$12 million. Project assignments included hydraulic modeling investigations, geotechnical investigations, final plans and specifications, and close-out documents. Responsible for briefing and interfacing with DWR, affected landowners, the USACE technical and regulatory staffs, local cost-sharing partners and the regulatory resource agencies.

William J. Bennett, P.E., G.E.

Project Role: QA/QC Reviewer, Vice President and Principal Engineer



Bill Bennett is a GEI Project Manager for the water resources planning practice for the Pacific Region. He has spent four decades in water resource planning and dam engineering for public and private organizations.

His expertise includes developing water management plans, managing flood emergency response activities and other flood management programs, overseeing grant and loan funding, and working on water transfers, watershed management, and fish passage. He has extensive experience in collaborative planning and guiding stakeholder groups to decisions on shared resources. Additionally, Mr. Bennett has substantial experience in all aspects of dam safety work and has performed or directed numerous independent engineering analyses on proposed or existing dams in California.

RELEVANT PROJECT EXPERIENCE

Delta Flood Emergency Safety Plans, Sacramento County OES, Sacramento County, CA. Principal-in-Charge. Assisting the County with updating its Delta Flood Emergency Action Plan (EAP) in coordination with the Levee Maintaining Agencies (LMAs).

Flood Emergency Response (FloodER) Program, California Dept. of Water Resources, Sacramento, CA. GEI is the prime consultant assisting DWR with a major, multi-year program to overhaul California's Flood Emergency Response Program. Assisted with Flood Academy, Delta Flood Emergency Preparedness, Response and Recovery Plan, New JOC, and other planning efforts.

FloodSAFE California Program Management, California Dept. of Water Resources, Sacramento, CA. This is a five-year project to help the California DWR implement a comprehensive, sustainable flood management program for the state. Work includes review of web communications, development of implementation plans, contract system improvements and other support as required.

Statewide Flood Management Plan, CH2M-Hill for California Dept. of Water Resources, Sacramento, CA. Serves as GEI's Lead Manager for supporting DWR's Statewide Flood Management Program and the production of California's Flood Future Report. Directs GEI staff in data gathering, mapping of risk analysis and infrastructure, and other aspects of this important program.

Central Valley Flood Protection Plan, MWH for California Dept. of Water Resources, Sacramento, CA. Serves as GEI's Contract Manager supporting DWR's development of the CVFPP as part of the consultant team. The plan was developed in 2011-2012 and recently adopted by the Central Valley Flood Protection Board.

Embedded Energy in Water Statewide and Regional Water-Energy Relationship, California Institute for Energy and Environment, Sacramento, CA. Program Manager. In concert with Navigant Consulting, was responsible for conducting two studies developed for the California Public Utilities Commission.

EXPERIENCE AT THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

Dam Safety and Flood Management. Has considerable on-the-ground experience in handling flood, earthquake, and other dam-related and levee emergencies. Was on the DWR's executive team for the 1997 California Floods and was the operations manager for the state's dam safety response and post-event inspection program for the Morgan Hill, Loma Prieta, and Northridge earthquakes, receiving department team commendations for the thorough and timely emergency response. Was incident commander on several dam

EDUCATION

B.S., Civil Engineering, University of California Davis
M.S., Soil Mechanics, University of California Davis

EXPERIENCE IN THE INDUSTRY
41 years

EXPERIENCE WITH GEI
10 years

REGISTRATIONS AND LICENSES

Professional Civil Engineer, CA No. 26848
Professional Geotechnical Engineer, CA No. 137

safety emergencies and other emergency operations for lesser earthquake responses. Dam failure investigation for Lake Leavitt and North Lake dams are notable examples.

With the State Division of Safety of Dams, performed or directed numerous independent engineering analyses on proposed or existing dams in California. This includes the review and approval of plans and specifications, evaluations of structural design and independent analyses of hydrology, hydraulics, and structural adequacy of spillways, outlets and other appurtenant structures. Performed seismic stability, liquefaction, and dynamic response analyses for dams such as Camanche, Lopez, Calaveras, Estates, Thermalito Afterbay and Forebay, Pilarcitos, San Andreas, and Oroville. Has several related publications. As Regional Field Engineer, he led construction oversight for several new major California dams including Seven Oaks, Los Vaqueros, and Homestake Mine Tailings. For eight years led a team responsible for annual maintenance inspection for 40% (450) of the state's jurisdictional dams.

Water Management Planning. Responsible for the California Water Plan Update in 1998, as well as elements of the 1993 plan update. Helped institute and supervise the planning process for California's offstream water storage development (Sites Reservoir preliminary planning) and the Integrated Storage Investigation Program, which includes conjunctive use of groundwater, fish passage, on-stream storage enlargement, and Delta storage alternatives.

For five years was California's Klamath River Compact Commissioner and for several years, a representative to the Trinity River Task Force, dealing with interstate water, water rights allocations, and controversial endangered species restoration and protection measures. As Special Manager for Klamath Watershed Issues, actively worked with federal, state, and local groups to successfully meld species recovery efforts with continued agricultural water use. Served on the state's Shasta-Scott Coho Recovery Team and participated in the Statewide Coho Recovery Plan compilation for DWR. Attended Klamath Stakeholders Collaborative Sessions (Chadwick Workshops) on Klamath River Watershed issues. Other collaborative efforts included the San Clemente Dam stakeholder discussions, the Glen-Colusa Irrigation District Fish Screen Agency Team, and the Trinity River Task Force.

Water Use Efficiency and Transfers. Supervised the State's Water Use Efficiency and Transfers Office in 2005 and 2006. Oversaw water transfers in California and was a part of the Calfed Environmental Water Account Team, negotiating statewide water acquisitions and transfers between various water districts and DWR to offset fish restoration actions within the Bay-Delta. Was in charge of California's agricultural and urban water conservation, desalination, water recycling related grants, and technical assistance programs. He also administered the review of all urban water management plans submitted by urban water suppliers every 5 years (more than 350 submittals).

Michael Conant, P.E.

Project Role: Team Lead for Community of Locke, Staff Engineer



Michael Conant is a registered civil engineer with eight years of experience specializing in water resource engineering and program management especially related to flood planning in the California Central Valley and California Delta.

He has been involved in the DWR Central Valley Flood Protection Plan, and supported many DWR FloodSAFE activities including program management, implementation, and resourcing. His experience includes expansive flood planning projects including strategic and implementation plans for DWR Division of Flood Management, analysis of watershed runoff characteristics, data QA/QC, and producing plans and details using AutoCAD and GIS.

EDUCATION

B.S., Civil Engineering, University of California, Davis

EXPERIENCE IN THE INDUSTRY

8 years

EXPERIENCE WITH GEI

8 years

REGISTRATIONS AND LICENSES

Professional Engineer, CA No. 79228

PROJECT EXPERIENCE

Central Valley Flood Protection Plan, California Department of Water Resources, Sacramento, CA.

The intent of the Central Valley Flood Protection Plan (CVFPP) is to provide guidance in managing flood risk along the Sacramento and San Joaquin River systems. SB 5 dictated the CVFPP is updated every five years, and the 2017 version of the plan will be the second publication. Assisted in planning and technical activities in progressing the Sacramento Basin-wide Feasibility Study (BWFS). Activities included assistance with project management, plan formulation, alternatives analysis, and review of non-structural action. Also assisted with review of hydrologic and hydraulic modeling results, program cost estimates, geotechnical assessment of levee conditions, development of ecosystem enhancements, and helped prepare materials for and coordinate review discussions with DWR.

FloodSAFE California Program Management – Project Database, California Department of Water Resources, Statewide, CA.

Project engineer assisting in project management and resource planning during the creation of a project tracking database. The database is used to better track expenses and the work done on projects for DWR's Department of Flood Management and allows project managers to better track their project progress. Assisted with resource planning that included identification of State operations and local assistance funding to help identify potential funding or staffing discrepancies. Other activities include assisting in developing of annual accomplishment reports for the department and assisting in development of process diagrams to document tracking procedures.

FloodSAFE California Program Management – Program Resourcing, California Department of Water Resources, Statewide, CA.

Participated in the development of the 2010 FloodSAFE Implementation Plan. This effort included aligning the available funding with the work activities and resourcing among the DFM organization and the FloodSAFE Program organizational structure of functional areas, elements, and components. The program interdependences (referred to as functional area cross-coordination teams) were mapped across the DFM and other participating State, federal, and local agency participants. Assisted in development of funding availability for each of the functional areas.

FloodSAFE California Program Management – RFMP Regional Atlas, California Department of Water Resources, Statewide, CA.

Regional Atlases that are prepared to support and assist in the preparation of the Regional Flood Management Plan (RFMP). This task included developing the framework and layout of the Atlases, incorporating all available GIS information used during the development of the CVFPP, preparing the layout for the individual regions, coordinating data collection efforts from ongoing DWR programs including the Flood System Repair Program, and working with DFM staff and the RFMP lead agencies to coordinate data exchange procedures.

Star Bend Levee, Levee District No. 1, Sacramento, CA. Prepared plans and details of project features using CAD to assist in the operations and maintenance of the project area. Also assisted in project management including tracking of project expenses for State reimbursement.

Flood Emergency Response Program (Phase I), California Department of Water Resources, Statewide, CA. As part of DWR's Flood Emergency Response Program, assisted in the development of the Delta Flood Emergency Facilities Improvement Project. The intent of this project is to increase preparedness of the Department of Water Resources to respond to flooding emergency within the California Delta. Prolonged flooding of the Delta islands can cause catastrophic economic damage within the area, as well as disrupt the water supply for Southern California. Performed site feasibility research for repair facilities, project site plans and details, and cost analysis for the facilities.

Kristopher Van Sant, P.E.

Project Role: Structural Solutions-Cost Estimating, Senior Engineer



Kris Van Sant is a senior engineer with experience providing engineering support in the design and construction phases for levee and dam work. He has a background in geotechnical, environmental, and structural engineering along with surveying experience.

PROJECT EXPERIENCE

Feather River Levee Repairs and Setback Levee, Three Rivers Levee Improvement Authority, Marysville, CA.

Worked on the design and construction teams improving and repairing two segments of the existing Feather River Levee totaling approximately 6.5 miles of levee and a 6-mile setback levee to be constructed up to 0.5 miles back from the existing Feather River levee. Levee repair work involved the installation of soil-cement-bentonite and soil-bentonite cutoff walls, stability berms, seepage berms, relief wells and piezometers, slope flattening, and crown reshaping. Setback levee work involved foundation preparation, soil-bentonite cutoff walls, stability berms, relief wells and piezometers, drainage ditch construction, culvert and railcar bridge placement, pump station construction, and existing levee degradation. Worked as part of the design team as well as the design representation and QA support in the field during the construction phase of the remediation work. Duties included design and preparation of the construction contract drawings, quantity analysis, coordination and design of field improvements, analysis of project QA/QC, relief well design and review, coordination of QA surveys, review and response to contractor RFI's and submittals, construction inspection and coordination and compilation of the construction completion reports.

Upper Sand Creek Detention Basin, Contra Costa County Flood, Antioch, CA. GEI served as the Engineer of Record for this 50-acre detention basin formed by construction of a dam and excavation. The basin was designed to provide 100-year-flood protection and serve multi-use recreational and environmental purposes. Worked on the design team for the Upper Sand Creek Basin Expansion and is currently part of the design team providing engineering support to the County for the construction phase of the project. The Upper Sand Creek Basin Expansion design involved expanding a current detention basin along the Upper Sand Creek in the foothills of Antioch with approximately 100 acre-feet of capacity to a basin with approximately 900 acre-feet of capacity. Basin expansion efforts include the construction of an earth dam across Sand Creek as well as up to 60 feet of excavation from the existing ground to the design basin surface. Duties during design included design and preparation of the construction contract drawings for the dam, basin expansion and grading as well as performing area-capacity analysis for the basin. Duties included in the engineering support for the County during construction include submittal and RFI review and response.

Flood Emergency Response Program (Phase I), California Department of Water Resources, Statewide, CA. GEI is the prime consultant assisting DWR with a major, multi-year program to overhaul California's Flood Emergency Response Program. Worked as GEI's principle engineer on the initial design of three sections of multi-piezometers along a 100 foot stretch of levee of the Sacramento River within Reclamation District 1500. A total of eighteen fully grouted multi-piezometers, two open standpipe piezometers, and a sand packed multi-piezometer were designed. Duties included the design and preparation of the design package.

Periodic Levee Inspections - Chico and Mud Creek Levee Systems, U.S. Army Corps of Engineers, Sacramento, CA. Worked in collaboration to inspect and then evaluate the condition of two levee systems, the Brannan-Andrus (Sacramento County, CA) and Cherokee Canal (Butte County, CA) levee systems totaling 51.6 miles. Duties for the Brannan-Andrus levee system in Sacramento County, California included the research of historical documents, crafting a pre-inspection packet, inspection of 28.77 miles of levee, and drafting the final evaluation report. For the Cherokee Canal levee system in Butte County, California, duties included the inspection of 22.87 miles of levee.

EDUCATION

B.S., Civil Engineering, University of California Davis

EXPERIENCE IN THE INDUSTRY

10 years

EXPERIENCE WITH GEI

10 years

REGISTRATIONS AND LICENSES

Professional Civil Engineer, CA No. 76640

Dams and Reservoirs on Kauai, State of Hawaii, Honolulu, HI. GEI evaluated the existing condition of five state-owned dams on the island of Kauai and performed design and construction management work to mitigate identified deficiencies or remove the dam from state jurisdiction in accordance with the Hawaii Dam and Reservoir Safety Act of 2007. Worked as the Resident Project Representative (RPR) during the construction phase from June 2011 to October 2012. Construction began on four dams: the Wailua Reservoir Dam, Upper Kapahi Reservoir Dam, Hanamaulu Field 21 Reservoir Dam and the A'ohoaka Reservoir Dam. As the sole design representative on island, duties included construction inspection, foundation inspection and approval, review and response to contractor RFI's and submittals, analysis of project QA/QC, coordination of weekly progress meetings, design of required remediation efforts, creating construction EAP's, providing cost estimates, composing O&M manuals, and emergency inspections during severe storm events.

Periodic Inspections - Cache Creek Yolo and Willow Bypasses Levee Systems, U.S. Army Corps of Engineers – Sacramento District, Northern, CA. Worked in collaboration to inspect and then evaluate the condition of the Cache Creek (Yolo County, CA) levee systems totaling 50.1 miles. Duties for the Cache Creek levee system PI in Yolo County, California included the research of historical documents, crafting a pre-inspection packet, inspection of 50.1 miles of levee, drafting the final evaluation report, and development and preparation of the final recommendations presentation to the USACE.

AWARDS

IID- All American Canal Design, "*Project of Year 2012*", American Public Works Association, San Diego & Imperial Counties Chapter

TRLIA-Feather River Levee Repairs, "*Outstanding Flood Management Project 2010*", ASCE, Region 9

IID- All American Canal Design, "*Public Works Project of the Year 2010*", American Public Works Association

TRLIA-Feather River Levee Repairs, "*Flood Control Project of the Year 2009*", ASCE, Sacramento Section

Graham Bradner, P.G., C.E.G., CHg., P.M.P.

Project Role: Geotechnical Investigation Lead, Senior Geologist



Graham Bradner is a Professional Geologist, Certified Engineering Geologist, and Certified Hydrogeologist. His background includes expertise in subsurface exploration, subsurface and aquifer characterization, relief well and extraction well design, and geotechnical modeling. Mr. Bradner has extensive knowledge of geotechnical drilling techniques, and is also experienced with aquifer testing and analysis procedures, geophysical data interpretation, and geomorphologic and geologic interpretation of subsurface conditions, which he routinely applies to dam and levee projects.

Mr. Bradner regularly interfaces with State and Federal regulatory agency representatives, and provides detailed technical presentations to clients and reviewers. He routinely develops project scopes, costs, and schedules, and performs ongoing project management activities for several simultaneous projects.

PROJECT EXPERIENCE

Sacramento River East Levee Improvement Project, Sacramento Area Flood Control Agency, Sacramento, CA.

Project Geologist supervising all aspects of the investigation and evaluation of 8.1 miles of levee along the eastern bank of the Sacramento River, which protects urbanized Sacramento and Pocket area neighborhoods. Work consisted of gathering geotechnical information and performing an evaluation of the levees for seepage and stability with the objective of identifying deficiencies and developing remedial measures, where necessary, and complying with USACE criteria on these Federal levees.

Levee Evaluations, Kings River Conservation District, Fresno, CA. Project Manager for the evaluation of 140 miles of flood project levees within the District's service area. Tasks include identifying deficiencies and recommending appropriate management actions, where appropriate. The scope includes the review of existing information, identification of data gaps, collection of additional data, performing analyses, and review of remedial alternatives.

DWR Urban and Non-Urban Levee Evaluations Program, California Department of Water Resources, Statewide, CA. GEI Project Manager for the following Study Areas:

- ULE Marysville, 7.6-mile ring levee, Marysville, CA
- ULE Sutter Feather River, 42 miles of levee, Feather River west bank, Thermalito Afterbay to Sutter Bypass
- ULE American River, 22 miles of levee, north and south bank from high ground to Sacramento River confluence
- NULE Colusa South, 23.5 miles of levee, Sacramento River west bank, Colusa to Tisdale Bypass
- NULE Colusa Drain, 13.5 miles of levee, Colusa Basin Drainage Canal east bank, South of Colusa

Responsibilities include interpretation of subsurface conditions and evaluations of levee performance. Developed subsurface investigation plans, managed field exploration programs, and performed analyses. Presented findings to clients, partners, and stakeholders. Coordinated numerous team partners to obtain access rights, local and regional permits, and cultural and biological clearances. Performed cost estimating, resource scheduling, and attended client meetings.

EDUCATION

M.S., Hydrogeology, Clemson University
B.S., Environmental Geology, Clemson University

EXPERIENCE IN THE INDUSTRY
13 years

EXPERIENCE WITH GEI
10 years

REGISTRATIONS AND LICENSES

Certified Engineering Geologist, CA No. 2495
Certified Hydrogeologist, CA No. 862
Professional Geologist, CA No. 7805

CERTIFICATIONS

Project Management Professional No. 1365358

Robert A. Jaeger, Ph.D., P.E.

Project Role: Geotechnical Investigations, Project Engineer



Dr. Robert Jaeger is a project engineer with experience in seepage, stability, and deformation analysis of dams and levees, liquefaction triggering evaluations, subsurface characterization, and instrumentation. Since joining GEI Consultants, he has evaluated over 125 miles of levees in California and several dams across the country. Dr. Jaeger is currently a lead analyst for four study areas of the California Department of Water Resources Urban and Non-Urban Levee Evaluation Programs. Prior to joining GEI Consultants, Dr. Jaeger was a doctoral student at the University of California at Davis under the guidance of Professor Jason DeJong and Professor Ross Boulanger. Dr. Jaeger's research included the development of a framework for interpreting soil properties from cone penetration tests (CPT) in sands and intermediate soils (e.g. silts, silty sands, sandy silts, and clayey silts) and evaluations of the effects of fines content on CPT-based liquefaction triggering relationships for sand.

PROJECT EXPERIENCE

DWR Urban and Non-Urban Levee Evaluations, URS

Corporation, Statewide, CA. GEI is a key member of a multi-firm team engaged in an unprecedented effort to comprehensively evaluate 350 miles of urban levees and 1,250 miles of non-urban levees in California's Central Valley. The evaluation estimates the risk of levee failure by determining whether they meet defined geotechnical criteria and identify remedial measures including cost estimates required to meet the criteria. Efforts have included the characterization of levees and foundations with field and laboratory tests, development and evaluation of steady-state seepage models to assess seepage gradients and the static and rapid drawdown stability of levees, liquefaction triggering evaluations, and design and analysis of remediation alternatives to mitigate seepage and stability hazard for over 125 miles of levees. Has been the lead analyst for three study areas and continues to be a key member of GEI's ongoing levee evaluation projects.

Flood Emergency Response Program (Phase I), California Department of Water Resources, Statewide, CA. GEI is the prime consultant assisting DWR with a major, multi-year program to overhaul California's Flood Emergency Response Program. Analyzed the data collected from a network of piezometers that were installed within a 100-foot section of levee along the Sacramento River near Colusa, California. Developed and analyzed seepage models of the instrumented levee sections to assess the feasibility of instrumentation networks for real-time monitoring of levee performance.

Engineering Design Support for Dam Safety, California Department of Water Resources, Statewide, CA. GEI provides a variety of dam safety engineering services for all 30 State Water Project dams. For this phase of the project, GEI led a team of technical experts, under the direction of DWR, in the development of the Delta Seismic Design report, which addresses the complexities and difficulties of evaluating the seismic stability of State Water Project facilities in the Sacramento – San Joaquin River Delta region. Dr. Jaeger coauthored a section within the report titled "Delta Specific Design Criteria and Application of Load to Structure" and led the effort of editing and compiling the final report.

GRADUATE ENGINEERING COURSEWORK

- Advanced Soil Mechanics (ECI281A, ECI281B)
- Physico-Chemical Influences and In Situ Evaluation of Soil Behavior (ECI283)
- Advanced Foundation Design (ECI286)
- Geotechnical Earthquake Engineering (ECI287)
- Earth and Rock-Fill Dams (ECI288)

EDUCATION

Ph.D., Civil and Environmental Engineering, University of California, Davis

M.S., Civil and Environmental Engineering, University of California, Davis

B.S., Civil and Environmental Engineering, University of California, Davis

EXPERIENCE IN THE INDUSTRY

5 years

EXPERIENCE WITH GEI

5 years

REGISTRATIONS AND LICENSES

Professional Civil Engineer, CA No. C82502

- Advanced Hydrogeology (ECI272A)
- Theoretical Geomechanics (ECI284)
- Computational Geomechanics (ECI285N)
- Dynamic Finite Elements (ECI280B)
- Finite Element Procedures in Applied Mechanics (ECI212A)
- Meshfree Methods and Partition of Unity Finite Element Methods (ECI289F)
- Theory of Elasticity (ECI201)
- Inelastic Behavior of Solids (ECI203)
- Continuum Mechanics (ECI205)

PROFESSIONAL DEVELOPMENT COURSES

- Earthquake Reconnaissance, Dr. Rob Kayen, UC Davis Geotechnical Graduate Student Society Summer Institute, 2009
- Rock Mechanics: A Short Course, Professor Richard Goodman, UC Davis Geotechnical Graduate Student Society Summer Institute, 2008
- Dam Failure/Incident Case Histories, United States Society on Dams Annual Meeting and Conference, 2008
- Cone Penetration Testing Short-Course, Gregg Drilling, 2007

- In Situ Testing Field Day, Taber Consultants, 2007

COMPUTER SOFTWARE

- Numerical Modeling: FLAC 5.0/6.0/7.0, OpenSEES
- Programming, data acquisition, and signal generation in LabView
- Geotechnical Software: UTEXAS 3, UTEXAS 4, SHAKE91
- Computation Environments: MathCAD, MATLAB
- Programming Languages: C++, TCL
- Operating Systems: Windows, Mac OS X, Linux/Unix

PUBLICATIONS

"State-Based Overburden Normalization of Cone Penetration Resistance in Clean Sand," Maki, I. P., Boulanger, R. W., DeJong, J. T., and Jaeger, R. A., ASCE Journal of Geotechnical and Geoenvironmental Engineering, accepted, 2013.

"Numerical Analyses of Penetration Resistances in Silty and Clayey Sands at High Overburden Stresses," Maki, I. P., Boulanger, R. W., DeJong, J. T., Jaeger, R. A., and Driller, M. W., Center for Geotechnical Modeling Report, in preparation, 2013.

"Numerical and Experimental Study on Cone Penetration in Sands and Intermediate Soils," Jaeger, R. A., Ph.D. Thesis. University of California, Davis, 2012.

Alberto Pujol, P.E., G.E.

Project Role: Geotechnical Evaluations, Senior Principal Engineer

Alberto Pujol is a registered civil engineer with over 30 years of experience. He has been responsible for the planning, siting, evaluation, and design of a wide range of water resources projects as well as numerous projects involving the rehabilitation or replacement of existing infrastructure; including levees, dams, pipelines, roads, tunnels, and impoundments. Managing contracts with professional service budgets up to \$25 million, he has directed conceptual and feasibility engineering, planning and execution of investigations, development of construction plans and specifications, preparation of reports, and construction management. He has extensive experience in the supervision of multi-disciplinary teams of engineers and scientists, as well as a strong technical background with emphasis on solving problems and reducing costs, particularly for levee improvement projects in Northern California.

Mr. Pujol has provided engineering support of construction operations for dams, and flood control projects, including temporary support of excavations, river diversions, cofferdam design, borrow area operations, material processing, dewatering systems, sediment control, and access roads.

PROJECT EXPERIENCE

Sacramento River East Levee Improvement Project, Sacramento Area Flood Control Agency (SAFCA), Sacramento, CA. Project Manager for the geotechnical evaluation, remediation design, and FEMA accreditation support for 8.1 miles of CVFPP and USACE levees along the left bank of the Sacramento River in Sacramento County, including evaluation of stability and seepage of levee and foundations, existing utility penetrations, erosion and scour potential, design of levee remediation measures, and preparation of documentation to support FEMA accreditation of the levee system.

DWR Urban Levee Evaluations - Feather River Sutter County, California Department of Water Resources, Sacramento, CA. Serving as Senior Technical Reviewer on behalf of DWR's Early Implementation Group. The Sutter-Butte Flood Control Agency (SBFCA) is developing detailed designs for the remediation of 44 miles of levee along the west bank of the Feather River north of Sacramento. A significant portion of the funding for the project is being provided by the Department of Water Resources under California's Proposition 1E Program. Role responsibilities include reviewing the adequacy, appropriateness, and acceptability of the SBFCA designs for the purpose of assuring public health, safety, and welfare, while maintaining a cost-effective remediation approach.

Feather River Phase 4 Levee Repairs and Setback Levee, Three Rivers Levee Improvement Authority, Yuba County, CA. Project Manager and Engineer-of-Record for Feather River Phase 4 Levee Repairs, a \$200M project that addressed safety deficiencies for 13 miles of the left bank Feather River levee between the Yuba and Bear Rivers. The project involved the strengthening of seven miles of existing CVFPB and USACE levee, the removal of six miles of existing levee, and the construction of a new 5.6-mile-long setback levee. The levee strengthening program included the full range of levee remedial measures, i.e., levee raises, cutoff walls, waterside low-permeability blankets, stability berms, slope flattening, relief wells, and a flood gate at a railroad crossing. The setback levee, now completed, incorporated 1.4 million square feet of cutoff wall, 3.6 million cubic yards of levee fill, and an interior drainage system including a 5-mile-long channel, 24 relief wells and a major pump station. The project also included riparian restoration and fish stranding mitigation measures within the new floodplain. The GEI team performed the planning studies, supported project permitting including USACE 408 approval, prepared the preliminary and final designs, and provided CM and FEMA accreditation services.



EDUCATION

M.B.A., Business Administration,
University of California
M.S., Civil Engineering /Geotechnical
Engineering, University of Wisconsin
B.S., Civil Engineering, Polytechnic
University of Madrid

EXPERIENCE IN THE INDUSTRY

34 years

EXPERIENCE WITH GEI

16 years

REGISTRATIONS AND LICENSES

Professional Geotechnical Engineer, CA
No. GE2072
Professional Civil Engineer, CA No.
C37051

Bear River Setback Levee, Three Rivers Levee Improvement Authority, Yuba County, CA. Project Manager and Engineer-of-Record. This project consisted of feasibility planning, investigating, designing, and constructing two miles of setback levee to increase the level of flood protection in southwestern Yuba County. This \$51M project gives the Bear River additional channel capacity and lowers the water surface profile by over 3 feet during major flood events, providing Reclamation District 784 with 200-year flood protection. The project included the removal of the existing levee and the riparian restoration of 600 acres within the new floodplain. GEI performed the planning studies, supported project permitting including CVFPB/USACE 408 approvals, prepared the preliminary and final design of the setback levee and associated structures, and provided CM services.

Natomas Levee Improvement Program Peer Review Services, Sacramento Area Flood Control Agency, Oakland, CA. Project Manager for leading an independent evaluation of a recently-constructed levee along the left bank of the Sacramento River within the City of Sacramento. The regulatory agency with responsibility to approve the levee construction had issued SAFCA two Notices of Violation regarding some of the materials used to construct the levee within two specific reaches. Services included a sampling and testing program to evaluate the levee materials and as-built conditions in the levee, and investigation documentation.

Sacramento Riverbank Protection Plan, USACE - Sacramento District, Sacramento, CA. Served as the geotechnical reviewer on panels of experts conducting Type II Independent External Peer Reviews, also known as Safety Assurance Reviews, for the following levee modification projects:

- Napa River Dry Bypass, Napa
- Sacramento Riverbank Protection 57.2R, West Sacramento
- American River Common Features, Sites R3A, R6, R7, L7, Howe Avenue, L10, NEMDC North, Sacramento
- South Sacramento Streams, Florin Creek, Sacramento

The reviews were conducted in general accordance with the guidelines contained in Appendix E of the Corps' Engineer Circular 1165-2-209. The review panels considered adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. Reviewed and commented on the design documentation report (Basis of Design), the Operations and Maintenance Manual, and the final plans and specifications, and performed a construction review at the midpoint of construction for the projects that advanced to construction.

Upper Sand Creek Detention Basin, Contra Costa County Flood Control & Water Conservation District, Antioch, CA. Project Manager and Engineer-of-Record for this 50-acre detention basin formed by construction of a dam and excavation. The basin was designed to provide 100-year-flood protection and serve multi-use recreational and environmental purposes. Responsible for managing design studies including the detention basin and dam alignment layout; field explorations and laboratory testing; geologic investigation and interpretation; analyzing the static and seismic stability and seepage of the proposed dam; preparation of geotechnical data report and design report; preparation of plans and specifications; and coordination of design reviews with DSOD. Construction of the 40-foot-high earth dam and 1,000-acre-foot detention basin was completed in early 2014.

Shoreline Levee Design, Alameda County Public Works Agency, Hayward, CA. Project Manager for the planning and design of six miles of new shoreline levees along the east shore of San Francisco Bay in Alameda County. The need for new flood protection facilities results from the ongoing restoration of a historic salt pond complex to tidal marsh and from higher tide levels and sea level rise. The project involves identifying feasible and cost effective levee alignments for implementation, evaluating alternative alignments, and developing preliminary and final engineering designs for the selected levee alignments. Project activities also include hydrologic modeling of the salt pond and flood control systems, stakeholder outreach activities, decision support processes, and support of environmental compliance efforts.

Emilie Singleton, P.E.

Project Role: Geotechnical Evaluations, Senior Engineer



Emilie Singleton is a professional civil engineer with experience in geotechnical and civil engineering evaluations, analyses, and design, with specific strengths in levee analysis and evaluation. She is proficient in subsurface geologic evaluations, project/task coordination, report preparation, and drafting in support of civil/geotechnical engineering evaluation and design. She is also well experienced in database management and project QA/QC.

PROJECT EXPERIENCE

Sacramento River East Levee Improvement Project, Sacramento Area Flood Control Agency, Sacramento, CA.

Project Engineer helping to complete the geotechnical evaluation and remediation design of 8.1 miles of levee along the left bank of the Sacramento River in Sacramento County, including evaluation of stability and seepage of levee and foundations, design of levee remediation measures, and preparation of documentation to support FEMA accreditation of the levee system. Responsibilities have included data collection and review, development of subsurface profile and cross sections, management of gINT databases and coordination of boring log completion, data sharing with external project participants, preparation and coordination of project documents, and contribution to design drawings.

Central Valley Flood Protection Plan, California Department of Water Resources, Sacramento, CA. The intent of the Central Valley Flood Protection Plan (CVFPP) is to provide guidance in managing flood risk along the Sacramento and San Joaquin River systems. Task lead providing geotechnical support for the Sacramento Basin Wide Feasibility Study being prepared in support of the 2017 CVFPP update. Provided assessment of existing levee conditions based on geotechnical evaluations recently completed for DWR to help facilitate the selection and extent of levee improvements for the feasibility study. Responsible for data collection and review, existing levee conditions assessment, and documentation and presentation of geotechnical results.

Urban and Non-Urban Levee Evaluations, California Department of Water Resources, Statewide, CA. GEI was a key member of a team engaged in an unprecedented effort to comprehensively evaluate 350 miles of urban levees and 1,250 miles of non-urban levees in California's Central Valley. GEI Lead Analyst and/or key team member for the following Study Areas:

- ULE Marysville, 7.6-mile ring levee, Marysville, CA
- ULE Sutter Feather River, 44.7 miles of levee, Feather River west bank, Thermalito Afterbay to Sutter Bypass
- ULE American River, 22 miles of levee, north and south bank from high ground to Sacramento River confluence
- ULE Reclamation District 17, 16.2 miles of levee, east bank of the San Joaquin River from south Stockton to Walthall Slough, south of Lathrop.
- NULE Colusa South, 24 miles of levee, Sacramento River west bank, Colusa to Tisdale Bypass
- NULE Colusa Drain, 13.5 miles of levee, Colusa Basin Drainage Canal east bank, South of Colusa

Responsibilities included site characterization of levees, development and evaluation of steady-state seepage models to assess seepage gradients and the static and rapid drawdown stability of levees, and selection and analysis of conceptual remedial alternatives to mitigate seepage and stability hazards. Presented findings to clients, partners, and stakeholders in addition to close coordination with GIS staff and other internal team members, external team members, and the client. Managed gINT databases, coordinated of completion and review of boring log and laboratory testing. Maintained QA/QC documentation and prepared and coordinated completion of project documents including CAD graphics.

EDUCATION

B.S., Civil Engineering, University of California, Davis

EXPERIENCE IN THE INDUSTRY

9 years

EXPERIENCE WITH GEI

8 years

REGISTRATIONS AND LICENSES

Professional Civil Engineer, CA No. 76672

FloodSAFE California Program Management, California Department of Water Resources, Statewide, CA. The FloodSAFE Program was established to address California's long-term flood management issues. GEI was selected by DWR as the FloodSAFE Program Management Engineering Consultant to aid in strategic program planning, development and implementation of this critical statewide effort. Contributed to the formulation of the Regional Levees: Descriptions and Assessment Results Appendix of the Regional Flood Management Plan for the Feather River System. The Regional Flood Management Plan was prepared for the Yuba County Water Agency, Three Rivers Levee Improvement Authority, Marysville Levee Commission, and Sutter Butte Flood Control Agency. The plan reflected the flood management priorities of the Feather River Region while at the same time aligning with the 2012 Central Valley Flood Protection Plan to the extent feasible and is intended to facilitate future funding and implementation of much-needed flood risk reduction projects. Additionally, responsibilities included helping to facilitate and support meetings for several of FloodSAFE's newly created Functional Area Cross-Coordination Teams (FAXCTs). Responsibilities included providing requested support to team leads, preparing meeting materials and meeting summaries, and maintaining team document files and calendar on program SharePoint site.

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers, Member

Association of Women in Water, Energy, and Environment, Member

Chris A. Ferrari, P.E., CFM

Project Role: Technical Lead for Hydrology and Hydraulic Investigations, Senior Professional



Chris Ferrari has 25 years of comprehensive experience in both the public and private sectors. Mr. Ferrari is currently the project manager developing several Emergency Safety Plans in the Delta along the Sacramento River system for the Sacramento County Office of Emergency Services and the Department of Water Resources. Mr. Ferrari was also the project manager and played a significant role in developing the DWR Central Valley hydraulic model for the Sacramento River system. During his 20 years in the private sector, Mr. Ferrari has developed, evaluated and provided quality control on several water resource projects in El Dorado, Sacramento, Placer, Yolo, and San Joaquin Counties. Mr. Ferrari's clients have included Flood Control Agencies, Reclamation Districts, Irrigation Districts, the United States Corps of Engineers Sacramento District (USACE), the Federal Emergency Management Agency (FEMA) and the State of California Department of Water Resources (DWR). Mr. Ferrari was recognized by the Consulting Engineers and Land Surveyors of California (CELSOC) and the American Public Works Association (APWA) for the City/County of Sacramento Emergency Rescue and Evacuation mapping project in 2006. Mr. Ferrari's experience also includes many FEMA flood control projects including the City of Sacramento's Letter of Map Revision (LOMR) project which removed 3,000+ residential parcels from the Special Hazard Flood Zone.

EDUCATION

B.S., Civil Engineering, California State University, Sacramento

EXPERIENCE IN THE INDUSTRY

25 years

EXPERIENCE WITH GEI

2 years

REGISTRATIONS AND LICENSES

Professional Civil Engineer, CA No. 53226
ASFPM CFM; US-14-07917

PROFESSIONAL ASSOCIATIONS

Association of State Floodplain Managers (ASFPM)
Floodplain Management Association, Member (FMA)
American Society of Civil Engineers, Member (ASCE)
American Public Works Association, Member (APWA)

PROJECT FLOOD CONTROL EXPERIENCE

Sacramento County Office of Emergency Services Emergency Safety Plans, CA. - Senior Consultant responsible for developing emergency safety plans for 18 reclamation districts in Delta including the Delta Legacy Communities of Hood, Isleton, Locke and Courtland, Walnut Grove, Ryde and Isleton. Hydraulic models developed for the Sacramento River system were utilized to develop flood mapping from hypothetical levee failures protecting the reclamation districts. The model results were used to map the estimated maximum depths, time to one foot and evacuation route plans for each of the Districts. (GEI Project)

California Department of Water Resources Sacramento Basin Wide Feasibility Study, Central Valley Flood Protection Plan (CVFED). Senior Consultant responsible for the hydraulic modeling evaluation and quality control for the Yolo Bypass and the Sacramento River system models to reduce the risk of flooding. The focus of the evaluation included modifying the system hydraulic model with levee setbacks, adding flood gates and modifying bridges for comparing to baseline existing conditions. The following urban areas adjacent to the Yolo Bypass were reviewed for potential impacts to the system: Yolo County, City of West Sacramento, City of Sacramento, City of Davis and the City of Woodland. (GEI Project)

Rescue and Evacuation Mapping for the City and County of Sacramento, CA. Senior Consultant responsible for evaluating and quality control on twenty-seven hypothetical levee failures along the Sacramento and American Rivers. The model results were used to develop rescue and evacuation mapping for the City/County of Sacramento Emergency Operations. Project limits included 80+ miles of levees within the City of Sacramento and portions of the County of Sacramento. The mapping includes maximum flood depths, time of inundation contours, and evacuation routes. The analysis utilized the State Department of Water Resources CVFED hydraulic models for each of the flood inundation maps. (GEI Project)

California Central Valley Flood Evaluation and Delineation Sacramento River System Hydraulic Model, Department of Water Resources FloodSAFE project – Sacramento River System Hydraulic Model for Sacramento, Placer, Butte, Yuba Counties, CA. Project Engineer/Project Manager in charge of developing an

800+ mile calibrated one-dimensional system hydraulic model using HEC-RAS for the Sacramento River system. The Sacramento River system hydraulic model calibrated to the 1997 and 2006 flood events was developed for future modeling efforts to lower the risk of flooding in the urban areas protected by project levees. A two-dimensional TUFLOW model was also developed to enhance the complex split flows for the Fremont Weir and Sacramento River Bypass system. (Non-GEI Project)

American River Letter of Map Revision (LOMR) for the Sacramento Area Flood Control District (SAFCA) and the City and County of, Sacramento County, CA. Project Manager responsible for processing a Letter of Map Revision (LOMR) to the Federal Emergency Management Agency (FEMA) to certify 20+ miles of levee along the American River. The FEMA levee certification approval updated the effective Zone A99 designation to Zone X. Both the City and County of Sacramento participated in the LOMR effort removed 1000+ residence from the Zone A99 delineation. (Non-GEI Project)

South Sacramento Streams Group Letter of Map Revision (LOMR), City/County of Sacramento, Sacramento Area Flood Control District (SAFCA), United States Army Corps of Engineers (USACE). Project Manager responsible for developing a combined hydrologic and hydraulic HEC-RAS system model for 25+ miles of Morrison, Unionhouse, Elder and Florin Creeks in an urban section of the City and County of Sacramento to remove 3000+ residences and businesses out of the floodplain. The LOMR was approved by FEMA in December 2013. The LOMR includes several channel and floodwall projects designed and constructed by the USACE. After evaluating the system for the 500-, 200-, 100-, 50-, and 10-year storm events, Mr. Ferrari also evaluated a cost effective flood control solutions for Florin Creek to remove an additional 500+ residences out of the floodplain which is scheduled to be constructed in 2015. In addition, this hydraulic model will be utilized for future monitoring of upstream development mitigation between the City and County of Sacramento to maintain existing peak flows and water surface elevation conditions. (Non-GEI Project)

City of West Sacramento Internal Drainage Study Evaluation (in conjunction with the USACE) – City of West Sacramento, CA. Project Manager responsible for developing a detailed evaluation of the internal drainage system for the City of West Sacramento. The analysis was provided to the United States Army Corps of Engineers (USACE) for their flood damage economic analysis as part of a general reevaluation study (GRR) of the City's flood control system. The detailed hydrologic (Sac-Calc, HEC-HMS) and hydraulic models (Unsteady flow HEC-RAS) evaluated the City of West Sacramento internal pump and gravity flow drainage system for a range of theoretical storm events. The report also provided recommendations for future improvements. (Non-GEI Project).

Federal Emergency Management Agency (FEMA) Region IX Flood Insurance Study (FIS) Task Order No. 35; Upper Truckee River, Trout Creek and Bijou Creek; City of South Lake Tahoe, El Dorado County, CA. Developed log Persons Type III analysis and hydraulic model to update the 500- and 100-year floodplain for the Upper Truckee River, Trout Creek and Bijou Creek for the City of South Lake Tahoe. The study stream reaches totaled approximately 8 miles. The waterways included preparation of digital floodplain mapping, public outreach and coordination, field surveys, and reconnaissance. (Non-GEI Project)

EID Basin Evaluation; El Dorado Irrigation District; El Dorado County, CA. Provided mapping for several proposed reservoir sites in El Dorado County. Developed hydrology and hydraulic model for Dry Creek and tributaries south of Placerville. The goal of the evaluation was to provide potential impacts downstream if the proposed reservoirs failure. (Non-GEI Project)

Ron Manning, M.S., P.E.

Project Role: Hydrologic Evaluations, Project Engineer



Ron Manning has a strong background in flow-frequency analysis, hydrologic and hydraulic modeling, risk analysis, computer-programming and software development. Mr. Manning is skilled in using programming to accelerate repetitive tasks as well as to facilitate data entry/extraction and model parameter modification for numerous HEC modeling programs. He has extensive experience conducting sensitivity analyses involving HEC modeling programs.

PREVIOUS PROJECT EXPERIENCE

Real-Time Flood Forecasting Pilot Study, California Department of Water Resources. Assisted in conducting a pilot study to develop and apply a real-time flood forecasting model to determine how to effectively roll-out a system-wide application of these models in real time for flood emergency response. Assisted in expansion and customization of existing HEC-RAS models for the pilot area. Led the development of automation tools for pre- and post-processing, and visualization using the Flood Emergency Response Information Exchange (FERIX).

Development of Real-Time River Forecasting Tools, California Department of Water Resources. Assisted DWR Hydrology Branch staff in developing a watershed runoff model using HEC-HMS to simulate real-time flood operations in the Feather River watershed. Used information and data from the Feather River Precipitation Runoff Modeling System and other models to prepare the Feather River Flood Forecasting model. This included the development of a standalone software tool developed to assist the user in creating and executing forecasts, as well as viewing forecasted results.

Central Valley Flood Protection Plan (CVFPP), California Department of Water Resources. Developed regulated flow frequency curves for eight modeling alternatives based on results from the CVHS. Duties included making model-wide parameter adjustments for each HEC-RAS alternative models using scripts. Provided guidance and training for DWR staff on regulated flow-frequency curve development procedures and IPAST Software. Supervised and contributed to the development of regulated flow-frequency curves for over 100 analysis points for each alternative. Assisted with input/output and QA/QC of model data in HEC-FDA software. All while subject to very short and sensitive deadlines.

Central Valley Hydrology Study (CVHS), USACE Sacramento District. CVHS was a comprehensive assessment of stream flow frequencies and magnitudes in the Sacramento and San Joaquin river basins. The goal of the hydrologic analysis was to estimate peak flows and hydrographs for various annual exceedence probabilities to describe flood hazard throughout the basins. In the three years involved with the project, contributed to missing gage data estimation, historical flow development, unregulated/regulated hydrograph development, rainfall/runoff modeling of unaged watersheds, unregulated/regulated flow frequency analysis and was lead developer for the Information Processing and Synthesis Tool (IPAST) software (below).

Information processing and synthesizing tool (IPAST) software development, USACE Sacramento District. The IPAST software application was developed as part of the CVHS project described above. IPAST extracts relevant data from model results and processes those data to create useful hydrologic outputs. As lead engineer responsible for software development, was responsible for making engineering decisions to implement technical engineering concepts into software while directing a team of software developers. Worked closely with the client to add and modify software functionality to meet the goals of the project on a continual basis. Tasks included writing code in VB.NET, Python, and R programming languages as well as getting them to work in concert. Helped manage software debugging and testing.

EDUCATION

M.S. Civil engineering, University of California, Davis

B.S., Civil Engineering, California State University, Sacramento

EXPERIENCE IN THE INDUSTRY

5 years

EXPERIENCE WITH GEI

1.5 years

REGISTRATIONS AND LICENSES

Professional Civil Engineer, CA No. 82041

Dambreak inundation mapping for statewide (CA) emergency response planning, California

Department of Water Resources. CA DWR undertook a study on behalf of the California Emergency Management Agency and the California Natural Resources Agency to develop dambreak inundation maps for emergency response planning. The study used HEC-RAS for the dam breach modeling, FLO-2D for the inundation modeling, and GIS tools for the inundation mapping. My responsibilities included using aerial photography and GIS to assign gridded model parameters in FLO-2D. I also assisted with QA/QC of model inputs requiring a large degree of engineering judgment and knowledge of manning's n coefficients.

Hydrologic analyses of New Hogan and Farmington reservoirs for the Lower San Joaquin Feasibility Study, San Joaquin County, CA.

Study of alternative flood risk reduction measures that would provide protection against a flood with a probability of exceedence equal 0.005 (i.e., "200-year flood"). Used knowledge of VBA and R programming languages to accelerate the development of unregulated flow frequency curves, unregulated-to-regulated flow transforms, and regulated flow frequency curves. Provided QA/QC of the study's model data.

Folsom Dam Permanent Operations Study, USACE Sacramento District.

Flood management study for Folsom Dam to evaluate a number of flood risk management operational rule alternatives and the impact of those alternatives on Folsom Reservoir's other project purposes. The results of the study support development of a revised water control manual, including a revised water control diagram and emergency spillway release diagram. Assisted with the development and implementation of the process used to identify critical flow durations at Folsom Reservoir. Provided QA/QC of additions, modifications, and enhancements to the study's HEC-ResSim models.

SKILLS

Computer Applications

- HEC- RAS, ResSim, HMS, FDA, GeoRAS, GeoHMS
- Flo-2D
- ArcGIS 10
- AutoCAD
- Microsoft Office
- IPAST

Computer languages

- Visual Basic for Applications (VBA)
- Visual Basic.NET
- SQL
- Python
- R

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers, Member

Chong Vang, P.E.

Project Role: Hydrologic and Hydraulic Evaluations, Project Engineer



Chong Vang's expertise is in water resources planning and project management. His experiences include providing lead engineering and project management support on civil designs, site plans, floodplain water management and modeling analyze. His current work involves water resources engineering support for the California Department of Water Resources (DWR) Division of Flood Management in directing the Department's integrated flood management and emergency response systems throughout California.

PROJECT EXPERIENCE

Central Valley Flood Protection Plan, California Department of Water Resources, Sacramento, CA. Project engineer responsible for technical support on the planning efforts for the Sacramento River Basin Wide Feasibility Study. Services included hydraulic modeling and evaluation of the Sacramento River Basin system configurations with the use of 1-D hydraulic models (HEC-RAS). Used geo-spatial processing tools to implement channel feature modifications to the hydraulic model geometries. Evaluated modeling results for the interpretation and presentation of the system configurations. Coordinated with the management team on the Yolo Bypass Feasibility Study technical evaluation and modeling of the Yolo Bypass flow conveyance optimization. Led the technical development efforts of the 2-D hydraulic model of the Yolo Bypass with habitat restoration evaluations for near-term and long-term implementation. Emphases on the enhancement of the bypass ecosystem habitat restoration and the resiliency of the flood management system. The hydraulic evaluation included the development of a detailed 2D hydrodynamic model to evaluate the options to improve bypass capacity and resiliency through levee setbacks and raises, effects of sea-level rise, and expansions of existing weirs, effects of habitat and environmental restoration plans on water currents, velocities, and hydraulic conveyance capacity.

Flood Emergency Response Program (Phase I), California Department of Water Resources, Statewide, CA. Project Engineer responsible for post-processing hydrologic and hydraulic results and products from California Department of Water Resources (DWR) Central Valley Floodplain Evaluation and Delineation (CVFED) Program and DWR Central Valley Hydrology Study (CVHS) data. Products from CVFED and CVHS were integrated into DWR's Flood Emergency Response Information Exchange (FERIX) to provide interactive geographical information display of flood inundation extents within the Central Valley. Provided technical assistance to DWR staff on the development of 1-D HEC-RAS hydraulic modeling and 2-D FLO-2D floodplain modeling and inundation. Part of the CVFED Technical Review Team with the responsibility to track and perform Quality Assurance on the development of hydraulic models. The hydraulic models included regions within the Sacramento River Basin, San Joaquin Basin, and Upper Cache watershed that included the Middle Creek, Scotts Creek, and surrounding streams.

Flood Emergency Response Program (Phase II), California Department of Water Resources, Statewide, CA. GEI is the prime consultant assisting DWR with a major, multi-year program to overhaul California's Flood Emergency Response Program. Project Engineer involved in multiple projects coordinating and providing technical assistance to DWR Hydrology and Flood Operations Office (HAFOO). The projects consists of developing a standard quality control guideline for real-time snow data collection and snow field equipment maintenance plan; analyze the hydraulic conveyance capacity of the Sacramento River and San Joaquin River basin systems with the use of hydraulic model; development of a real-time river forecasting tool for use in HEC-HMS and HEC-RTS; perform analyzes to estimate the peak flood wave travel times along the Sacramento and San Joaquin River basin systems by analyzing period of records from DWR California Data Exchange Center (CDEC); development of geo-spatial pre- and post-processing tools for hydrology and hydraulic modeling

EDUCATION

M.S., Water Resources Engineering,
California State University of
Sacramento

B.S., Mechanical Engineering, California
State University of Sacramento

EXPERIENCE IN THE INDUSTRY
9 years

EXPERIENCE WITH GEI
4 years

REGISTRATIONS AND LICENSES
Professional Engineer, CA No. 80454

applications; and quality control review of DWR Central Valley Floodplain Evaluation and Delineation (CVFED) program HEC-RAS riverine hydraulic models, 2-D riverine TUFLOW models, and FLO-2D floodplain models; provided assistances to the development of inundation modeling and mapping for 10 urban area within the Central Valley; integration of hydrology and hydraulic geo-spatial and post processing data to Flood Emergency Response Information Exchange (FERIX) to provide interactive and dynamic geographical information in support of flood emergency responses

Hernandez Dam and Paicines Dam Emergency Action Plan (EAP), Dam Failure and Inundation Study, San Benito County Water District, Hollister, CA. Project Engineer prepared an EAP in accordance with California Emergency Management Agency (EMA) requirements for regulatory dams classified as high-hazard. Performed dam failure analysis, and inundation mapping for the agency's dam located at the headwaters of San Benito River and Parajo River. Developed HEC-RAS hydraulic model to evaluate the dynamic flood routing downstream of each dam, performed flood inundation sensitivity analyses, and prepared a completed dam failure and inundation study report.

Mirabel Inflatable Dam Operations Response and Recovery Plan, Sonoma County Water Agency, Santa Rosa, CA. Project Engineer responsible for the preparation of an operations and recovery plan to establish and define emergency management procedures and organizational response for overall coordination of public protective actions that may be needed in the event of an event of an emergency situation to the inflatable dam. Plan identifies the operations monitoring plan for the inflatable dam during wet and dry season and applicable emergency scenarios.

Reclamation District 2127 (RD 2127, Simmons-Wheeler) Hazard Mitigation Plan Levee Repair and Improvement Project, Solano County, CA. Project consists of improving District levee to meet the minimum State Hazard Mitigation Plan (HMP) Standard height and levee cross section standard on RD 2127 in the Suisun Marsh. As a staff engineer tasked with managing the district levee dataset and coordinating efforts to meet HMP. In coordination with California Department of Fish and Wildlife (CDFW) and Department of Water Resources (DWR) performed field inspections for environmentally sensitive managed wetland habitat of endangered species of animal and plant life. Documented levee design and construction phases identifying areas of potential negative effects and impacts. Established mitigation and enhancement plans for areas of disturbance to wetland habitat.

Reconnaissance Study for Conveyance, Stevinson Water District, Newman, CA. The Stevinson Water District's ability to control flooding within its boundaries is heavily influenced by its ability to manage flows within the Bear Creek drainage. Staff engineer responsible for the evaluation of the hydraulic capacity of increased flood flows to the San Joaquin River by modification to the existing Bear Creek Diversion Structure. The evaluation includes the use of 1-D hydrodynamic modeling to determine its water depths and inundations of increasing incremental flows to determine the design of an overflow relief control on the canal.

Christopher B. Kissick, P.E.

Project Role: Hydraulic Evaluations, Staff Engineer



Christopher Kissick is a staff water resources engineer with experience in engineering design and analysis. He is familiar with the State of California Flood Emergency Response Program, California Urban Level of Flood Protection, and hydraulic modeling. Prior to joining GEI, he spent a year in land development designing and analyzing storm drainage and water distribution systems for commercial developments. He is involved with several projects relating to flood hazard mitigation, hydraulic modeling, and flood hazard visualization. He trained at the USACE Hydrologic Engineering Center in 1D Unsteady flow modeling. This HEC training included sessions covering; bridge modeling, storage area modeling, weir and gate modeling, model calibration, and dam break modeling. Software experience includes HEC-RAS, FLO-2D, XPSWMM, ArcGIS, HEC-GeoRAS, AutoCAD/Civil 3D, WaterCAD, Microsoft Office, and Visual Basic for Applications (VBA).

EDUCATION

B.S., Civil Engineering, California State University, Chico

EXPERIENCE IN THE INDUSTRY

3 year

EXPERIENCE WITH GEI

2 years

REGISTRATIONS AND LICENSES

Professional Engineer, C 84861

TRAINING

Unsteady Flow Using HEC-RAS

PROJECT EXPERIENCE

Flood Emergency Response Program (Phase II), Department of Water Resources, Statewide, CA. Supported efforts to incorporate the Central Valley Floodplain Evaluation and Delineation (CVFED) Program and the Alluvial Fan Floodplain Evaluation and Delineation (AFFED) Program Models and Model Results into the CA DWR Flood Emergency Response Information Exchange (FERIX), a web based mapping application that displays study data for the state. Efforts included; extraction of levee breach hydrographs and 2D flood flow depths from HEC-RAS and FLO-2D models to facilitate animation of CVFED levee breach models, operation of AFFED FLO-2D models to verify model outputs prior to Library of Models integration, and creation of ArcGIS maps summarizing flood model locations, modeling parameters and model results.

Supported CA DWR Flood Project Integrity/Vulnerability Assessments by performing levee log database compilation and performing QA/QC efforts in accordance with DWR criteria. Supported DWR activities in assessing the channel conveyance capacity of the State Plan of Flood Control (SPFC) levee system. Efforts include; identifying controlling flow of channel reach by comparing flows at freeboard stage with different flow profiles, performing a sensitivity analysis of major confluences to assess highest stage at lowest flow, comparing steady flow HEC-RAS model rating curves to unsteady rating curves to validate extrapolation of top of levee channel capacities. Performed engineering analysis comparing costs and benefits of potential early warning gage locations. Activities include; delineation of early warning benefit area from FEMA 100-yr floodplain, assess types of land uses affected within each flood plain, quantify number of structures benefited by early warning system, calculate lengths of road affected by floodplain, collect federal census data to determine economic impact of early warning in each area.

Central Valley Flood Protection Plan, Department of Water Resources, Statewide, CA. Supported efforts to analyze Yolo Bypass improvement options. Activities include calculating setback and degrade levee quantities for cost planning effort, updating HEC-RAS models with roughness coefficients in coordination with ecologic improvements, creating visual representations of model data in GIS to assist planning analysis team.

FloodSAFE Program Management Consulting Services, Department of Water Resources, Statewide, CA. Generated 100-yr and 200-yr water surface elevations from CVFED hydraulic routing models for Channel Capacity Atlas. Verified model results and generated AutoCAD drawings to display 100-yr, 200-yr, and 1957 Design water surface elevations. Display of data used to help identify weak points of flood routing system.

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers, Member

Vance Howard

Project Role: Environmental Constraints & Opportunities Lead, Senior Restoration Ecologist



Vance Howard is a senior restoration ecologist and project manager who specializes in planning, design, and implementation of restoration and mitigation projects in riparian, wetland, grassland, oak woodland, and forested habitats. He specializes in large-scale conservation and mitigation planning, including projects that integrate ecosystem restoration and natural resource management with flood protection, recreation, and urban planning. Mr. Howard has worked on numerous projects with California Department of Water Resources, Sacramento Area Flood Control Agency, and California State Parks. He has prepared habitat conservation and mitigation strategies, habitat restoration plans, habitat mitigation plans, construction plans and specifications, watershed management plans, CDFW wildlife area land management plans, mitigation and monitoring plans and long term management plans for wetland, woodland, and grassland mitigation projects, environmental constraints reports, and EIR analysis for projects involving habitat restoration. He also has on-the-ground experience implementing habitat restoration, streambed realignment, biotechnical erosion control, and landform restoration projects in California. Mr. Howard is a strategic planning process leader, skilled meeting facilitator and graphic recorder, and habitat restoration construction manager.

EDUCATION

B.S., Environmental Horticulture and Urban Forestry, University of California, Davis

EXPERIENCE IN THE INDUSTRY

17 years

EXPERIENCE WITH GEI

Less than one year

RELEVANT PROJECT EXPERIENCE

Central Valley Flood Protection Plan 2017 Update, CH2MHill for California Dept. of Water Resources, Sacramento, CA. Serving as the task leader developing the ecosystem integration approach for the Sacramento River Basin-wide Feasibility Study (BWFS), which is one of the supporting documents for the 2017 CVFPP Update. This includes the focused efforts on the near-term activities in the Yolo Bypass through the Yolo Bypass assessments completed as part of the Sacramento River BWFS.

Central Valley Flood System Conservation Strategy, California Dept. of Water Resources, FloodSAFE Environmental Stewardship and Statewide Resources Office (FESSRO), Sacramento, CA. Served as project manager responsible for supporting DWR FESSRO and the Central Valley Flood Planning Office (CVFPO) with development of the CVFS Conservation Strategy (CS). Development of the CS included identifying ecosystem restoration opportunities throughout the CVFPP Systemwide Planning Area, and delineating, at a conceptual level, specific river reaches where key ecosystem functions could be restored, and incorporating these restoration opportunities into potential CVFPP Management Actions in the 2017 CVFPP Update.

Levee Accreditation Project, Sacramento Area Flood Control Agency, Sacramento County, CA. Serving as the habitat conservation and mitigation planning and design manager who is leading the development of the overall conservation strategy for the project. Oversees the team preparing mitigation and monitoring plans, mitigation construction plans and specifications, long-term site-specific management plans for multiple habitat mitigation sites, and providing construction oversight and contractor management for the project's habitat mitigation. Work is part of SAFCA's program of flood control improvements to provide the Sacramento metropolitan area with a "200-year" level of protection.

Natomas Levee Improvement Program, Sacramento Area Flood Control Agency, Sacramento County, CA. Overall project manager for SAFCA's NLIP and task leader for development of the plans and specifications, programmatic long-term management plan, and site-specific management plans for multiple habitat mitigation sites, and providing construction oversight and contractor management for the project's habitat mitigation. Work is part of SAFCA's program of flood control improvements to provide the Sacramento metropolitan area with a "200-year" level of protection.

Cindy Davis

Project Role: Environmental Constraints, CEQA/NEPA Lead, Senior Regulatory Specialist



Cindy Davis is a senior regulatory specialist and project manager/director with over 21 years of experience leading natural resources projects. She has a long and successful track record of securing permits and other regulatory approvals for private developers, state agencies, and local jurisdictions. Her project management experience includes directing projects pertaining to restoration; flood control and water storage; infrastructure; residential, commercial, and government buildings; and transportation. She is proficient in ESA and CESA compliance with considerable experience in Section 7 consultations. Ms. Davis has extensive experience in USACE wetland regulations and the permitting process pursuant to Section 404 and 401 of CWA. She has developed positive and productive relationships with the representatives of regulatory agencies (e.g., USACE, CDFW, USFWS, and RWQCB) to facilitate permit acquisition. She has experience conducting numerous field surveys and assessing impacts on biological resources for CEQA/NEPA documents and statutory compliance. Her experience includes resource inventories, wetland delineations and evaluations, preconstruction surveys, habitat evaluations, and baseline wildlife surveys.

EDUCATION

B.S., Biological Conservation, California State University, Sacramento

EXPERIENCE IN THE INDUSTRY

21 years

EXPERIENCE WITH GIE

Less than one year

PROJECT EXPERIENCE

2014 Drought Emergency Temporary Rock Barriers Project, California Department of Water Resources, Contra Costa, Sacramento, and Yolo Counties CA. Project manager and Permitting Task Leader. Completed an IS/MND and permitting applications to help DWR implement the Governor's 2014 Drought Emergency Proclamation calling for DWR to install temporary barriers to protect water quality and water supply in the Delta and work with CDFW to minimize impacts to aquatic species. This project was extremely expedited, with all permit applications completed within four days of notice to proceed. Helped DWR lead and participated in weekly multi-stakeholder meetings involving all pertinent regulatory agencies. Lead the preparation of CWA Section 404 Individual permit, Section 401 certification, DFW 1600 Agreement and 2081 permit permits/authorizations and successfully obtained permits for a 2015 installation of the project. Continuing to assist DWR with the development of programmatic permits that will allow installation of the drought barriers if they are needed in future years.

McCormack-Williamson Tract Levee Modification and Habitat Development Project, The Nature Conservancy and Reclamation District 2110, Sacramento and San Joaquin Counties, CA. Project manager and senior regulatory specialist for the planning, design, and permitting services for the restoration of the 1,600 acre McCormack Williamson Tract (MWT). Due to its location, geography, and ecological history, MWT has been viewed as a prime site for restoration of fresh water tidal marsh, seasonal wetlands and riparian forest. The proposed Project is intended to improve flood control in the North Delta in a manner that benefits aquatic and terrestrial habitats, species and ecological processes.

Courtland and Walnut Grove Wastewater Treatment Plant Feasibility Study: Environmental and Regulatory Constraints Analysis, Sacramento County Sanitation District 1, Sacramento County, CA. Senior regulatory biologist for an environmental and regulatory constraints analysis for various proposed treatment processes, discharge and nondischarge disposal alternatives, and wastewater conveyance alternatives under consideration by County Sanitation District 1 (CSD-1) to upgrade the Courtland and Walnut Grove wastewater treatment plants in the Sacramento-San Joaquin Delta. Key environmental and planning constraints included land application issues; land use compatibility; farmland conversion; groundwater and surface water quality; effects on aquatic, wetland, and riparian biological resources; special-status species; odors; cultural resources; Delta Protection Commission policies and regulations; community outreach; and natural resource permitting. The results of the analysis helped CSD-1 identify its preferred alternative for the wastewater treatment plant upgrades.

Delta Service Center Relocation IS/MND and Permitting, California Department of General Services and California Conservation Corps, San Joaquin County, CA. Senior regulatory biologist/project manager for permitting services for this project involving construction of new education, recreation, residential, and multipurpose buildings to replace existing outdated facilities. Also prepared a wetland delineation and permit applications; provided support during the public review process; acquired CWA Section 404 and 401 permits for the project; and prepared a mitigation and monitoring and reporting program document. Key environmental issues included wetlands, land use, and water and wastewater supply.

Cosumnes River Preserve Denier II / Oneto Property Floodplain and Riparian Habitat Restoration Project Permitting Support, The Nature Conservancy, Sacramento County, CA. Project director/project manager. The project restored approximately 600 acres of riparian forest habitat on the lower Cosumnes River using engineered levee breaches and targeted grading. Approximately 4,500 feet of existing levee was removed. Project earthwork included excavation of a swale that improved site drainage and alleviate an existing fish stranding problem. Provided permit strategy guidance and lead permitting support services. Prepared and obtained permits/authorizations from a number of agencies including Sacramento County, DFG, USACE, USFWS, NMFS, State Historic Preservation Office, RWQCB, and the Central Valley Flood Protection Board.

Flooded Islands Feasibility Study, California Department of Water Resources, Contra Costa and Sacramento Counties, CA. Regulatory specialist for a multidisciplinary team that investigated the feasibility of altering hydrodynamics at Lower Sherman Lake, Big Break, and Franks Tract with the objectives of restoring ecosystem values, improving water quality conditions and enhancing recreation and other social values of the flooded islands. The team evaluated the feasibility of constructing tidal gates and restoring shoreline levees with strategically located openings to beneficially alter the salt-trapping and mixing characteristics of the three flooded islands while retaining tidal flow to the island interiors. The team developed and evaluated innovative and cost-effective Delta tidal marsh restoration concepts to recreate the dendritic channels and provide ecological benefits for native plants, fish, and wildlife, and impede the success of invasive, nonnative fish and aquatic plants.

Delta Emergency Rock and Transfer Facilities Project IS/MND, California Department of Water Resources, San Joaquin, Sacramento, and Solano Counties, CA. Senior regulatory biologist for biological surveys and other environmental constraints assessments to provide DWR with strategic guidance on environmental compliance and permitting for three rock stockpiling sites. Provided permitting assistance and compliance with the following agencies: DFG, USFWS, NMFS, Central Valley Flood Protection Board, Central Valley Regional Water Quality Control Board, and USACE.

Suisun Marsh Permitting and Monitoring, California Department of Water Resources Solano County, CA. Senior regulatory specialist/PM for identifying permitting needs and strategy as well as biological monitoring, water quality monitoring reports for projects within the Suisun Marsh Program.

Twitchell Island Levee Improvements Project: San Joaquin Reach EIR and Permitting, Reclamation District 1601, Sacramento County, CA. Senior regulatory specialist for needed improvements to the Twitchell Island levees along the San Joaquin River. Work included wetland delineation, review of potential impacts to special-status plant and wildlife species, and permitting assistance. Prepared the EIR, supporting studies, and permitting strategy related to Reclamation District 1601 (RD 1601) plans. The levee improvements, which include a stability berm and backup levee, are intended to increase levee resistance to the 100-year flood event and erosion caused by wind-generated wave-run up.

Phase 3 Levee Seepage Repair Project, Reclamation District 17, San Joaquin County, CA. Senior regulatory specialist for Phases 2 and 3 wetland delineation, USACE CWA Section 404 Letter of Permission, FGC Section 1602, RWQCB 401 Certification, and ESA compliance related to Reclamation District 17 (RD 17) plans for needed repairs to the eastside of the San Joaquin River levee. The repairs are designed to enable the levee system to withstand 100-year flood conditions and receive FEMA certification. Engineering studies found that installation of in-levee cutoff walls, toe drain, and landside seepage berms would effectively control seepage. Coordination with USACE is a requirement because of a preexisting flood control project. Provided strategic guidance and environmental studies to support for Phase 1 exemptions. Also prepared environmental documents and supporting technical studies for Phase 2 IS/MND and Phase 3 EIR/EIS.

Eric Htain

Project Role: Environmental Constraints & Opportunities Evaluations,
Senior Environmental Scientist

Eric Htain has over 17 years of experience in environmental consulting, focusing primarily on regulatory permitting, biological studies, and project management. His field experience includes conducting general biological surveys and focused surveys for rare, threatened and endangered plant and wildlife species, conducting wetland delineations pursuant to USACE standards, and monitoring construction activities for regulatory compliance. In addition, Mr. Htain is familiar with California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) documentation, has expertise in obtaining regulatory permits from such agencies as the U.S. Army Corps of Engineers (USACE), State and Regional Water Quality Control Boards (RWQCB), California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and Central Valley Flood Protection Board (CVFPB), and understands how these processes relate to construction.

PROJECT EXPERIENCE

Natomas Levee Improvement Program EIR, EIS, and Permitting Assistance, Sacramento Area Flood Control Agency, Sacramento and Sutter Counties, CA. Regulatory permitting specialist in charge of preparing the regulatory permits for this multi-phase, multi-year program. The program consisted of four multi-year projects each requiring Clean Water Act (CWA) Section 404 permits, CWA Section 401 water quality certifications, Section 1602 Streambed Alteration Agreements, Biological Opinions from the USFWS and NMFS, California Endangered Species Act take permits, and Section 106 National Historic Preservation Act compliance. Also assisted with construction compliance during construction of the project and prepared numerous amendments to the permits.

Cosumnes River Preserve Denier II / Oneto Property Floodplain and Riparian Habitat Restoration Project Permitting Support, The Nature Conservancy, Sacramento County, CA. Project manager/Regulatory biologist in charge of environmental services for this restoration project. The project was designed and constructed to restore approximately 500 acres of riparian forest habitat on the lower Cosumnes River using engineered levee breaches, targeted grading, and some horticultural restoration efforts. Managed the project's environmental services including preparation of technical sections of the CEQA document, preparation of the regulatory permit applications, coordination on issuance of permits, oversight of construction compliance monitoring, and managing the design subcontractor.

Site 18A Culvert Replacement and Fish Passage Enhancement Project, Sacramento Area Flood Control Agency, Sacramento County, CA. Project manager/Regulatory biologist in charge of environmental compliance services for this project. The Site 18A Project involves reconstructing a culvert, with connection to Steelhead



EDUCATION

B.A., Environmental Analysis and Design,
University of California, Irvine

EXPERIENCE IN THE INDUSTRY

17 years

EXPERIENCE WITH GEI

Less than one year

Creek, and implementing habitat enhancement for the purposes of eliminating fish entrapment and improving habitat quality within a basin adjacent to Steelhead Creek. Prepared permit applications for and facilitated the issuance of regulatory permits for the project. Role continues into the construction phase of the project, managing the environmental compliance task and overseeing monitoring and reporting efforts.

American River Mile 0.5 Aquatic and Riparian Habitat Creation Project, Sacramento Area Flood Control Agency, Sacramento County, CA. Regulatory specialist who managed the regulatory task, consisting of preparation of regulatory permit applications and documents including CWA Section 404 permit, CWA Section 401 water quality certification, Section 1602 Streambed Alteration Agreement, Biological Opinions from the USFWS and NMFS, and coordination with CDFW regarding CESA. The task included field surveys for threatened and endangered species, a wetland delineation, and coordination with restoration ecologists on the restoration design.

Tuolumne River Regional Park—Gateway Parcel Phase 2, City of Modesto, Stanislaus County, CA. Regulatory specialist who prepared the CWA Section 404 permit, CWA Section 401 water quality certification, Section 1602 Streambed Alteration Agreement and the CVFPB encroachment permit application, as well as coordinated on preparation of the biological assessment and restoration design plans for this open space element of the Tuolumne River Regional Park (TRRP) Gateway Parcel phase 2 in the city of Modesto. The approximately 17-acre Phase 2 area will host a variety of active and passive recreational opportunities as well as extensive areas of restoration.

Bear River Levee Setback Project, Yuba County Water Agency/Three Rivers Levee Improvement Authority, Yuba County, CA. Regulatory specialist who prepared application packages for a Reclamation Board encroachment permit, Clean Water Act Section 404 permit, permits under California Fish and Game Code Sections 2081 and 1602, and Section 401 water quality certification; biological assessments for consultation under ESA Section 7; and assisted in adapting EIR material for use in NEPA compliance and a Section 404(b)(1) alternatives analysis for construction of a levee setback area on the Bear River at the confluence with the Feather River.

Feather River Levee Repair Program EIS/EIR and Permitting, Three Rivers Levee Improvement Authority, Yuba County, CA. Regulatory specialist who prepared extensive permitting applications for levee repairs and a large setback levee. Application packages included CWA 404 permitting, CDFW Section 1602 agreements, Section 401 water quality certifications, and biological assessments for USACE consultation with USFWS and NMFS under ESA Section 7. Assisted with preparation of the EIS and provided construction monitoring. The project increases flood protection in the Reclamation District (RD) 784 area by addressing identified deficiencies in the Feather River levee and made related improvements to the Yuba River levee near its confluence with the Feather River.

Prichard Lake Restoration Project, Sacramento County Airport System, Sacramento County, CA. Biologist/regulatory specialist who provided regulatory guidance to the Sacramento County Airport System to help resolve past compliance issues on airport property, including the Prichard Lake site, a 9-acre wetland that was filled and degraded over several years by airport maintenance personnel without regulatory approval or compliance notification. Prepared and obtained a streambed alteration agreement and RWQCB water quality certification, and consulted with CDFW on the project's effects on the state-listed and federally listed giant garter snake. Secured other permits for both past activities and future projects. Prepared a biological assessment, wetland delineation, and assisted with preparation of the IS/MND, for the restoration of a 42-acre area including Prichard Lake. Restoration design included open water, emergent marsh, seasonal wetland, and upland habitat.

Andrea L. Shephard, Ph.D.

Project Role: CEQA/NEPA Evaluations, Senior Environmental Project Manager



Dr. Andrea Shephard is a senior environmental project manager with 21 years of experience. Dr. Shephard specializes in managing the preparation of environmental compliance documents for water resources projects to satisfy California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA) and related permitting and regulatory requirements. She has extensive experience working with Federal environmental statutes, including the Clean Water Act (CWA), Endangered Species Act (ESA), Section 106 of the National Historic Preservation Act (NHPA), Clean Air Act (CWA), and related state and local environmental regulations. Dr Shephard's technical focus is on water quality and marine ecology, and her environmental review experience includes the full range of topic areas, from air quality and climate change to utilities and service systems.

Dr. Shephard's water resources experience includes work on complex multidisciplinary projects involving habitat restoration, levee improvements, dam modifications, water transfers, and wastewater and water supply treatment and conveyance in Northern California, including the Sacramento-San Joaquin Delta (Delta) and the Central Valley.

PROJECT EXPERIENCE

Delta Emergency Rock and Transfer Facilities Project IS/MND, California Department of Water Resources, San Joaquin, Sacramento, Solano Counties, CA. Project manager for the Initial Study/Mitigated Negative Declaration (IS/MND) and mitigation monitoring in support of several DWR, Division of Flood Management projects designed to enhance response to large-scale flood events in the Delta. Coordinated the biological surveys and other environmental constraints assessments, and provided guidance on environmental compliance and permitting. Also managed preparation of a water pollution control plan, advised staff on modeling air quality impacts and indirect source review compliance, and managed permit preparation to comply with state and federal agency requirements. In support of the project, the Division of Engineering proposed and completed the Delta Emergency Rock and Transfer Facilities project under an expedited schedule for the 2007–2008 flood season. Following project completion, managed biological surveys, a wetland delineation, and mitigation plan preparation in support of an after-the-fact permit from the U.S. Army Corps of Engineers (USACE) under CWA Section 404 for accidental fill of wetlands during rock stockpiling activities. Also managed the preparation of two additional nationwide permits under CWA Section 404 to facilitate construction of an access ramp at the stockpile site.

Twitchell Island Levee Improvements Project: San Joaquin Reach EIR, Reclamation District 1601, Sacramento County, CA. This project involves implementation of improvements to the Twitchell Island levees along the San Joaquin River to increase the levee's resistance to erosion, provide better overall levee stability, and provide enhanced rearing and out-migration habitat for juvenile salmonids. Specifically, improvements include nearly 4 miles of new foundation berm and setback levee, raising the height of an existing setback levee, a new sheet-pile wall in front of an existing pump station, a new dryland levee across Chevron Point, and creation of channel margin habitat. Project manager for the Environmental Impact Report (EIR), supporting studies, and permitting, including CWA Section 404 and 401, California Fish and Game Code Section 1600, and ESA and Section 106 compliance, for Reclamation District (RD) 1601. The EIR was certified and the project was approved by RD 1601.

Small Erosion Repair Program EIR, California Department of Water Resources, San Joaquin, Central Valley, CA. The Small Erosion Repair Program (SERP) is a streamlined regulatory review and authorization

EDUCATION

Ph.D., Biological Oceanography,
Massachusetts Institute of Technology/
Woods Hole Oceanographic Institution
Joint Program in Oceanography
B.S., Marine Biology/Biology, University of
North Carolina (summa cum laude)

EXPERIENCE IN THE INDUSTRY

22 years

EXPERIENCE WITH GEI

Less than one year

PROFESSIONAL AFFILIATIONS

Association of Environmental
Professionals
Association of California Water Agencies
Floodplain Management Association
WaterReuse California

process to facilitate implementing annual repairs of small erosion sites on levees maintained by DWR in the Sacramento River Flood Control Project area. A SERP Manual was created to serve as the program description document and is comprised of elements to guide implementation of the program including baseline assessment methodology, notification requirements, mitigation and monitoring success criteria, conservation measures, and annual monitoring reports. Permitting to provide streamlined environmental clearances for implementation of small erosion repairs within the SERP included a programmatic biological assessment to satisfy the federal ESA and a programmatic agreement to satisfy the requirements of Section 106 for SERP. Task leader for the program EIR. The EIR was certified and the program was approved by DWR.

North Sacramento Streams, Sacramento River East Levee, Lower American River, and Related Improvements Project, Sacramento Area Flood Control Agency, Sacramento County, CA. SAFCA is implementing the North Sacramento Streams (NSS), Sacramento River East Levee (SREL), Lower American River, and Related Improvements Project, also referred to as the Levee Accreditation Project (LAP), to secure FEMA accreditation for 100-year flood protection for the levees protecting the city of Sacramento, including the levees along the American River, the east side of Natomas East Main Drainage Canal (NEMDC), Arcade Creek, Dry Creek North Levee, Robla Creek South Levee, the Lower Sacramento River from the mouth of the American River to the town of Freeport, and Beach Lake Levee (Morrison Creek). The major components of the LAP are the (1) NSS levee improvements, (2) SREL levee improvements, and (3) a Conservation Strategy to support the LAP that includes a Corridor Management Plan for Steelhead Creek/NEMDC and the Site 18A Culvert Replacement. The LAP also addresses high hazard/unacceptable encroachments and vegetation affecting all levee segments to varying degrees to allow accreditation of these levee segments. Deputy Project Manager assisting with project coordination and preparation of the EIS for the Sacramento River East Levee (SREL) component of the LAP, and an Addendum to the EIR prepared for the LAP addressing changes to the NSS component. The SREL component involves substantial work to meet embankment and foundation stability requirements along approximately 6 miles of the Sacramento River East Levee, including the Little Pocket and Pocket areas; and erosion repair work at several sites on the SREL, covering approximately 3,000 linear feet of levee. The NSS component of the LAP would involve approximately 4 miles of levees along the NEMDC East Levee and Arcade Creek North and South Levees, which also require substantial work to meet embankment and foundation stability requirements.

Reclamation District 17 Phase 3 Levee Repair Project EIR/EIS Compliance, Reclamation District 17, San Joaquin County, CA. The RD 17 levee system, which starts near the southern boundary of the City of Stockton, extends through the City of Lathrop, and ends at the western boundary of the City of Manteca requires repairs, including levee slope and crown width modifications to meet levee geometry requirements, construction of seepage berms and setback levees with seepage berms, and installation of slurry cutoff walls and chimney drains to reduce the potential negative effects of under and through seepage. This project is intended to improve the existing levee integrity based on the new USACE standards for seepage and to continue providing flood risk reduction during a 100-year flood event. Project manager for preparation of an Environmental Impact Statement (EIS) and EIR, supporting studies, federal and state permitting (Section 404 and 401, Section 1600), and ESA and Section 106 compliance.

Clifton Court Forebay Fishing Facility CEQA Compliance, California Department of Water Resources, Contra Costa County, CA. Project manager for the IS/MND and supporting cultural resources studies for construction of a recreational fishing pier and appurtenant facilities to improve angler access in Clifton Court Forebay (CCF). The project was proposed by DWR as one measure to reduce pre-screen losses of ESA-designated salmon, steelhead, and sturgeon within the CCF to comply with the reasonable and prudent alternative action (IV 4.2(2)) required in the National Marine Fisheries Services' (NMFS) Biological Opinion and Conference Opinion on the Long-term Operations of the Central Valley Project and State Water Project. The proposed project would also improve the security of the CCF's radial intake gates and other facilities. Because project implementation would require a permit from the USACE under CWA, a Cultural Resources Inventory, Evaluation, and Finding of Effect report was also prepared to support Section 106 compliance. The IS/MND was adopted and the project was approved by DWR.

Kelly Fitzgerald-Holland

Project Role: Regulatory Permitting Evaluations, Senior Wildlife Biologist & Regulatory Specialist

Kelly Fitzgerald-Holland is a Certified Wildlife Biologist, senior wildlife biologist, and environmental compliance expert. She has nearly 20 years of experience in ecological research, program management, environmental regulation and compliance, and terrestrial ecosystem monitoring in the western U.S. She has served as senior wildlife biologist or task lead manager for a large number of projects that require endangered species permitting and biological analysis for CEQA/NEPA compliance. Ms. Holland specializes in evaluating impacts on threatened and endangered wildlife species and their habitats and coordinating with resource agency staff to ensure compliance with the Federal and State Endangered Species Acts, including completing Section 7 consultation. Prior to her position at GEI, she spent 4 years conducting ESA consultations as a USFWS biologist, reviewing projects to assess impacts on listed species, providing technical assistance to minimize impacts on listed species, and preparing biological opinions for projects that impacted federally listed species and designated critical habitat. While at USFWS, Ms. Holland garnered extensive knowledge of the federally threatened giant garter snake, assisting with conservation and recovery planning for this species through research consolidation, technical oversight, and coordination with species experts. In addition to having worked for USFWS, as well as the National Park Service and U.S. Forest Service, Ms. Holland has worked extensively with state and federal agencies to assist clients with compliance with CESA/ESA, Migratory Bird Treaty Act, and CEQA/NEPA.

PROJECT EXPERIENCE

Natomas Levee Improvement Program, Sacramento Area Flood Control Agency, Sacramento and Sutter Counties, CA. Senior wildlife biologist who prepared the biological assessments and 2081(b) permit applications for the program's Landside Improvements Project, coordinated closely with client and agency staff throughout the consultation process, assisted with the environmental analyses in NEPA and CEQA documents, assisted with the development of a comprehensive habitat mitigation and monitoring plan for the project, and oversaw the development and implementation of the project's mitigation and monitoring plan and the long-term management plan. She continues to lead environmental compliance for this program.

Reclamation District 17, Reclamation District 17 Levee Repair Project, San Joaquin County, CA. Regulatory specialist for ESA compliance and senior wildlife biologist who prepared biological assessment that evaluated Reclamation District 17 (RD 17) plans for needed repairs to the eastside of the San Joaquin River levee. The repairs are designed to enable the levee system to withstand 100-year flood conditions and receive Federal Emergency Management Agency certification. Prepared the biological assessment to support ESA compliance and the development of the permitting and mitigation strategy.



EDUCATION

M.S., Environmental Science, Washington State University, Pullman

B.A., Environmental Studies, University of California, Santa Cruz

EXPERIENCE IN THE INDUSTRY

20 years

EXPERIENCE WITH GEI

Less than one year

REGISTRATIONS AND LICENSES

Certified Wildlife Biologist, the Wildlife Society (2014)

PROFESSIONAL ASSOCIATIONS

The Wildlife Society

Conservation Affairs Committee Chair, Western Section of The Wildlife Society

PRESENTATIONS

- *Wetlands and Endangered Species Act Training.* Beale Air Force, Yuba County, California. May 2014.
- *Endangered Species Act Section 7 Consultation and Incidental Take Permit Applications – Overview.* AECOM Employee Brown Bag Series, Sacramento, California. October 2014.
- *Restoring Habitats and Connective Corridors to Support Species Recovery in the Natomas Basin, Sacramento, CA.* The Western Section of the Wildlife Society, 2012 Annual Conference, Sacramento, CA, 2012.
- *Organizational Structure and Permitting Processes of the US Fish and Wildlife Service,* Association of Environmental Professionals luncheon, Sacramento, CA, February 2009.
- *The Effects of Land Management Practices on Reptile Populations: How Grazing Regimes Impact Reptile Density, Diversity, Foraging Opportunities, and Thermoregulation Behaviors.* Physiological Ecology Meeting, White Mountain Research Station, Bishop, CA, 1997.

North Sacramento Streams, Sacramento River East Levee, Lower American River, and Related Flood Improvements Project, Sacramento Area Flood Control Agency, Sacramento and Sutter Counties, CA. Senior wildlife biologist and environmental compliance expert who prepared the CEQA/NEPA environmental analyses for terrestrial biological and lead the ESA compliance effort, which required preparing a Biological Assessment and supplementary material and coordinating with USFWS, NMFS, and USACE. This project, also known as SAFCA's Levee Accreditation Project, includes improvements to ensure that levees protecting Sacramento are adequate to meet State requirements. Levee improvements are needed along the most the rivers and streams in the Sacramento region; other issues, including high-hazard/unacceptable encroachments and vegetation affecting all levee segments to varying degrees, must be addressed to allow accreditation of these levee segments.

Southport Levee Improvement Project, West Sacramento Area Flood Control Agency, City of West Sacramento, CA. Senior wildlife biologist who oversees and manages biological field surveys and support, compensatory mitigation planning, and preconstruction surveys and construction monitoring for the construction of the Southport Levee Improvements Project. This project would construct flood risk reduction measures (e.g., seepage berms, slurry cutoff walls, setback levees) along approximately 30,000 linear feet of the Sacramento River south levee in order to provide 200-year level of performance consistent with the State mandate for urbanized area, as well as to provide opportunities for ecosystem restoration and public recreation.

Sacramento River Flood Control System Evaluation, Phase III, Mid-Valley Project, Yolo County, California. Senior wildlife biologist who oversees coordination with wildlife agencies on environmental compliance for the Knights Landing Drainage District's Ridge Cut Slough portion of the project. The proposed project seeks to improve integrity of the Knights Landing Drainage District's east levee by reducing the potential for erosion and levee failure due to levee instability and seepage under or through the levee. Levee improvements would include reconstruction of a portion of the levee and construction of a landside spoil berm.

Central Valley Flood Protection Plan Conservation Strategy, California Department of Water Resources (DWR), FESSRO, Central Valley, CA. Senior wildlife biologist who supported DWR in the development of a conservation framework, conservation strategy, regional permitting effort, and supporting documents for the CVFPP. Developed a conservation framework and strategy that would take a comprehensive approach to ecological and environmental planning throughout the Central Valley and integrate it with flood management planning efforts.

Central Valley Flood Protection Plan PEIR, California Department of Water Resources (DWR), Northern and Central CA. Senior wildlife biologist who provided support and technical analysis for environmental planning and technical support services to prepare the CVFPP PEIR. The Plan and EIR provided the basis for State implementation of Central Valley flood protection, including the Delta, and incorporates CEQA compliance in overall flood protection planning enabling site-specific flood management actions to proceed incrementally. Assisted with the impact evaluation for terrestrial biological resources.

Rio Vista Rock Stockpile Project IS/MND and Permitting, California Department of Water Resources (DWR), Solano County, CA. Regulatory biologist who provided permitting support to the DWR, Division of Flood Management and Division of Engineering for the Rio Vista Rock Stockpile Project, which was established to enhance response to large-scale flood events in the Sacramento–San Joaquin Delta. Providing biological surveys, a wetland delineation, and mitigation plan preparation in support of an after-the-fact permit under Section 404 of the Clean Water Act for accidental fill of wetlands during rock stockpiling activities.

Feather River Levee Repair Project EIR/EIS, Permitting, and Monitoring, Three Rivers Levee Improvement Authority, Yuba County, CA. Regulatory specialist who provided senior regulatory oversight for CWA and ESA compliance following issuance of the Section 7 biological opinion. Coordinated with the USFWS and TRLIA staff to develop a compensatory mitigation strategy, resolving complex jurisdictional issues and facilitating nationwide permit approvals for project design revisions. The project would address identified deficiencies in the levees, build a large setback levee, and make related improvements to the Yuba River levee. Key issues included flood control, endangered species, wetlands, fisheries, and conversion of agricultural land. Completed and EIR, and EIS (USACE), agency consultation, permitting, and monitoring services.

Sarah A. N. Bennett

Project Role: Regulatory Permitting Considerations, Senior Regulatory Specialist, Biologist, and Certified Arborist



Sarah Bennett has focused her career and more than 13 years of experience on botany and environmental compliance. She has extensive experience with US Army Corps of Engineers wetland regulations and the permitting process pursuant to Section 404 and 401 of the Clean Water Act (CWA) and Section 1600 of the California Fish and Game Code (FGC). Ms. Bennett has experience with federal Endangered Species Act and California Endangered Species Act compliance, particularly in Section 7 consultations. She also has experience conducting field surveys and assessing impacts on biological resources for CEQA and NEPA documents. Ms. Bennett is certified as an arborist and her botanical experience includes conducting vegetation inventories, tree surveys, rare plant surveys, wetland delineation, and wetland conditional assessments. She has conducted surveys throughout the Central Valley, Sierra Foothills, north Coast Ranges, and Bay-Delta regions of California.

EDUCATION

M.S., Soils and Biochemistry, University of California, Davis

B.S., Botany and Plant Pathology, Michigan State University

EXPERIENCE IN THE INDUSTRY

13 years

EXPERIENCE WITH GEI

Less than one year

PROFESSIONAL LICENSES

Certified Arborist, CA No. WE-7726A

PROJECT EXPERIENCE

North Sacramento Streams, Sacramento River East Levee, Lower American River, and Related Improvements Project, Sacramento Area Flood Control Agency, Sacramento County, CA. Permitting lead for 404/401/1600 permitting, team lead for wetland delineation field survey and technical report, and contributor to biological resource sections of CEQA/NEPA documents. This project, also known as SAFCA's Levee Accreditation Project, includes improvements to ensure that levees protecting Sacramento are adequate to meet the minimum requirements of the National Flood Insurance Program and the State of California's recently adopted Urban Levee Design Criteria. Levee improvements are needed along the American River, the east side of NEMDC/ Steelhead Creek, Arcade Creek, Dry Creek North Levee, Robla Creek South Levee, the Lower Sacramento River from the mouth of the American River to the Town of Freeport, and Beach Lake Levee (Morrison Creek). Approximately 3,000 feet of erosion work at several sites on the Sacramento River East Levee also require repair. Other issues, including high-hazard/unacceptable encroachments and vegetation affecting all levee segments to varying degrees, must be addressed to allow accreditation of these levee segments.

Natomas Levee Improvement Program, Sacramento Area Flood Control Agency, Sacramento and Sutter Counties, CA. Regulatory biologist that completed wetland delineations, provided technical assistance in the permitting process, conducted tree inventories, mapped elderberry shrub locations, and assisted in construction monitoring. The NPIP Landside Improvements Project in Sacramento and Sutter Counties, is a multi-phased effort by USACE, Sacramento District, DWR, and SAFCA to bring the entire 42-mile Natomas Basin perimeter levee system into compliance with applicable Federal and State standards for levees protecting urban areas. This program involved making improvements to flood control infrastructure that will provide the Sacramento Metropolitan Area with a "200-year" level of protection. The program also included largescale, multiyear, multilocation restoration efforts, including those for sensitive species such as giant garter snake and Swainson's hawk, and implementation of a basinwide conservation strategy.

American River Mile 0.5 Aquatic and Riparian Habitat Creation Project, Sacramento Area Flood Control Agency, Sacramento County, CA. Completed wetland delineation, assisted with 404/401/1600 permitting, and participated in tule planting. The American River Mile 0.5 Aquatic and Riparian Habitat Creation Project is a habitat restoration project located on the Lower American River, adjacent to Discovery Park in the City of Sacramento, approximately 1/2-mile upstream from the confluence with the Sacramento River. The project entails grading and excavation of a portion of the north bank of the American River to create a more active floodplain along the river. The project was constructed to create approximately 0.35 acre of shallow water habitat, persistently connected to the river; 3.47 acres of riverine riparian habitat; and 6.29 acres of upland riparian woodland habitat with elderberry shrubs planted.

North Area Flood Control/Robla Creek Restoration, Sacramento Area Flood Control Agency, Sacramento County, California. Wetland ecologist responsible for the delineation of the Dry and Robla Creek floodplain. The project that contributed to SAFCA's efforts to provide flood protection to North Sacramento, including the Natomas Basin and Rio Linda. Project components included levee and floodwall construction, creek realignment and restoration and various local drainage improvements. Services provided included CEQA compliance, wetland delineations, coordination of regulatory compliance (including CWA Section 404 and 401 permits, FGC Section 1600, and ESA Section 7 biological opinion for valley elderberry longhorn beetle and giant garter snake), and design of a new Robla Creek channel.

California Levee Vegetation Research Program, Sacramento Area Flood Control Agency, Sacramento and Sutter Counties, CA. Project biologist who evaluated sites for biological resources and sensitive aquatic resources. GEI Staff prepared a CEQA document, regulatory permitting packages, and three technical studies to evaluate effects of woody vegetation on levee integrity. The technical studies included tree root architecture and levee slope stability, soil piping and potential seepage effects of tree roots, and vegetation habitat preferences of burrowing rodents. Key staff actively participated in the California Levee Vegetation Science Team (Science Team), which is a focused levee research group formed by the California Levees Roundtable. The Roundtable is an interagency collaborative of regional, State, and Federal flood management and natural resource agencies.

Western Pacific Interceptor Canal 200-Year Standard Project, Three Rivers Levee Improvement Authority, Yuba County, CA. Senior regulatory specialist responsible for 404/401/1600 permitting, wetland delineation and technical report, and contributing to biological resource section of CEQA/NEPA document. This project would correct deficiencies related to seepage and slope stability, and construct a landside access road for future operations and maintenance activities, along portions of the approximately 5.9 miles of the Western Pacific Interceptor Canal West Levee. Eight levee reaches totaling approximately 2 miles require remediation measures, including cutoff walls and landside berms and fill. Project team, including design engineers, and will ensure all permit requirements are met during project construction.

Yuba Goldfields 100-year and 200-year Flood Protection, Three Rivers Levee Improvement Authority, Yuba County, California. Biologist for the Yuba Goldfields 100- and 200-year projects, proposed by TRLIA to improve flood protection for south Yuba County. Services provided include completing biological surveys for sensitive resources including valley elderberry longhorn beetle and jurisdictional wetlands. Participated in the field efforts to identify biological constraints to support the preparation of a constraints analysis for each alternative. Important stakeholders in the alternatives evaluation process include the mining companies with vested mining rights and active operations in the Goldfields, the resources agencies with responsibility for protecting sensitive habitat and listed species, including the USFWS, NMFS, CDFW, and the other landowners within the Goldfields, including USACE and USBR.

Feather River Setback Conservation Bank Project, Three Rivers Levee Improvement Authority, Yuba County, CA. Served as project biologist for the habitat restoration project on the eastern floodplain of the Feather River, responsible for conducting all biological field surveys including wetland delineation and mapping of valley elderberry long horn beetle habitat, contributed to the biological resource section of the CEQA document, and prepared the FGC Section 1600 application. The project is part of establishing an approximately 500-acre conservation bank approved by USFWS and CDFW to provide advance mitigation credit for impacts of future levee and floodway improvement projects and operations and maintenance activities associated with the Central Valley Flood Protection Plan and the State Plan of Flood Control, respectively.

Twitchell Island Levee Improvements Project: San Joaquin Reach EIR, Reclamation District 1601, Sacramento County, CA. Wetland ecologist responsible for completing wetland delineation and associated technical report. This project involves implementation of improvements to the Twitchell Island levees along the San Joaquin River to increase the levee's resistance to erosion, provide better overall levee stability, and provide enhanced rearing and out-migration habitat for juvenile salmonids. Specifically, improvements include nearly 4 miles of new foundation berm and setback levee, raising the height of an existing setback levee, a new sheet-pile wall in front of an existing pump station, a new dryland levee across Chevron Point, and creation of channel margin habitat.

Steven Chainey

Project Role: Eco-System & Habitat Improvements, Senior Ecologist

Steven Chainey is an ecologist and watershed restoration expert with more than 28 years of experience in natural resources management and environmental restoration. He is a recognized leader in watershed management, wetland and riparian ecology, and restoration. Mr. Chainey is experienced in managing large-area environmental restoration projects, and in aquatic, wetland, and terrestrial habitat trend analysis, restoration, mitigation, and revegetation. He has expertise integrating ecosystem restoration and management with flood control, water supply, public open space, and agricultural uses throughout California, including numerous projects benefiting riverine aquatic habitat, riparian forest, perennial marsh, seasonal wetland, vernal pool, oak woodland, and native grassland ecosystems.

PROJECT EXPERIENCE

North Sacramento Streams, Sacramento River East Levee, Lower American River, and Related Improvements Project, Sacramento Area Flood Control Agency, Sacramento County, CA. Senior ecologist advising on the development and implementation of the overall conservation strategy. Provides strategic input and senior review to the team preparing mitigation and monitoring plans, mitigation construction plans and specifications, long-term site-specific management plans for multiple habitat mitigation sites, and providing construction oversight and contractor management for the project's habitat mitigation. This project, also known as SAFCA's Levee Accreditation Project, includes improvements to ensure that levees protecting Sacramento are adequate to meet the minimum requirements of the National Flood Insurance Program and the State of California's recently adopted Urban Levee Design Criteria. Levee improvements are needed along the American River, the east side of NEMDC/Steelhead Creek, Arcade Creek, Dry Creek North Levee, Robla Creek South Levee, the Lower Sacramento River from the mouth of the American River to the Town of Freeport, and Beach Lake Levee (Morrison Creek). Approximately 3,000 feet of erosion work at several sites on the Sacramento River East Levee also require repair. Other issues, including high-hazard/ unacceptable encroachments and vegetation affecting all levee segments to varying degrees, must be addressed to allow accreditation of these levee segments. Other project components include implementing a Conservation Strategy to support the Levee Accreditation Project, which includes a Corridor Management Plan for NEMDC/Steelhead Creek.

Natomas Levee Improvement Program, Sacramento Area Flood Control Agency, Sacramento and Sutter Counties, CA. Senior/lead ecologist for habitat and agricultural mitigation components of this multiphase program including levee and berm expansion along 42 miles of the Sacramento River and several hundred acres of borrow sites. Led design of shaded riverine aquatic (SRA) habitat. Led engineers, landscape architects, agronomists, soil scientists, and wildlife biologists planning and designing a large-scale, multiyear restoration project and implementing SAFCA's basin-wide conservation strategy. This work is part of SAFCA's program of flood control improvements to provide Sacramento with a "200-year" level of protection. Prepared a program-level EIR on funding mechanisms for comprehensive flood control improvements and operational modifications; and seepage, levee freeboard, and erosion remediation for Sacramento River, American River, and Natomas Cross Canal levees. Subsequently prepared project-level EISs and EIRs tiering from this PEIR.

Bank Protection Work Group (BPWG), Sacramento Area Flood Control Agency, Sacramento County, CA. Senior ecologist and participant in the reconstituted Lower American River (LAR) BPWG and the technical



EDUCATION

M.S., Range and Wildlands Science,
University of California, Davis
B.S., Landscape Architecture, University
of California, Davis

EXPERIENCE IN THE INDUSTRY

28 years

EXPERIENCE WITH GEI

Less than one year

SPECIALIZED TRAINING

Biotechnical Slope Protection and Erosion
Control, University of Wisconsin
Extension
Jurisdictional Wetlands Delineation and
Federal Wetland Regulation—A Field
Course, Wetlands Training Institute
Fluvial Geomorphology and Stream
Restoration, University of California
Extension, Berkeley
Applied Fluvial Geomorphology and River
Restoration- course by Dave Rosgen,
Wildland Hydrology Consultants,
sponsored by local RCD, Quincy, CA
Several courses in stakeholder facilitation
and consensus-building techniques.

support team. Worked as an original member and co-facilitator of the LAR-BPWG in the 1990's when many innovative designs for bank protection and onsite habitat were constructed (e.g. LAR Sites 1-5). Conducted field surveys and assessments of bank repair and onsite mitigation sites constructed since 1999 on LAR and Sacramento River, and will present lessons learned at the March 2016 meeting of the BPWG

PREVIOUS PROJECT EXPERIENCE

California Levee Vegetation Research Program, Sacramento Area Flood Control Agency and California Department of Water Resources, Sacramento and Sutter Counties, CA. Senior ecologist assisting principal investigators for three technical studies: tree root architecture and levee slope stability, soil piping and potential seepage effects of tree roots, and vegetation habitat preferences of burrowing rodents. Active participant in the California Levee Vegetation Science Team (Science Team) since its formation in 2007. The Science Team is a focused levee research group formed by the California Levees Roundtable, an interagency collaborative of regional, state, and federal flood management and natural resource agencies. Well versed in USACE's Engineering Technical Letter, which sets new policy and criteria for vegetation on certified levees. Familiar with the academic and applied research related to potential effects of vegetation on levee slope stability, levee through seepage, riverbank cohesion, and habitat functions and values of riparian vegetation.

Lower Feather River Corridor Management Plan (LFRCMP), DWR, Sutter and Yuba Counties, California. Senior/lead ecologist for restoration planning and coordinator of hydraulic modeling team developing a long-term plan and strategy for managing 20-mile river corridor between Marysville and Sutter Bypass. Collaborates with an agency and stakeholder Work Group to direct hydraulic modeling, ecological design, and technical analysis of potential restoration opportunities and priorities for floodway maintenance and enhancement of flood conveyance and ecosystem functions.

North Area Streams and Sacramento River East Levees (SREL) Project, Sacramento Area Flood Control Agency, Sacramento County, CA. Senior Restoration Ecologist developing mitigation and conservation strategy to compensate for environmental impacts of multi-phase flood risk reduction projects. SAFCA needs to secure FEMA accreditation for 100-year flood protection along a 4 mile stretch of Arcade Creek and up to 8 miles on the SREL between the mouth of the American River and Freeport. Tasks include preparing EIR and supporting technical studies, developing mitigation/conservation strategy, coordinating with regulatory agencies, coordinating with geotechnical engineers to prepare habitat design plans & specifications, preparing permit applications and related documents, public outreach and assisting in planning for implementation strategies.

Twitchell Island Levee Improvements Project: San Joaquin Reach EIR, Reclamation District 1601, Sacramento-San Joaquin Delta, CA. Senior restoration ecologist developed aquatic and riparian restoration design concepts, in collaboration with project engineers and DWR, for five options on the waterside of the existing levee along the San Joaquin River. The design allows for the creation of a mosaic of different habitat types such as tidal marsh, tule marsh, mud flats, seasonal wetlands, riparian forest and scrub, and upland scrub, and grassland. Prepared illustrated drawings depicting conceptual habitat (vegetation types, graded features, intertidal zone) integrated with the engineering design. Also prepared the EIR, supporting studies, permitting strategy, and 60% drawings, specifications, and cost estimates related to improvements to the Twitchell Island levees along the San Joaquin River. The levee improvements, which include a stability berm and backup levee, are intended to increase levee resistance to the 100-year flood event and erosion caused by wave-run up.

Lower American River Floodway Management Plan, Sacramento Area Flood Control Agency, Sacramento County, CA. Senior restoration ecologist, facilitator and co-author for a multiple resource master plan addressing the lower 15 miles of the American River and its floodplain habitats within the American River Parkway and managed floodway. Collaborated with a large stakeholder oversight group, the Lower American River Task Force, local, state, and federal agency staff, and technical subcommittees in developing plan priorities and concepts for future management, flood protection, and restoration of the river to meet multiple resource and floodway objectives.

Cache Creek Flood Control Phase I/Phase II, Yolo County Flood Control and Water Conservation District, Yolo County, and Water Resources Association of Yolo County, Yolo County, CA. Senior

ecologist, and the facilitator of the independent, technical Flood Advisory Committee (FAC), in support of the Cache Creek Flood Control Project. FAC reviewed past documents and model submissions and provided the clients a summary report of what they thought to be the true flood risk, as well as the best short-term and long-term solutions to the problem. FAC then gave presentations to the clients and to consumer groups to communicate their findings and reach out to stakeholders and the community, to meet the goal of generating greater consensus on flood risk and solutions. The clients have since created a Cache Creek flood and countywide stormwater management program to address flood risk and damage reduction measures.

CALFED Ecosystem Restoration Program and Strategic Plan, CALFED Ecosystem Restoration

Program Plan, Statewide, CA. Senior restoration ecologist who prepared programmatic habitat restoration visions and objectives for CALFED's Ecosystem Restoration Program Plan (ERPP) for rivers and riparian habitat, wetlands, and natural physical processes (e.g., stream meander functions) of the Sacramento River and San Joaquin River systems and the Bay-Delta ecosystem. Facilitated and participated in an independent team of resource scientists responsible for developing the strategic plan for implementation of the ERPP over a 30-year period.

Comprehensive Potential Mitigation Survey of the Sacramento River—Sacramento River Bank

Protection Project, Sacramento Area Flood Control Agency and Sacramento River Bank Protection Project Interagency Working Group, Sacramento and Yolo Counties, CA. Principal ecologist for a team of engineers, fluvial geomorphologists, and fish biologists conducting surveys, setting priorities, and designing and initiating mitigation projects for SAFCA and the Interagency Working Group (IWG). Also the facilitator and technical coordinator of the IWG, a collaborative of state and federal natural resource and flood management agencies, including the USACE, DWR, USFWS, and NMFS. The project involved the identification of potential future mitigation project sites and conceptual designs for the entire lower Sacramento River, from Knight's Landing to Clarksburg, and the lower American River. Based on ongoing bank protection projects needing a large number of mitigation projects, SAFCA sponsors a survey of all potential mitigation sites and river restoration design approaches.

Barry G. Scott, R.P.A.

Project Role: Cultural Resources, Senior Archaeologist



Barry Scott is a Registered Professional Archaeologist (RPA), Project Director and Project Manager who performs various phases of environmental project management for Section 106 of the National Historic Preservation Act (NHPA), NEPA, and California Environmental Quality Act (CEQA) compliance projects. Specific roles include staff oversight and quality control; direct oversight of subcontractors; Native American consultation; preparation of technical documents for compliance with Section 106 of the NHPA, as well as CEQA, NEPA, and other state and federal laws; development of mitigation plans; and preparation of CEQA and NEPA compliance documents. He is experienced in the preparation of environmental compliance documents such as EIRs, EISs, ISs, and EAs.

Mr. Scott has extensive experience organizing and participating in meetings and consultation with and between various state, local, and federal agencies, Native Americans, and client representatives, especially to address cultural resource issues. Barry has been delegated authority by federal agencies to consult directly with the California State Historic Preservation Officer on behalf of the lead federal agency. He also specializes in coordination with Native Americans and with project design staff to develop methods of avoiding impacts on significant cultural resources. He has over 30 years of experience in archaeology in the United States and he has conducted or has been the Principal Investigator for innumerable cultural resource investigations for the private sector, local, state and federal agencies, including several multi-state projects and highly controversial projects. He meets the Secretary of the Interior's standards for work in Archaeology.

EDUCATION

M.S., Anthropology, California State University, Sacramento

B.S., Anthropology, California State University, Sacramento

EXPERIENCE IN THE INDUSTRY

30 years

EXPERIENCE WITH GEI

Less than one year

REGISTRATIONS AND LICENSES

Register of Professional Archaeologists

PROJECT EXPERIENCE

California Dept of Water Resources, Lower Elkhorn Setback Levee Project. Group leader for cultural resources studies including archaeological surveys, sensitivity analyses and geoarchaeological investigations, archaeological resource evaluations, built environment identification and evaluation, compliance with CEQA and section 106 of the National Historic Preservation Act.

Sacramento Area Flood Control Agency, North Sacramento Streams. Senior archaeological advisor and reviewer and director of Native American coordination and consultation for a complex levee improvement project. Barry reviewed cultural resources sections for CEQA/NEPA document and archaeological technical documents and correspondence. Barry also directed preparation of Section 106 / CEQA and NEPA cultural resources implementation plan and is conducting Native American consultation and coordinating between SAFCA, USACE and Tribes.

Sacramento River East Levee Improvements Project, Sacramento County, CA. Senior archaeological advisor and reviewer and director of Native American coordination and consultation for a complex levee improvement project. Barry reviewing cultural resources sections for CEQA/NEPA document and archaeological technical documents and correspondence. Barry also directed preparation of Section 106 / CEQA and NEPA cultural resources implementation plan and is conducting Native American consultation and coordinating between SAFCA, USACE and Tribes.

Sacramento Area Flood Control Agency, American River Common Features Project, Sacramento County, CA. Senior archaeologist and Native American consultation specialists directing preparation of the Historic Properties Management Plan (HPMP) for the US Army Corps of Engineers' implementation of a Programmatic Agreement for this large regional flood protection project

Three Rivers Levee Improvement Authority, Goldfields 200-Year Flood Protection Project, Yuba County, CA. Senior archaeological advisor and director of Native American consultation for compliance with

CEQA for this flood control project which includes construction of a new levee. Coordinated negotiation with culturally Affiliated Native Americans for revisions to EIR mitigation measures.

Three Rivers Levee Improvement Authority, Western Pacific Interceptor Canal 200-Year Standard Project, Yuba County, CA. Senior archaeological advisor and director of Native American consultation for compliance with CEQA for this flood control project which includes improvements of a levee. Coordinated negotiation with culturally Affiliated Native Americans, and preparation of an Initial Study cultural resources section.

Three Rivers Levee Improvement Authority, Crossing 21 Embankment Project, Yuba County, CA. Senior archaeologist and Native American coordinator. Directed actions for Section 106 compliance and coordinated Native American consultation on behalf of TRLIA for this flood protection project.

Sacramento Area Flood Control Agency (on behalf of Corps), Natomas Levee Improvements Program, Reach I, Sacramento County, CA. Senior archaeologist and Native American consultation specialist. Conducted Native American coordination of Native American monitoring for geotechnical investigations along the Garden Highway in Sacramento. Currently assessing cultural resources strategy for compliance with Section 106 of the NHPA.

Sacramento Area Flood Control Agency, Site 18A Culvert Replacement and Fish Passage Enhancement Project, Sacramento County, CA. Coordinated Native American consultation for Native American field studies and preparation for Native American monitoring during construction.

Sacramento Area Flood Control Agency, Natomas Levee Improvements Program, Site 19A, Sacramento County, CA. Coordinated Native American consultation for Native American field studies and Native American monitoring during construction. Oversaw archaeological assessment of a discovery of artifacts during construction.

PROFESSIONAL ASSOCIATIONS

Society for American Archaeology

Jesse Martinez, R.P.A.

Project Role: Cultural Resources, Project Archaeologist



Jesse Martinez specializes in prehistoric, protohistoric, and historic archaeology. His experience includes archaeological surveying, extensive archaeological excavation, laboratory management, artifact analysis, and field crew supervision. He is an accomplished writer and has coauthored and contributed to numerous resources management reports for CEQA, Section 106, and NEPA compliance, and archeological reports for USACE, Caltrans, DWR and several other federal and state agencies. He has extensive experience in the prehistory of California and the Great Basin, having worked in the Mojave Desert, eastern California, northern California, San Francisco Bay Area, the western Sierra Nevada, and the Central Valley. Mr. Martinez has also worked in Idaho, Washington, Nevada and Montana.

Mr. Martinez completed his master's degree in anthropology with an emphasis in archaeology from California State University, Sacramento. His thesis was a diachronic study of obsidian use across various environmental zones at the Mount Hicks obsidian source in Mineral County, Nevada. His thesis work included stratified random sampling of four different environmental zones and development of an obsidian hydration rate for the Mount Hicks source. Mr. Martinez performed the hydration and lithic analysis for his thesis himself, cutting more than 300 artifacts for hydration analysis and analyzing thousands of obsidian artifacts. He has particular interest in the theory technological organization and how it relates to hunter-gatherer subsistence-settlement strategies.

PREVIOUS PROJECT EXPERIENCE

North Sacramento Streams, Sacramento River East Levee, Lower American River, and Related Flood Improvements Project, Sacramento County, CA. Conducted several archaeological pedestrian surveys for the project, conducted archaeological monitoring during geotechnical testing, and facilitated geoarchaeological testing in support of the project. The Sacramento Area Flood Control Agency (SAFCA) is proposing to implement improvements to the flood management system protecting portions of the City and County of Sacramento, reducing flood risk and bringing the flood management system in the project area into compliance with applicable engineering standards established under the National Flood Insurance Program (NFIP). In addition, the proposed project would allow the flood management system in the project area to meet the urban levee design standards established by the California Department of Water Resources.

Natomas Levee Improvement Program EIR, EIS, and EIR/EIS, Sacramento Area Flood Control Agency, Sacramento County, CA. Project archaeologist for the environmental compliance effort supporting SAFCA's program of flood control improvements to provide the Sacramento metropolitan area with a "200-year" level of protection. Provided archaeological monitoring at Mile 0.5 and 19A and later investigated reports of an archaeological discovery at Reach 19A and authored a memo report on the find and monitoring activities at the work site. Investigated work and monitoring activities at Reach I and authored a summarizing memo report. Reviewed technical analyses for several archaeological site evaluations.

Knights Landing Ridge Cut Levee Repair Project, Knights Landing Ridge Drainage District, Yolo County, CA. Principal Investigator for this project which required CEQA and Section 106 compliance. The project consisted of bringing 3.5 miles of levee into compliance with State and Federal levees standards. Conducted and oversaw cultural resource surveys as well as authoring the technical report and providing senior review of memo reports. Coordinated with USACE, DWR and Native American groups regarding resource avoidance mitigation strategy.

EDUCATION

M.A., Anthropology, California State University, Sacramento

B.A., Anthropology, California State University, Sacramento

EXPERIENCE IN THE INDUSTRY

18 years

EXPERIENCE WITH GEI

Less than one year

REGISTRATIONS AND LICENSES

Register of Professional Archaeologists

Small Erosion Repair Program Programmatic EIR, California Department of Water Resources, Division of Flood Management, Central Valley, CA. Project archaeologist for the programmatic EIR for a program that would facilitate implementing repairs of small erosion sites on levees maintained by DWR within the Sacramento River Flood Control Project (SRFCP) area. The project also required a programmatic biological assessment under the federal Endangered Species Act and a programmatic agreement to satisfy requirements of Section 106 of the National Historic Preservation Act. These analyses and permits streamlined environmental clearances for implementation of small erosion repairs within the Small Erosion Repair Program (SERP).

Lower Cosumnes River Floodplain and Riparian Habitat Restoration Project Permitting Support, The Nature Conservancy, Sacramento County, CA. Principal Investigator and report author for this project which was subject to Section 106 regulations. The project restored approximately 600 acres of riparian forest habitat on the lower Cosumnes River using engineered levee breaches and targeted grading. Oversaw field work which included intensive pedestrian survey, augering, and subsurface test pits. Also coordinated with the client and Native American tribes during monitoring of the project.

Bear River Bank Protection Project, Reclamation District 2103, Placer and Sutter Counties, CA. Field director for the cultural resources survey for this project. The project involved construction to increase shore protection, including installing and replacing riprap. Coauthored the Section 106 compliance report for the investigation.

Bear River North Levee/Grasshopper Slough Surveys, U.S. Army Corps of Engineers, Yuba County, CA. Field director for the cultural resources inventory of two levee systems. The project involved construction of new levees and improvements to existing facilities. Wrote the historic properties survey report for the investigation. After the initial investigation, he was also an archaeological monitor during construction of the new levee systems.

Feather River Setback Mitigation Project, Three Rivers Levee Improvement Authority, Yuba County, CA. Closely coordinated with Native American Tribes interested in the project addressing their concerns and representing the client during Native American surveys of the project area. Also wrote a detailed memo describing the Native American survey and its results for the client.

Western Pacific Interceptor Canal West Levee Improvement Project, Three Rivers Levee Improvement Authority, Yuba County, CA. Served the role as principal investigator for this project requiring CEQA and Section 106 compliance. The project consisted of TRLIA bringing the levee up to DWR's Urban Levee Design Criteria. Oversaw field work including pedestrian survey, coordinated geoarchaeological testing of soils, developed worker environmental awareness training material, and reviewed technical documents.

Southport Sacramento River Early Implementation Project, West Sacramento Area Flood Control Agency, Yolo County, CA. The project would implement flood risk-reduction measures along the Sacramento River South Levee. Because the United States Army Corps of Engineers is lead agency under NEPA, the project is considered a federal undertaking and subject to Section 106 as well as CEQA. Oversaw archaeological participation with Native American Tribes, wrote several technical memorandums, and facilitated geoarchaeological testing for the project.

PROFESSIONAL ASSOCIATIONS

Society for California Archaeology
Society for American Archaeology
Nevada Archaeological Association

Mike Mirmazaheri, P.E., C.F.M.

Project Role: Non-Structural Solutions, Senior Project Manager

Mike Mirmazaheri is a registered engineer and has more than three decades of engineering and project management experience focused on water resources planning and management, i.e. water supply and quality and flood control. His areas of expertise are preparation of planning documents such as technical, environmental impacts and feasibility reports, and flood emergency and flood management plans. Mr. Mirmazaheri's strengths are in project management, permitting, local projects coordination, hydraulics and hydrology, and government funds and grants. Mr. Mirmazaheri has worked on many projects in the Central Valley and the Sacramento – San Joaquin Delta. He worked for the California Department of Water Resources for about 27 years prior to joining GEI.

He has worked on projects obtaining various Federal and State regulatory permits and managed local flood control projects. He is currently working on preparation of the local flood safety plans for the Sacramento County Delta LMAs. He has also worked on the DWR strategic planning for the Delta, Central Valley Flood Protection Plan, Sacramento River Basin Wide Feasibility Study, and the Feather River Regional Flood Management Plan.

PROJECT EXPERIENCE

Emergency Safety Plans, Sacramento County OES, CA. Has been the lead engineer in managing formulation of Flood Emergency Safety Plans (ESP) for 18 local agencies in the Sacramento – San Joaquin Delta. The ESPs utilize the existing information and include maps developed based on the hypothetical levee breach locations. They also include protocols for emergency actions during flood events based on SEMS organizational structure.

Floodplain Analysis and Mapping, City of Sacramento – Department of Utilities, CA. GEI is the prime consultant assisting the City of Sacramento with preparation of evacuation and rescue maps; the total levee length on this project is 62 miles. The project involves analyzing various hypothetical levee failures along the Sacramento and American Rivers to formulate flood depths delineations and rescue and evacuation plans for the City and County Emergency Services, Police, and Fire Departments. The analysis utilized the existing hydraulic models for developing the hypothetical levee breach locations. LiDAR topography information was used to delineate the flood limits, flood paths, and maximum flooding depths. Evacuation plan assisted in the city to develop the reverse 911 protocol. Led the review of the products and had a critical role in managing the project. Led the review of the maps and reports as part of GEI quality control and had a critical role in finalizing the project.

District Engineering Support, Bethel Island Municipal Improvement District, CA. GEI provides district engineering services to Bethel Island Municipal Improvement District. Has been providing policy advice, grant application and pursuing funding support to the District Engineer and District Counsel in pursuing public funds for the levee projects on the District levee system, including repair, maintenance, improvement, and habitat restoration and mitigation and drainage work on the district jurisdictional land. He has also managed multi-purpose levee rehabilitation projects for the District.



EDUCATION

B.S., Civil Engineering, California State University, Sacramento

EXPERIENCE IN THE INDUSTRY

31 years

EXPERIENCE WITH GEI

3 years

REGISTRATIONS AND LICENSES

- Professional Engineer, CA No. 53467
- Professional Engineer, HI No. 16368
- Professional Engineer, OR No. 89890
- Professional Engineer, WA No. 52028

CERTIFICATIONS

Floodplain Manager (CFM) through ASFPM, No. US-06-02110

GRADUATE OF THE FOLLOWING MANAGEMENT PROGRAMS:

California Department of Water Resources Management Program
University of California, Davis Executive Program
California Department of Water Resources Project Management (PMI) Program

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers (ASCE)
Association of State Floodplain Managers (ASFPM)
Floodplain Management Association (FMA)

District Engineering Support, Suisun Marsh, CA. GEI provides district engineering services to Honker Bay (RD 2130) and Simmons Wheeler (RD 2127). Has been providing technical and policy support to the District Engineer for the levee repair, maintenance, and improvement projects on the District levee system and drainage work on the district jurisdictional land.

FloodSAFE California Program Management, California Department of Water Resources, Statewide, CA. GEI is the prime consultant leading a multi-firm team providing the FloodSAFE Program management support to the DWR. Is a key GEI staff formulating the Regional Floodplain Management Plan for the Feather River system. The Regional Floodplain Management Plan is prepared for the Yuba County Water Agency, Three Rivers Levee Improvement Authority, Marysville Levee Commission, and Sutter Butte Flood Control Agency. It reflects the flood management priorities of the Feather River Region while at the same time aligning with the recently adopted 2012 Central Valley Flood Protection Plan goals and objectives. The Feather River Regional Floodplain Management Plan will facilitate future funding and implementation of much-needed flood risk reduction projects.

Flood Emergency Response Program, California Department of Water Resources, Statewide, CA. GEI is the prime consultant assisting DWR with a major, multi-year program to overhaul California's Flood Emergency Response Program. As part of the quality control team, conducted the final review of GEI document and provided comments on the Evaluation of Quantitative Precipitation Forecasts and Watershed Runoff Forecasting report prepared for the Feather River Basin.

NOTABLE PROJECT EXPERIENCE WITH CALIFORNIA DEPARTMENT OF WATER RESOURCES

Delta Levees Flood Protection Program, Sacramento – San Joaquin Delta, CA. Managed all components of the Program including the Delta Levees Maintenance Subventions Program and the Delta Levees Special Flood Control Projects. Also managed the mitigation and habitat work associated with the two program components. Worked very closely with the Delta LMAs and their engineers.

Project Levee Encroachment Management, Central Valley, CA. Responsible for management of all issues related to encroachments in the Sacramento River Basin, San Joaquin River Basin, and the Tulare Lake Basin for the Central Valley Flood Control Board (formerly the Reclamation Board). Responsibilities included review and analysis of impacts, making specific recommendations to the Board, and leading enforcement actions when required.

Sacramento and San Joaquin River Comprehensive Study, Central Valley, CA. Represented the State interest and involvement and managed coordination of technical analysis for all the technical studies associated with the flood control planning in the Sacramento and San Joaquin River basins. Responsibilities included quality control and review of the technical studies and report produced by a combined team of engineers and scientists from both DWR the U. S. Army Corps of Engineers (USACE).

American River Watershed Feasibility Study, Folsom, CA. Managed State involvement and coordination of the joint State and Federal feasibility study for the American River Watershed, focusing on raising the Folsom Dam and associated components. The feasibility study was prepared by a combined team of engineers and scientists from the Sacramento Area Flood Control Agency, DWR, and the USACE. This responsibility required a comprehensive know ledge of the USACE feasibility study process.

South Delta Water Management Program, Sacramento – San Joaquin Delta, CA. Managed, contributed to and prepared several environmental documents, including Environmental Impact Reports, Feasibility Study Reports, Scoping Reports, and several technical reports utilizing the knowledge and understanding of California Environmental Quality Act, National Environmental Policy Act, and the Endangered Species Act.

Leo H. Winternitz

Project Role: Stakeholder and Public Outreach Lead, Senior Consultant



Leo Winternitz specializes on ecosystem restoration projects and their relationship to water management in northern California and is particularly skilled in organizing and working with collaborative partnerships involving stakeholders with conflicting interests.

Prior to joining GEI in 2014, Mr. Winternitz held several prominent positions in the California water resources arena, most recently, as Delta Program Director and Senior Advisor for The Nature Conservancy.

While with the California Department of Water Resources (DWR), he served as an Environmental Program Manager for the Department's Environmental Services Office, and led the Department of Water Resources' Sacramento/San Joaquin Delta fish and water quality programs.

Mr. Winternitz also served as Deputy Director for the CALFED Bay-Delta Program, which focused on water and environmental management activities in the Sacramento-San Joaquin Bay-Delta Estuary. He also served as Executive Director for the Sacramento Water Forum a diverse group of 40 stakeholder organizations representing business, agriculture, citizens groups, environmentalists and water managers who have collaboratively negotiated a regional water supply and environmental protection agreement to the year 2030.

SELECTED PROJECT EXPERIENCE

FloodSAFE California Program Management, California Department of Water Resources, Statewide, CA. As Senior Project Consultant for the *Yolo Bypass Flood Control and Habitat Restoration Task*, working with DWR's principal manager and staff to develop strategies for stakeholder engagement and to implement project features. Activities include preparing draft policy papers, analyses, and reports to support DWR's efforts to work with other state, federal, local agencies, and stakeholders to develop a plan of implementation for the project. Directly working on developing a governance, finance and stakeholder outreach plan.

Bay Delta Collaborative Science and Adaptive Management Program and Team Support, Metropolitan Water District of Southern California, Bay Delta Area, CA. Currently serving as a co-chair to a court mandated order to develop a collaborative science adaptive management program that addresses specific issues related to fish passage, survival and entrainment at the South Delta water export facilities. As a co-chair, leading management staff from DWR, the California Department of Fish and Wildlife, the US Bureau of Reclamation, the US Fish and Wildlife Service, the National Marine Fisheries Service, and representatives of public water agencies and non-governmental organization groups, to collaboratively develop scientific processes that address policy-related water management questions.

Central Valley Flood Protection Plan, California Department of Water Resources, Sacramento, CA. Working with the Department of Water Resources' flood and environmental staff to integrate habitat restoration projects with flood projects. Developing recommendations for implementing specific projects including aspects of permitting, environmental documentation, financing, stakeholder outreach, communications with other state and federal agencies, and project mitigation.

Developing Water Supply Reliability and Environmental Protections for the Lower American River, The Water Forum, Placer, Sacramento and El Dorado Counties, CA. As Executive Director for the Sacramento Water Forum, planned and managed the activities of staff and consultants on behalf of a diverse group of 40 stakeholder organizations representing business, agriculture, citizens groups, environmental organizations, and water managers to complete negotiations and implement a regional water supply and environmental protection agreement to the year 2030.

EDUCATION

M.S., Water Resources Management,
University of San Francisco
B.A., Biological Sciences, Gonzaga
University, Spokane, Washington

EXPERIENCE IN THE INDUSTRY
38 years

EXPERIENCE WITH GEI
2 years

Mark Bowen

Project Role: Delta Legacy / History, Senior Architectural Historian



Mark Bowen is a senior historian and architectural historian with more than 19 years of experience conducting cultural resources inventories and evaluations in California for federal, state, and local agencies. Mr. Bowen authors or coauthors cultural resources technical reports including historic resources and historic architectural inventories and evaluations, and archives and collections management documents. He specializes in historic building and structure documentation, research for thematic contexts, and design and implementation of project-specific computer databases. He also is experienced in archaeological field survey and excavation methods. He has conducted research for primary and secondary documentation at various repositories throughout California as well as in Washington, Nevada, Utah, Colorado, and Ohio for the purposes of environmental compliance, land use histories, water rights research, and other litigation support.

Mr. Bowen has experience in historic research, field inventory, and site assessment for Section 106, Section 110, and Section 111 of the National Historic Preservation Act, Section 4(f) of the Department of Transportation Act of 1966, California Public Resources Code 5024.5, NEPA, and CEQA compliance; evaluating resources for significance (and formal listing of resources) for the California Register of Historical Resources (CRHR) and the National Register of Historic Places (NRHP); preparation of Historic American Building Survey (HABS) and Historic American Engineering Record (HAER) documentation; developing integrated cultural resource management plans and mitigation measures; preparing reports for cultural resource and environmental compliance; developing onsite interpretive exhibits and website content; assisting the consultation with State Historic Preservation Officers and local review agencies; preparing and coordinating proposals for work and cost estimates; and managing projects. His agency clients have included the US Forest Service, US Air Force, US Marine Corps, US Navy, Army National Guard, US Army Corps of Engineers, California Department of Transportation (Caltrans), California Department of General Services, and numerous county and city public works and planning departments.

EDUCATION

M.A., Public History, California State University, Sacramento
B.A., History, California State University, Chico
Certificate in Public History and Archaeological Field School, California State University, Chico

EXPERIENCE IN THE INDUSTRY

19 years

EXPERIENCE WITH GEI

Less than one year

REGISTRATIONS AND LICENSES

Registered Historian, CA No. 576

PROJECT EXPERIENCE

Bethany Dam and Reservoir Improvements Project and the Bethany Sediment Removal Project, Department of Water Resources, Alameda County, CA. As Project Manager, oversaw the multidisciplinary resource teams within the project area. Key topics included resources eligible for the NRHP for their association with the California Aqueduct. The proposed project will improve the Bethany Dam and Bethany Forebay Dam intake structure to ensure safe and reliable operations. All documentation was prepared according to DWR guidelines.

Cultural Resources Analysis for the Butte Slough Outfall Gates Rehabilitation Project, Department of Water Resources, Butte County, CA. As Project Manager, oversaw a cultural resources team for DWRs replacement of water valves in Butte Slough.

Cultural Resources Analysis for the Willow Slough and 5 SERP Sites Project, Department of Water Resources, Colusa County, CA. As Project Manager, oversaw a cultural resources team for DWRs levee repair analysis in Colusa County. Team integrated DWR policies and project needs with new levee evaluation approach developed by USACE.

Cultural Resources Analysis for the Proposed Gauging Station in the Oroville Wildlife Area Near River Mile 54, Department of Water Resources, Butte County, CA. Conducted an update analysis and

impacts/effects analysis of dredge mining district near Oroville for the purposes of installation of gauging station. Facilitated consultation between DWR and the Office of Historic Preservation.

Natomas Levee Improvement Program, Sacramento Area Flood Control Agency, Sacramento County, CA. Senior historian and architectural historian for environmental compliance effort in SAFCA's program of flood control improvements to provide the Sacramento metropolitan area with a "200-year" level of protection. Facilitates compliance with cultural resources regulations by conducting inventories and evaluations of buildings and structures for historic significance. Participating in the completion of cultural resources technical reports, environmental documentation, and agreement documentation required by state and federal compliance requirements.

El Dorado Flume 31/31A Replacement Project, El Dorado Irrigation District, El Dorado County, CA. Architectural historian who assisted with cultural resources studies for the flume replacement project on the El Dorado Canal. Wrote evaluation reports and presented findings to EID.

Water Treatment Plant—Evaluation of Buildings under CEQA and Section 106, Far Western Anthropological Research Group, Sacramento County, CA. Architectural historian who conducted field research on and evaluated the historical significance of buildings within the water treatment plant in Folsom and drafted an evaluation report.

FERC 184 Hydroelectric Context, El Dorado Irrigation District, El Dorado County, CA. Architectural historian who assisted with historic context development for future studies for FERC 184 relicense Section 106 compliance requirements.

West Sacramento Clarksburg Branch Compliance, City of West Sacramento, Yolo County, CA. Architectural historian who assisted the City with cultural resources studies for a railroad acquisition project. Coordinated with SHPO to complete cultural resources studies pertaining to the railroad alignment.

PROFESSIONAL ASSOCIATIONS

California Preservation Foundation

EDUCATION

- ◆ University of California, Davis
Completed course work for MS in Civil Engineering, 1984
with emphasis in Water Resources
- ◆ University of Santa Clara
BS in Civil Engineering, 1980

PROFESSIONAL LICENSES and SOCIETIES

- ◆ Registered Civil Engineer in California, No. 36308
- ◆ Member, American Society of Civil Engineers
- ◆ Member, Tau Beta Pi, Engineering Honor Society
- ◆ Member, U.S. Committee on Irrigation and Drainage

EXPERIENCE

1984 to Present **MBK Engineers, Sacramento, CA,**

Principal

Civil engineer in fields of flood control, hydrology, hydraulics, water resources planning, drainage, water supply, surveying, and levee rehabilitation and maintenance.

1980 to 1983 **Bechtel Corporation, San Francisco, CA,**

Civil / Structural Engineer

Design and construction of concrete and steel involving structural analysis, seismic design, interdisciplinary coordination, field construction correspondence and temporary field assignments.

EXPERIENCE HIGHLIGHTS***Reclamation District Levee Engineering***

Acts as public representative and provides consulting engineering service to 33 Sacramento / San Joaquin Delta and Suisun Marsh Reclamation Districts in regard to levee maintenance and rehabilitation. This includes levee rehabilitation design and construction, levee surveys, bank protection design and construction, resolution of seepage and subsidence problems, development of encroachment control criteria, maintenance inspections, maintenance recommendations, assistance with regulatory filing, environmental assessment assistance, assistance and participation in funding programs through the State and Federal governments, flood fight planning, coordination and hazard mitigation planning (1984–present). Levee work totaled over \$150 million between 1988 and 2016. Significant projects include a \$9 million full island levee rehabilitation project on Empire Tract, and a \$1.5 million seepage berm on Grand Island (2013); development of Emergency Operations Plans and Flood Contingency Maps for nine San Joaquin County Reclamation Districts (2015), development of five-year levee rehabilitation plans for 22 reclamation districts (2010), importation of 625,000 cy of material from Decker Island to stabilize 10 miles of levee on four reclamation districts (2000–2004), design and construction of a habitat-friendly levee on Reclamation District No. 2110 (2001, 2005 and 2014), development of procedures to perform non-destructive subsurface surveys of the levees using electromagnetic technology (2005), design and construction of breach closures on Prospect Island (1996), McCormack-Williamson Tract (1997), and Little Mandeville Island (2001). Provided services to U.S. Army Corps of Engineers in regard to \$196 million CALFED Levee Stability Program (2008–2009). Provided flood fight participation and coordination, and disaster restoration through federal and state disaster assistance programs for floods of 1982, 1983, 1986, 1995, 1997, 1998 and 2006.

BOARDS & COMMITTEES

Habitat Advisory Committee to the State of California Delta Levee Subventions Program	Delta Risk Management Strategy Technical Advisory Committee
CALFED Levees & Channels Technical Team	CALFED Levees & Channels Seismic Sub-Team
CALFED Suisun Marsh Levees Sub-Team	Lower Yolo Bypass Planning Forum
Delta Vision Stakeholder Coordination Group	Delta Conservancy Delta Dialogues Stakeholders Group

EDUCATION

- ◆ California State University, Sacramento
BS in Civil Engineering, 1995
- ◆ California State University, Sacramento
MS in Civil Engineering, 2002

PROFESSIONAL LICENSES and SOCIETIES

- ◆ Registered Civil Engineer, California
- ◆ Member, American Society of Civil Engineers

EXPERIENCE

1995 to Present MBK Engineers, Sacramento, CA
Civil Engineer
Principal Engineer in charge of hydraulic/hydrologic models for evaluation of flood control alternatives and development of design water surface elevation. Perform hydraulic/hydrologic analysis of flood problems and evaluation of flood control alternatives using HEC-RAS, RMA-2, FLO-2D, UNET, HEC-1. Preparation of plans and specifications for levee rehabilitation and habitat enhancement projects in the Sacramento-San Joaquin Delta.

EXPERIENCE HIGHLIGHTS

- ◆ Technical adviser and Principal in charge of HEC-RAS and FLO-2D models of the Sacramento-San Joaquin River Flood Control Project for the California Department of Water Resources, Central Valley Floodplain Evaluation and Delineation Project. (2008 to Present)
- ◆ Principal in charge of hydraulic analysis to assess flood risk associated with the Yuba Goldfields. (2010 to Present)
- ◆ Principal in charge of hydraulic analysis for the Lower Feather River Corridor Management Plan. (2011 to Present)
- ◆ Principal in charge of hydraulic analysis for the West Sacramento Levee Improvement Project. (2010 to Present)
- ◆ Technical adviser for development of RMA-2 model of the Sutter Bypass for evaluation of vegetation management. (2011 to Present)
- ◆ Evaluate hydraulic impacts using RMA-2 for the Abbott Lakes Restoration Project on the Feather River. (2009)
- ◆ Evaluate hydraulic impacts using HEC-RAS of the Nelson Slough Restoration Project on the Feather River. (2009)
- ◆ Evaluate hydraulic impacts of wetlands restoration on the Sutter Bypass using HEC-RAS. (2009)

EDUCATION

- ◆ California State University, Sacramento
MS in Civil Engineering, 1998
BS in Civil Engineering, 1996

PROFESSIONAL LICENSES AND SOCIETIES

- ◆ Registered Civil Engineer in California, 60093
- ◆ Member, American Society of Civil Engineers

EXPERIENCE

- 2000 to Present **MBK Engineers, Sacramento, CA**
Principal
Practice in the fields of hydrology, hydraulics, flood control, ecosystem restoration, and streambank stabilization design.
- 1999 to 2000 **US Army Corps of Engineers, Sacramento, CA**
Senior Project Planner
Developed and reviewed reconnaissance and feasibility reports in support of congressional authorizations. Responsible for alternative development, incremental analysis, policy compliance, document preparation, and coordination with the local sponsor as well as the public.
- 1996 to 1999 **US Army Corps of Engineers, Sacramento, CA**
Technical Manager and Civil Designer
Responsible for engineering design of flood damage reduction and ecosystem restoration projects. Coordinated structural, hydraulics, hydrology, geotechnical, and civil design aspects of project developmental. Developed biotechnical streambank stabilization plans, mitigation design, grading plans, utility relocations, and conducted hydraulic analysis.
- 1994 to 1996 **US Army Corps of Engineers, Sacramento, CA**
Student Assistant
Provided support on flood damage reduction projects.

PROJECT HISTORY

- 2000 to Present
- ◆ Program manager for the Lower Sacramento River/Delta North Regional Flood Management Plan. Responsible for identifying projects and building support for a regional vision of flood management. This included developing alternatives and building support for rural levee repairs, structural and non-structural solutions for small communities and system improvements to reduce flood stages and enhance the ecosystem.
 - ◆ District Engineer for Reclamation District (RD) 2103 and RD 817. Responsible for planning and design of a \$20 million levee improvement project to reduce the flood risk to the City of Wheatland.
 - ◆ Program manager for the Three Rivers Levee Improvement Authority. Responsible for planning, design and construction of a \$400 million levee improvement program to provide 200-year protection to South Yuba County. The Program includes two setback levees, restores over 2,000 acres of habitat, and improves 29 miles of levees.
 - ◆ Program manager for the Sacramento Area Flood Control Agency, Natomas Levee Improvement

Program. Responsible for planning, design and construction of a \$620 million levee improvement program to provide 200-year protection to the Natomas Basin in Sacramento, CA. The Program consists of raising and strengthening 42 miles of levees.

- ◆ Program manager for the West Sacramento Area Flood Control Agency Levee Improvement Program. Responsible for planning, design, and construction of a \$460 million levee improvement program to provide 200-year protection to the City of West Sacramento. The Project consists of raising and strengthening 50 miles of levee.
- ◆ Project manager and planner for the City of St. Helena Comprehensive Flood Control Project.
- ◆ YCWA project manager for the Marysville Ring Levee Project.

1995 to 2000

- ◆ Lead Project Planner on the following Corps of Engineers Projects:
 - American River Watershed Project Long Term Study
 - Limited Reevaluation Report on the American River Watershed, Folsom Modifications Project
 - Second Addendum to the Supplemental Investigation Report on the American River Watershed, Common Features Project
- ◆ Used HEC-2 and HEC-RAS to model small tributaries and develop flood reduction alternatives.
- ◆ Lead Designer for the Napa River Flood Control Project.

EDUCATION

- ◆ US Army Corps of Engineers Planning Associates Program, Ft. Belvoir, Virginia
Specific studies in the formulation, evaluation and selection of water resource alternatives, 1984
- ◆ University of Texas at Arlington, Arlington, Texas
MS in Civil Engineering, May 1979 with emphasis in Water Resources
- ◆ Texas A&M University, College Station, Texas
BS in Civil Engineering, December 1972

PROFESSIONAL LICENSES AND SOCIETIES

- ◆ Member, American Society of Civil Engineers

EXPERIENCE

2005 to Present MBK Engineers, Sacramento, CA

Senior Civil Engineer

Serves as Design Manager for the Three Rivers Levee Improvement Authority for implementation of the Reclamation District 784 Levee Improvement Program, a \$405M project completing construction. Managed the efforts of an Implementation Team of engineering consultants, real estate agents, and environmental scientists for the purpose of constructing this program for providing 200-year flood protection to Reclamation District 784. Provided coordination with California DWR, Central Valley Flood Protection Board, and USACE in obtaining grants and permits required for program implementation. Managed formulation and authored Feasibility Study Report for determining preferred project to address residual flooding from the Yuba Goldfields. Currently managing detailed design for the Yuba Goldfields preferred project.

1999 to 2005 US Army Corps of Engineers, Sacramento, CA

Senior Project Manager

Responsible for implementation of the \$272M Napa River Flood Protection Project. Managed the efforts of a 20-member Project Delivery Team of engineers, real estate agents, and scientists for the purpose of constructing this project.

1994 to 1999 US Army Corps of Engineers, Sacramento, CA

Engineering Technical Manager

Responsible for engineering design efforts for a series of projects including channel modification, levees, dams, and wetland restoration projects. Managed design teams that consisted of geologists, geotechnical engineers, material engineers, structural engineers, hydrologists, hydraulic engineers, and civil engineers.

1992 to 1994 Oregon Department of Transportation, Region 4, Bend, OR

Design Team Leader

Responsible for preliminary designs for highway modernization and major maintenance highway projects in Central Oregon.

1989 to 1992 US Army Corps of Engineers, Sacramento, CA

Engineering Technical Manager

Responsible for engineering design efforts for a series of projects including channel modification, levees, dams, and wetland restoration projects. Managed design teams of various engineering disciplines.

1987 to 1989 US Army Corps of Engineers, Sacramento, CA

Program Manager in Program Development Office

Assisted in preparing, defending, and tracking the Civil Works Budget for the Sacramento District, which was presented to Congress.

1973 to 1987 US Army Corps of Engineers, Fort Worth, TX and Sacramento, CA

Various Positions in the Engineering and Planning Divisions

PROJECT HISTORY

2006 to Present

- ◆ Responsible for design management for the Three Rivers Levee Improvement Authority Levee Improvement Program for the Reclamation District 784 levee system.
- ◆ Completed five design packages for levee improvement projects with a total value of \$350M.
- ◆ Prepared and submitted applications for CVFPB Encroachment Permits.
- ◆ Prepared summary reports for USACE Section 408 Permits.
- ◆ Assisted in preparation of applications for DWR EIP and UFRR Grants.
- ◆ Directed planning formulation and evaluation of flood protection alternatives for the Yuba Goldfields.
- ◆ Wrote Feasibility Study Report for the Goldfields Feasibility Study.

1999 to 2006

- ◆ Responsible for project management and implementation of the Napa River Flood Protection Project.
- ◆ Issued and completed five different construction contracts with a total value of \$35M.

CONTINUING EDUCATION

- ◆ Integrating Ecosystem Restoration into Flood Protection Projects
- ◆ Streambank Protection
- ◆ Risk-Based Analysis for Flood Damage Reduction Studies
- ◆ Managing Projects in Organizations
- ◆ Scheduling and Cost Control

EDUCATION

- ◆ California State University, Humboldt
BS in Environmental Resource Engineering, 2001

PROFESSIONAL LICENSES and SOCIETIES

- ◆ Registered Civil Engineer in California, C69146
- ◆ Member, American Society of Civil Engineers

EXPERIENCE

2006 to Present MBK Engineers, Sacramento, CA

Senior/Supervising Engineer

Civil engineer in fields of flood control, hydrology, water resources planning, drainage, water supply, surveying, and levee maintenance.

Responsible for overall management of levee rehabilitation projects for various reclamation districts, including preliminary design, final design, state and federal regulatory coordination, quality control and contract administration throughout construction.

Coordinate on behalf of clients supporting state, federal, and local agencies requirements and criteria to comply with state and federal programs for maintenance and rehabilitation projects, emergency response and recovery, and operations and maintenance planning and administration.

2001 to 2006 California Department of Water Resources, Sacramento, CA
Water Resources Engineer

Bay Delta Office

Primary hydrology developer for CVGSM2 application and initiation of calibration for 10 year data extension.

Delta Suisun Marsh Office

Claims auditor for the subventions and special projects branches. Project manager for several projects within the Delta. Worked with OES-FEMA on Emergency Storm event during winter 2005-06 and April 2006.

PROJECT HISTORY

2008 to Present

- ◆ Recent/Current Levee Rehabilitation Projects:
 - RD 2041, Medford Island (180,000 cubic yards, 2010-present)
 - RD 2033, Brack Tract (206,000 tons, 2010-2014)
 - RD 2037, Rindge Tract (206,000 tons, 2010-2014)
 - RD 2044, King Island (205,000 tons, 2010-2014)
 - RD 1607, Van Sickle Island (multi-phased, 2008-2013)

- ◆ Recent/Current Flood Control Planning Projects:
 - 5 – Year Plan Development Team, 23 Reclamation Districts (Sac-San J. Delta)
 - ULDC/ULOP Development Team, River Islands Phase 1 (Lathrop, CA)

CONTINUING EDUCATION SEMINARS AND WORKSHOPS

- ◆ SEMS/NIMS courses in emergency management and recovery, 2007-2014
- ◆ Pipeline Assessment Certification Program, NASSCO, 2010, 2014
- ◆ Levee design, 2011
- ◆ Public contract code requirements and competitive bidding, 2009
- ◆ Flood Fight Methods, California Department of Water Resources, 2003

Gilbert Ray Labrie, Managing Principal

DCC Engineering Co., Inc. and
Gilbert Labrie, AIA, Architect

EDUCATION: **CALIFORNIA STATE POLYTECHNIC UNIVERSITY**, San Luis Obispo, CA
Bachelor of Architecture, 1973
CALIFORNIA STATE POLYTECHNIC COLLEGE, San Luis Obispo, CA
Degree in Architectural Engineering, 1965
CALIFORNIA STATE UNIVERSITY SACRAMENTO, Sacramento, CA
Graduate studies in Business Administration

LICENSES: Licensed to practice architecture in the following jurisdictions:
State of California, April 1974, #C07880
State of Hawaii, August 15, 1988, #6369
State of Idaho, December 7, 2001, #AR-984075
State of Montana, June, 19, 2002, #2446
State of Nevada, November 8, 01, #4625

ASSOCIATIONS: American Institute of Architects
National Council of Architectural Registration Boards, August 28, 2001, #54031
International Code Council
American Institute of Steel Construction
National Fire Protection Association

Gilbert Labrie, a long time Delta resident, has over 40 years of broad-based experience in architecture, engineering, planning, programming and budget management, permit processing, and construction project management within both the private and public sector. He has been involved in a wide variety of project types, ranging from private and public recreation with waterway components, to levee maintenance, rehabilitation and dredging. Projects have involved commercial, industrial and residential structures, as well as pumping plants and marine equipment for in-Delta work.

Since 1991, Mr. Labrie has managed **DCC Engineering Co., Inc.**, a Delta-based, multi-disciplinary design and permitting firm. Mr. Labrie is considered an expert with regards to Delta land use and regulation; and has been called upon to provide input to several regional and state study and policy formation panels. Mr. Labrie was an active participant in drafting the legislation creating the Delta Protection Commission; and is a participating member of the Delta Levees Habitat Advisory Committee, Delta Citizens Municipal Advisory Council, and served on the Flood SAFE California Levee Design Criteria Workgroup, the Central Valley Flood Management Workgroup, and is a contributing member on the Rural Levee Repair Workgroup.

Delta projects attributable to a long-standing, multi-discipline team approach also employed by Mr. Labrie, acting as the team leader, include numerous private docks, agricultural irrigation structures over a 30-year span, pump stations on Staten and Andrus Islands, and numerous levee projects for Reclamation District 554, Reclamation District 38, and Brannan-Andrus Levee Maintenance District. The largest team project was a 2007, \$20 million emergency erosion repair project designed and managed for the Brannan-Andrus Levee Maintenance District.

GILBERT RAY LABRIE Firm Experience:

- 1991 to Present** **DCC Engineering Co., Inc.**, Walnut Grove, CA
Managing Principal. Operations Manager, responsibilities include operations management, project management and project coordination, principal designer and engineer. Involved in all stages of project management from program development to contract administration.
- 1979 to Present** **Gilbert Labrie, AIA, Architect**, Walnut Grove, CA
Owner, principal architect for architectural design firm involved in planning, architecture, engineering, and construction throughout the Delta.
- 1976 to 1979** **Loren Craner Company, Inc.**, Walnut Grove, CA
Architect, planner and project management consultant as well as general contractor.
- 1967 to 1976** **State of California, Joint Legislative Budget Committee**, Sacramento, CA
Capital outlay and program budget analyst.
- 1972 to 1973** **California State Polytechnic University**, San Luis Obispo, CA
Architectural faculty member.
- 1965 to 1967** **Dreyfuss and Blackford, Architects and Planners**, Sacramento, CA

Emily Pappalardo, Project Manager
DCC Engineering Co., Inc.

EDUCATION: **UNIVERSITY OF CALIFORNIA**, Davis, CA
Masters of Civil and Environmental Engineering, 2014
Thesis: The Condition of the levees in the Sacramento-San Joaquin Delta and developing appropriate levee standards based on risk vulnerability of rural communities.
CALIFORNIA POLYTECHNIC STATE UNIVERSITY, San Luis Obispo, CA
Bachelor of Architecture, 2009
Thesis: A resilient built-environment in the Sacramento-San Joaquin Delta
Honors: Magna Cum Laude

EXPERIENCE:

2005 to present **DCC Engineering Co., Inc.**, Walnut Grove, CA
Levee maintenance and erosion control projects for several Reclamation Districts, project planning and cost estimation, permitting, and implementation through funding and construction scheduling.

Develop proposals, produce construction documents, perform engineering calculations, and manage permitting process that involves interface with regulatory agencies, clients and contractors for small residential and commercial projects located in waterways and flood prone areas.



CHRISTOPHER H. NEUDECK, P.E. Principal
Kjeldsen, Sinnock & Neudeck, Inc.

Mr. Neudeck has 32 years of experience in the field of civil engineering. His emphasis has been in the area of planning, design, and construction of a wide variety of flood control related projects. Mr. Neudeck currently serves as the District Engineer and Local Agency Representative for numerous Reclamation Districts and Irrigation Districts in the Sacramento - San Joaquin Delta. Mr. Neudeck acted as an assistant to RD 799's District Engineer, Barbara Burns between 1995-2007. In addition Mr. Neudeck has served as the Principal Engineer/Project Engineer for KSN on many flood control projects. Mr. Neudeck is a recognized authority on flood control in the Sacramento-San Joaquin Delta.

CONTACT INFO

711 North Pershing Avenue
Stockton, CA 95203
(209) 946-0268
(209) 946-0296
cneudeck@ksninc.com

EDUCATION

BSCE Civil Engineering
University of Santa Clara

REGISTRATION

RCE 43473, California

MEMBERSHIP

American Society Civil
Engineers
American Council Engineering
Companies
National Society of
Professional Engineers
California Central Valley
Flood Control Association

**TOTAL YEARS OF
EXPERIENCE**

32

TOTAL YEARS WITH FIRM

32

PROJECT EXPERIENCE

Below is a partial list of Mr. Neudeck's flood control related project resume:

- Reclamation District 799 Hotchkiss Tract, Design and Construction of 100 Year Flood Control Improvements.
- Discovery Bay Slope Failure Investigation and Remedial Repair Project
- Rehabilitation and restoration of several flooded islands including Jones Tract 2004 within Delta.
- Mapping and delineation of riparian boundaries for the West Lathrop/River Islands Development
- Development of water habitat in conjunction with the design and construction of flood control improvements for the State of California Department of Water Resources.
- Mapping, Right of Way, and design of improvement for over 52 miles of levee for SJAFCA
- Mapping for USACE IDIQ Design Engineering for Water Resources Project Sacramento District
- Bishop Tract, RD 2042, Design and Construction of 100 Year Flood Control Improvements
- Atlas Tract, RD 2126, Design and Construction of 100 Year Flood Control Improvements.
- Byron Tract, RD 800, Design and Construction of 100 Year Flood Control Improvements.
- Shima Tract, RD 2115, Design and Construction of 100 Year Flood Control Improvements
- Mossdale Tract RD 17 Design and Construction of Seepage Control Improvements.
- Reclamation District 799, Hotchkiss Tract Assessment
- Delta Farms Reclamation District 2042 Bishop Tract Assessment
- Mosher Assessment District (City of Stockton)
- Reclamation District No 17, Mossdale Tract Assessment
- Reclamation District 501, Ryer Island Assessment
- SJAFCA –Smith Canal Closure Assessment
- Reclamation District No. 1614- Smith Tract Wisconsin Pump Station Assessment



William (Bill) Darsie, Senior Project Manager
Kjeldsen, Sinnock & Neudeck, Inc.

As a senior project manager for KSN, Mr. Darsie leads KSN's Delta Levee Subventions Program Support team. Mr. Darsie secures funding for reclamation districts through the Delta Levees Subventions Program and other sources, and administers the grant process, assisting reclamation district prepare claims and meet grant requirements to receive the maximum reimbursement of available grant funds As a Trustee for several Reclamation Districts, he has been responsible for the management of Reclamation District works, including maintenance of levees, pumps, and other related facilities. He has been responsible for the supervision and implementation of levee, road, and pump station construction and repairs, including the coordination of Federal, State and local agencies, selection of engineers and contractors, contract administration, financial administration, and environmental regulation and mitigation. Mr. Darsie has been actively involved in every major Delta flood fight and emergency response effort since 1964

CONTACT INFO

711 N. Pershing Avenue
Stockton, CA 95203
(209) 946-0268
wdarsie@ksninc.com

EDUCATION

BS Agronomy
California State University
Chico

**TOTAL YEARS OF
EXPERIENCE**

30

TOTAL YEARS WITH FIRM

18

PROJECT EXPERIENCE

Through his many years of work in the Sacramento-San Joaquin Delta region, Mr. Darsie has developed a vast working knowledge of the State and Federal environmental regulatory process as well as various grant programs including the Delta Levees Subventions Program, and the FEMA / OES Disaster Assistance Programs. Some of Mr. Darsie's most recent reclamation district experience includes:

- RD 800 Discovery Bay Maintenance Dredging Design, Permitting, Monitoring
- 2004 Jones Tract Flood Event Response, Recovery, & Disaster Assistance Claims
- RD 563, Tyler Island, Levee Raising Projects
- RD 2115, Shima Tract Levee Crown Raising
- RD 1601, Twitchell Island, HMP Levee Crown Raising
- Victoria Island Levee Crown Raising and Crown Road
- RD 404, Boggs Tract, Erosion Repairs & Annual Maintenance
- Previous Trustee on Reclamation Districts 2086, 556, and 2084

Jeanine Foster, JD

Principal/Project Manager/Senior Mitigation Planner

Professional Biography

Ms. Jeanine Foster is a principal of Foster Morrison Consulting and plays a key role as project manager, senior mitigation planner, and community/stakeholder engagement specialist. She has diverse experience providing project management, mitigation planning, and disaster recovery services to communities in response to damages caused by a variety of natural hazard events with a focus on cities and counties located in California, Colorado, and Mississippi.

Jeanine's responsibilities include project management; hazard mitigation planning; disaster recovery; project grant application development, including benefit-cost analysis (BCAs); environmental/historic preservation compliance, agency coordination; community and stakeholder engagement; National Flood Insurance Program (NFIP) Community Rating System (CRS) compliance; Floodplain Management Services; and regulatory compliance. She works closely with clients to define project direction and scope; to identify and pursue grant opportunities; to implement and administer projects funded through a variety of grants; and to ensure compliance with applicable regulatory programs such as FEMA's Disaster Mitigation Act (DMA) and NFIP's CRS program. These responsibilities have entailed working with the Federal Emergency Management Agency (FEMA), the National Oceanic and Atmospheric Administration (NOAA), Army Corp of Engineers (USACE), State Emergency Management Agencies and Water Resources Agencies, and local city and county officials to obtain grant funding and to execute and manage projects from startup to final project closeout. Her expertise includes:

- Project Management
- Hazard Mitigation and Emergency Management Planning and Disaster Recovery
- Floodplain Management Services/NFIP's CRS Program Compliance
- Regulatory/Environmental Compliance

Education

- JD, University of Denver, 1988
- BA, University of Colorado, 1984

Professional Qualifications/Registrations

- Admitted to Bar: Colorado, 1988

Representative Projects

Sacramento County Local Hazard Mitigation Plan (2005 Original Plan and 2011, 2016 Plan Updates), Sacramento County, CA

Project Manager and Senior Planner responsible for development of the original plan and two LHMP Updates that meet the requirements of DMA, CRS and FMA. Responsibilities included project management, updating the hazard and risk assessment data, identification and development of new plan goals and mitigation/risk reduction strategies, development and implementation of an enhanced public and stakeholder outreach effort, and maximizing participating CRS communities' credits for DMA planning under CRS Activities 510 and 450. The 2016 LHMP Update addressed natural hazards, focusing on flood and levee failure, and included an estimated 30+ participating jurisdictions. Other LHMP Update objectives included analysis of the flood hazard to include new DFIRMS, localized/stormwater flood issues, incorporation of information from the Central Valley Flood Control project, and an enhanced analysis of issues related to levee failures as well as the consideration of the impacts associated with recent levee de-certifications. The 2005 and 2011 plans were

approved by Cal OES/FEMA without issue. The 2016 LHMP Update will be submitted to Cal OES/FEMA in late 2016. As a result of these plans which were developed to obtain CRS credits, combined with other CRS activity credits, the County has increased their CRS classification to a Class 3, one of only a few Class 3 communities in the US. The in-process 2016 LHMP Update, being developed to meet both DMA and CRS requirements, includes an emphasis on the Delta area and flood risk reduction strategies, with a separate Delta Annex being created which contains the City of Isleton and 18 reclamation districts.

Comprehensive Flood Management Plan (CFMP) Update, City of Sacramento, CA, 2014

Project Manager and Senior Planner responsible for an update to the City's CFMP. This unique plan serves as the City's strategic plan to reduce flood risk to the City through a comprehensive approach to risk management. The risk reduction tools implemented through this plan include: Land Use Planning and Development Guidelines, Emergency Management, Levee and other Structural Improvements, Internal drainage Improvements, Risk Communication (Public Education and Awareness), and NFIP/CRS. As part of this effort a review, update and rewrite of each chapter was required and with a focus on overhauling the Emergency Management, Risk Communication and NFIP/CRS chapters. The updated CFMP also included development of a comprehensive mitigation strategy for each risk reduction tool.

Floodplain Management/CRS Services, City of Boulder, Boulder, CO, 2009

Project Manager providing floodplain management/CRS services to the City of Boulder. Specifically, Foster Morrison staff worked with the City to update their floodplain ordinance to regulate critical facilities within the 500-year floodplain. Foster Morrison staff conducted the initial research and analysis of model ordinances and policies throughout the country to determine the most effective and advantageous approach to the regulation of critical facilities in the floodplain. This effort considered technical, legal, and policy aspects of proposed approaches and further evaluated them to maximize CRS credits under Activity 430 for Higher Regulatory Standards. Activity 430 is the primary CRS activity for crediting floodplain development regulations that are more restrictive than the NFIP requirements. Tasks include, researching and analyzing model floodplain ordinances, including interviews with floodplain management officials from model jurisdictions; providing recommendations for draft ordinance language; developing a hazardous materials definition; determining options for grandfathering existing critical facilities versus making the ordinance apply retroactively; conducting preliminary engineering analysis to determine the cost of compliance impacts associated with various options; and developing emergency planning templates for critical facilities located within the floodplain. This project also entailed providing support at public meetings, Water Resources Advisory Board (WRAB) meetings, and City Council meetings.

Other Mitigation and CRS Planning Work

- City of Vacaville, CA 2015 Local Hazard Mitigation Plan Update
- Placer County, CA 2005, 2010, and 2015 Local Hazard Mitigation Plan and Plan Updates
- Calaveras County, CA 2010 and 2015 Local Hazard Mitigation Plan and Plan Update,
- Sutter County, CA 2009 and 2014 Local Hazard Mitigation Plan and Plan Update
- Modoc County, CA 2016 Local Hazard Mitigation Plan
- Amador County, CA 2008 and 2013 Local Hazard Mitigation Plan and Plan Update
- Butte County, CA 2012 Local Hazard Mitigation Plan Update
- Fresno County, CA 2009 Local Hazard Mitigation Plan
- Calaveras County Water District, Calaveras, CA 2009 and 2014 Local Hazard Mitigation Plan and Plan Update,
- City of Fullerton, CA 2008 Multi-Hazard Mitigation Plan
- DMA/CRS Plan, City of Boulder, CO 2008 DMA.CRS Hazard Mitigation Plan
- University of Colorado, Boulder, CO 2006 Disaster Resistant University (DRU) Plan
- City of Waveland MS, 2013 Hazard Mitigation/Climate Adaptation/CRS Plan,
- City of Pascagoula, MS 2013 Local Hazard Mitigation Plan Update

Alejandro Gutierrez

GIS Analyst

Professional Biography

Alejandro has 15 years of GIS data development, analysis, conversion, and manipulation within various GIS industries (floodplain mapping, E-911 data development, remote sensing, hydrogeology, and mining). For 6 years, Alejandro worked in a key capacity with FEMA on their Map Modernization (DFIRM) Program. As a GIS Project Manager, Production Manager, and GIS Analyst for the development of 27 county-wide vector- and ortho-based DFIRMs in FEMA Regions III, V, VII, and VIII, he developed a strong team/work environment, trained staff in production techniques, tracked budgets and schedules, and has traveled to study areas to coordinate public outreach meetings to discuss the new DFIRMs with the city/county officials, floodplain managers, emergency management officials, local engineers, FEMA representatives, NFIP coordinators, and the public. Alejandro has also provided mitigation planning and GIS/Risk Assessment/Hazus support for numerous California DMA plans. For the DMA plans, he generated thematic and illustrative facilities and hazards maps, both at the countywide and city scales, to represent FIRM data and to quantify risks to the county using parcel and assessor's value data. He also generated the standardized map template to present the wildfire risk analysis, also at the parcel level, using GIS data from the California Department of Forestry and Fire Protection. He has used the ESRI tools and Microsoft Access to perform flood analysis using FIRM data on parcels (land use type and valuation data) by city and performed the wildfire analysis using the same methodology. Alejandro has also provided mitigation planning and GIS support for three state hazard mitigation plan updates: Wyoming, Missouri, and Mississippi. For the state plans, Alejandro supported the initial GIS data collection efforts by contacting the county and jurisdictional representatives; created state, county, and jurisdictional thematic maps utilizing local and national DFIRM and HAZUS generated data; and also created thematic maps depicting earthquake, soil, and loss ratios utilizing local, national and HAZUS generated data.

Education

- University of TX, Austin, TX - BA Environmental Resource Management, 1999

Professional Qualifications/Registrations

- Rocky Mountain Hazus Users Group

Representative Projects

Hazard Mitigation Plans

Sacramento County Local Hazard Mitigation Plan Update, Sacramento County, CA (2011 and 2016 Plan Update)

Assisted in GIS analysis for the Sacramento County update. Performed GIS analysis on with natural hazards such as earthquake, fire, and flood, and levee failure to support the Sacramento County Plan Update. Analyzed population, critical facilities, and improved parcels at risk to hazards. Created maps to show relationships of hazards to earthquake shaking, wildfire, levee failure, and flooding (in FEMA flood zones) to the communities and the county.

Modoc County Local Hazard Mitigation Plan, Modoc County, CA (2015 Original Plan)

Alejandro was the lead GIS analyst for the Modoc County update. Performed GIS analysis on with natural hazards such as earthquake, fire, and flood to support the Plan Update. Analyzed population, critical facilities, and improved parcels at risk to hazards. Generated thematic and illustrative facilities and hazards maps, both at the countywide and city scales, to

represent hazard data and to quantify risks to the county using parcel and assessor's value data. Utilized Hazus to model the Earthquake hazard.

Placer County Local Hazard Mitigation Plan Update, Placer County Office of Emergency Services, Placer County, CA (2010 and 2015 Plan Updates)

Alejandro assisted in GIS analysis for the Placer County update in 2010. He was the lead GIS analyst in the 2015 Plan Update. Performed GIS and Hazus analysis for natural hazards such as earthquake, fire, landslide, and flood to support both the 2010 and 2015 Placer County Plan Updates. Analyzed population, critical facilities, and improved parcels at risk to hazards. Generated thematic and illustrative facilities and hazards maps, both at the countywide and city scales, to represent hazard data and to quantify risks to the county using parcel and assessor's value data.

Other Mitigation Planning and Risk Assessment Work

- Calaveras County Local Hazard Mitigation Plan Update, Calaveras County, CA (2010 Original Plan and 2015 Plan Update)
- Sutter County Hazard Mitigation Plan Update, Sutter County, CA (2009 Original Plan)
- Fresno County Hazard Mitigation Plan Update, Fresno County, CA (2009 Original Plan)
- Wyoming Mitigation Plan Update - Wyoming Office of Homeland Security, State of Wyoming
- Flood Decision Support System- Flood DSS, Riverside Technology, Inc., Colorado
- Missouri Mitigation Plan Update and Mapping Needs Assessment - Missouri State of Emergency Management Agency (SEMA), State of Missouri
- Mississippi Hazard Mitigation Plan - Earthquake Maps June 2007, Mississippi

DFIRM Work

- State of South Dakota – Brown, Davison, Sanborn, and Spink County DFIRMs.
- Bowen Collins & Associates, State of Utah - Box Elder, Iron, Moab/Grand, Sevier, Wasatch, Washington County DFIRMs.
- State of Missouri – State Emergency Management Agency (SEMA) - Boone, Franklin, Henry, Howell, Johnson, Lawrence, Perry, St. Louis, Wayne County DFIRMs
- North Dakota State Water Commission – Stark County DFIRM.
- State of Alabama - Colbert County DFIRM
- State of Arizona - Mohave County DFIRM
- State of Kentucky DOW – Henderson County DFIRM
- State of West Virginia – Greenbrier, Mineral, Webster Counties, WV DFIRM
- State of Virginia – Prince George County DFIRM
- State of Maryland – Alleghany County DFIRM

Dam Inundation Mapping

- Critical Infrastructure Protection and Resiliency (CIPR) – Dam Break Inundation Mapping: CONUS, USACE Nationwide, 2010



Tom Chapman, PE

Project Manager

Tom has more than 29 years of experience in the engineering profession. He has served as a leader in water resources, focusing on issues and projects in the state of California. Prior to joined HDR, he served as the commander of the U.S. Army Corps of Engineers (USACE) Sacramento District. In that role, Tom served as the agency lead for all USACE projects and built successful relationships with the primary water resource and regulatory agencies that impact dam, water, and power operations.

EDUCATION

MS, Civil Engineering,
Illinois Institute of
Technology

BS, Civil Engineering,
United States Military
Academy

REGISTRATIONS

Professional Civil Engineer,
California, No. 80150

Professional Civil Engineer,
Virginia, No. 0402019905

PROFESSIONAL MEMBERSHIPS

Society of American Military
Engineers

RELEVANT EXPERIENCE

Colusa County, Colusa Drain Flood Reduction Project, CA

Tom is the Project Manager for developing an FS and CEQA evaluation in order to provide 100-year level of flood protection on the west side of the City of Colusa. The FS will evaluate alternatives that propose constructing a ring levee to connect the existing Phase 1 Powell Slough levee and the northern end of the State Plan of Flood Control levee to provide flood damage reduction from the Colusa Basin Drain. The FS includes geotechnical, hydrologic, and hydraulic analyses of the different levee alignments to determine the costs and benefits of constructing the ring levee to meet FEMA criteria. Analysis will also be conducted in order to prepare the appropriate CEQA documents. MBK is a key member of the project team providing hydraulics and hydrology expertise.

Department of Water Resources (DWR), Central Valley Flood Protection Plan (CVFP) 2017 Update, San Joaquin River, CA

Tom is leading a multifunction team whose role is to facilitate alignment of the CVFP with USACE policy and ongoing USACE studies, as well as supporting plan formulation, hydraulics and hydrology, geotechnical analysis, and flood protection feature design.

DWR, Lower Sacramento/Delta North Regional Flood Management Plan, West Sacramento, CA

Working with MBK, Tom has a key role leading staff to formulate the overall plan through identifying the existing regional deficiencies in flood risk reduction and developing and prioritizing potential solutions through reconnaissance-level engineering and economic justification. He is overseeing maintenance of the GIS database and development of the Regional Atlas. Additionally, he serves as co-Program Manager for the entire regional consultant team working on this project, and in that role, working closely with DWR, WSAFCA, Yolo County, Solano County, and SAFCA.

USACE, District Engineer, Sacramento, CA

Tom was responsible for and oversaw the work of 1,100 staff and executing an annual \$600 million budget and providing planning, engineering and design, project and construction management, environmental and real estate services to deliver water resources, environmental, and military construction solutions in eight states, working with local and state officials and more than 40 members of the U.S. Congress. With a focus on project execution, he ran all monthly USACE Project Review Board meetings, coordinated closely with DWR, the Central Valley Flood Protection Board, local sponsors, and other federal agencies, and led efforts resulting in significant progress on decades-old flood risk management and ecosystem restoration studies. Some highlights were the successful completion of Section 408 permit requests from the Three Rivers Levee Improvement Authority (Feather River

Setback Levee) and the SAFCA (Natomas Levee Improvement Program), two of the first completed 408s nationwide in the USACE. Tom directed permit development and guided the requests through final approval from the USACE's South Pacific Division, USACE headquarters in Washington D.C., and the Office of the Assistant Secretary of the Army for Civil Works. He also supervised the completion of the first variance to the USACE's Levee Vegetation Policy nationwide. In 2007, with the initiation of the State of California's FloodSAFE Program, Tom oversaw the federal response in the form of a number of projects and studies, including initiation of the Central Valley Integrated Flood Management Study, which provides federal support for the CVFPP.

Port of West Sacramento, Sacramento River Deep Water Ship Channel Deepening Project, *West Sacramento, CA*

As Project Manager, Tom helped the Port Manager and his staff execute their local sponsor responsibilities through their Project Cooperation Agreement with the USACE, San Francisco District. In addition to working directly with USACE and representing the Port's interests in the project (deepening the Sacramento River Deep Water Ship Channel from 30 – 35 feet along 43 miles in the California Delta), Tom led the project team in coordinating with the Sacramento/ Delta offices of the U.S. Fish & Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish & Wildlife, and helping the Port and City of West Sacramento and the USACE complete the project's NEPA/CEQA requirements and Limited Re-evaluation Report.

Metropolitan Water District of Southern California, On-Call contract for Engineering Services, *CA*

Tom served as Co-Project Manager and assisted in negotiating and managing the successful completion of work on three Task Orders (TOs). All three TOs related to a potential water conveyance system through the California Delta. Through the first TO, he helped advance the USACE, Sacramento District CALFED Levee Stability study to strengthen levees on the east side of Bacon Island. Through coordination and negotiation with USACE, DWR, and the Local Sponsor (RD 2028), Tom assisted in making progress on the cost sharing agreement, which had languished for more than two years, by helping the USACE identify areas where they could reduce their cost estimate, thereby lowering the state and local sponsor cost share. He also helped research the feasibility of awarding some or all features of a new water conveyance system through a Design-Build contract and documented the findings in a white paper. Tom assisted the research and documentation of the expected cost and schedule for procurement and delivery of pumps and associated mechanical equipment from multiple manufacturers.

USACE, Project Manager, *Chicago, IL*

Tom led a multifunctional team of engineers, scientists, economists, planners, lawyers and real estate specialists during design and construction of a \$150 million flood control project on the Little Calumet River in northwest Indiana. The project consisted of more than 22 miles of levees and floodwalls with multiple pump stations. Tom supervised coordination between all team disciplines and led interface with the Indiana Departments of Transportation and Natural Resources, utility companies, railroads, members of Congress, city governments, and local citizens and successfully submitted a project Post Authorization Change Report through USACE HQ to Congress.



Jafar Faghieh

Senior Planner

Jafar has more than 16 years of experience as a civil engineer, specializing in water resources planning and management. He has assisted on multiple water supply and infrastructure master plans, integrated regional water management plans, water supply assessments, flood management plans and groundwater management plans for local, regional, state, and federal clients. His relevant experience includes development of feasibility studies water supply strategy on a local and regional level, estimation of future water demands and water supply reliability, and identification of water supply sources and facilities. With Jafar's expertise in integrated regional water management, he is particularly skilled at linking multiple planning studies, identifying emerging water resources and regional planning issues and opportunities, and addressing funding issues and challenges for fiscally responsible long-range planning.

EDUCATION

MS, Civil Engineering,
University of California, LA

BS, Civil Engineering,
University of California,
Davis

REGISTRATIONS

Professional Engineer,
California, No. CA 63393

PROFESSIONAL MEMBERSHIPS

American Society of Civil
Engineers

RELEVANT EXPERIENCE

California Department of Water Resources (DWR), Central Valley Flood Protection Plan (CVFPP), Basin-wide Feasibility Studies (BWFS), *Central Valley, CA*

Jafar, as the water resources planner, is currently working with DWR to update the 2012 CVFPP through the development of the BWFS. This study looks at the State of California's preferred plan for long-term flood management improvement in the Central Valley. Jafar is leading a team in the development of the San Joaquin River BWFS to describe the formulation of various configurations of solutions to solve the basin's flood management problems.

West Sacramento Area Flood Control Agency, Lower Sacramento/Delta North Regional Flood Management Plan (RFMP), *CA*

As the lead planner, Jafar served as the lead planner for the development of the Lower Sacramento/Delta North RFMP. He worked closely with the program manager and outreach consultant to ensure that the plan formulation process incorporates and supports the stakeholder process. The plan formulation process included: (1) documenting the regional setting, (2) describing the flood management problems being faced in the region, (3) collecting information about locally proposed projects and solutions (both structural and non-structural), (4) developing a project prioritization process, and (5) submit a final plan with a prioritized list of projects to DWR for consideration into the BWFS and State Systemwide Investment Approach.

Truckee River Flood Management Authority, Truckee Meadows Flood Control Project, *NV*

Jafar served as the planner and assisted in the development of the Locally Preferred Plan for inclusion in the US Army Corps of Engineers (USACE) General Reevaluation Report (GRR) for the Truckee River Flood Control project. He helped document the flood risk management plans which include levees, floodwalls and environmental and hydraulic mitigation on the Truckee River in Reno and Sparks, Nevada, as well as the lower reach of the river which terminates at Pyramid Lake. HDR modified the GRR and its technical appendixes to capture the results of the analysis of this alternative, with the goal of maximizing the net monetary benefits.

USACE, San Francisco District, San Francisco Bay Delta Smelt/Longfin Smelt Entrainment Study, CA

The intent of this project is to increase the knowledge regarding entrainment rates of Delta Smelt and Longfin Smelt during dredging operations in the San Francisco Bay by the USACE. Jafar was the project manager and led a team of biologists to review existing data, propose a prioritized list of technical studies (including lab and field studies), conference with stakeholders and technical experts, carry out one such technical study, and producing a technical report and peer-reviewed technical publication.

USACE, Sacramento District, Folsom Water Control Manual Update, Folsom, CA

Jafar served as the Quality Assurance Lead for this study. HDR developed computer models necessary for the creation of a Water Control Manual for Folsom dam. Work include the development, application and documentation of ResSim, CalSim II hydrologic models, and a number of other models to define the re-operation effects on project beneficial uses, including water supply, temperature, fisheries, erosion, recreation and power generation.

USACE, San Francisco District, Warm Springs Dam Hydropower, Lake Sonoma, CA

Jafar served as the project manager for this project that incorporated the design for the installation of a functioning, low-head micro turbine hydropower facility adjacent to the upper and lower stilling basins, located immediately downstream of the dam's main outlet tunnel that discharges into Dry Creek. The upper stilling basin wall required modification to supply flow to the turbine and the lower stilling basin will require modification to allow the powerhouse discharge to return to Dry Creek. The unit's power generating capability shall range from a rated minimum of approximately 90 kilowatts to a rated maximum of approximately 300 kilowatts. HDR provided the complete design for the low-head turbine and balance of plant appurtenances, which includes modifications to the stilling basins, underground work and installation of power transmission lines to nearest available metered utility service.

DWR, Sustainable Groundwater Management Act (SGMA) Program Support, CA

As the project engineer, Jafar is providing technical support to DWR in the development of the SGMA Program. Support has included projecting the number of possible groundwater sustainable management plans, documenting the results of the basin boundary modification requests, development of best management practices, and the development of an implementation plan.

Sacramento Groundwater Authority (SGA), Groundwater Elevation Contour Map Support, Sacramento County, CA

Jafar led a team to develop the Spring 2012, Spring 2014, and Spring 2016 groundwater elevation maps for the North Sacramento County Groundwater Basin for Sacramento Groundwater Authority's Basin Management Report Update. Groundwater elevation data was collected from SGA and DWR using, contoured, interpreted, and mapped using GIS. He also assisted SGA with calculating changes in groundwater storage and developing groundwater elevation contours of the basin. These maps and data were used in support of the SGA Biennial Basin Management Reports and 2014 Update of the Groundwater Management Plan.



Rod Mayer, PE, GE

Senior Policy Advisor

EDUCATION

MS, Civil Engineering,
California State University,
Sacramento

BS, Civil Engineering,
California State University,
Sacramento

REGISTRATIONS

Professional Civil Engineer,
California, No. 35088

Geotechnical Engineer,
California, No. 2068

PROFESSIONAL MEMBERSHIPS

American Society of Civil
Engineers

Rod is a Senior Water Resources Technical Advisor in the Folsom Office, specializing in flood management. Prior to joining HDR, Rod spent 37 years at the DWR involved in water resources planning, design, construction, operations, and maintenance. He has more than 20 years of experience working closely with the USACE and local agencies while developing numerous flood management programs, projects, and policies. At DWR, he served as Chief of the Flood Projects Office, Chief of the Division of Flood Management (DFM), and as DWR's FloodSAFE Executive. During this time, Rod assisted in development of Proposition 1E (providing \$4 billion for flood management) and major flood reform legislation, managed DFM during the floods of 2006 and the recovery effort with USACE, initiated DWR's Urban Levee Evaluation Program and CVFED Program, and led development of the Early Implementation Program and its guidelines that funded over one-half billion dollars of urban and non-urban levee repairs and improvements in the Central Valley. He also led development of the Local Levee Assistance Program and its guidelines, as well as the Urban Levee Design Criteria and Urban Level of Flood Protection Criteria. While FloodSAFE Executive, Rod lobbied Congress and the federal administration for reforms and funding for USACE projects. He also served as a member of the National Committee on Levee Safety that developed recommendations to Congress on development of a national levee safety program. USACE reforms and a national levee safety program were authorized in the Water Resources Reform and Development Act of 2014.

Rod also served 8 years as Program Manager for Reclamation Board Activities after serving 4 years as Chief Engineer for The Reclamation Board (now the Central Valley Flood Protection Board). As Program Manager for Reclamation Board Activities, Rod managed the Board's annual budget and capital outlay funding for about 30 of the Board's studies and projects with USACE. As the Board's Chief Engineer, Rod reviewed and approved about 1,000 encroachment permits and led development of the Board's Article 8 standards that were added to Title 23 of the California Code of Regulations in 1996.

RELEVANT EXPERIENCE

West Sacramento, Sutter Butte Flood Control Agency, Regional Flood Management Plans (RFMP), Reclamation District 108, CA

Rod is leading the Agricultural Floodplain Ordinance Task Force to address constraints on agriculture resulting from Federal Emergency Management Agency (FEMA) policy and flood insurance requirements. The work of the task force is being performed as part of three Sacramento Valley RFMP. The RFMPs will be considered in the 2017 Central Valley Flood Protection Plan.

Department of Water Resources (DWR), Effects of Vegetation and Rodent Burrowing on Levee Performance, CA

Rod is serving as a reviewer and commenter on research being performed by U.C. Berkeley on the effects of levee vegetation and rodent burrowing on levee performance, under the California Levee Vegetation Research Program.

Levee Performance Curves, DWR, CA

Rod served as an expert to DWR in an Expert Opinion Elicitation to quantify the benefits of flood fighting and levee maintenance, by advising on adjustments to make

to existing levee performance curves when considering flood fighting and when assuming no levee maintenance.

DWR, Basin-Wide Feasibility Studies (BWFS), CA

Rod developed a geotechnical approach for mitigating hydraulic impacts on levees for the Sacramento and San Joaquin Valley BWFS and the 2017 Central Valley Flood Protection Plan. The procedure provides for mitigation of hydraulic impacts on freeboard, slope stability, under-seepage, through-seepage, and pipelines for levees within the Delta and outside of the Delta.

Jennings Wastewater Treatment Plant Flood Risk Assessment, City of Modesto, Modesto, CA

Rod provided technical guidance and assisted in writing a report presenting a flood risk assessment study for the Jennings Wastewater Treatment Plant, which lies behind the right bank levee of the San Joaquin River in Reclamation District 2091. The report presented a map describing predicted flood water surface elevations and profiles in the area of the plant site for the 100-year flood event, along with peak flow, estimated duration of flooding, and depth and extent of site flooding. The study used the HEC-RAS riverine flood model and FLO-2D to analyze overland flooding.

City of Modesto, Sutter Wastewater Treatment Plant Flood Risk Assessment, Modesto, CA

Rod provided technical guidance and assisted in writing a report presenting a flood risk assessment study for the Sutter Wastewater Treatment Plant, which lies within the Tuolumne River floodway regulated by the FEMA and the Central Valley Flood Protection Board. The report presented a map describing predicted flood water surface elevations and profiles in the area of the plant site for the 100-year flood event and the 200-year flood event, along with peak flow, estimated duration of flooding, and depth and extent of site flooding. The study used the HEC-RAS riverine flood model to analyze river bank cut mitigation options.

USACE, Sacramento District, Periodic Inspection (PI) for Levee Systems,

Merced, Chowchilla, Mendota, Madera, Courtland, Rio Vista, West Sacramento, Tracy, Lathrop, Stockton, Modesto, Crows Landing, Chester, and Fairfield, CA

Rod provided Quality Control reviews for USACE levee safety PI pre-inspection reports. The levee systems to be inspected consisted of multiple segments located throughout central and northern California. The purpose of the PIs was to verify proper operation and maintenance, evaluate operational adequacy and structural stability, review design criteria to identify changes in current design standards, identify features to monitor over time and improve the ability to communicate the overall condition. The pre-inspection reports provided background information about the levee systems, including history, construction, performance, design, operation, and maintenance.



Robert B. Lokteff, CE, GE

Sr. Project Manager / Principal Geotechnical Engineer

With BCI Since 1998

Education

- *California State University, Sacramento – MS Civil Engineering (Geotechnical Concentration), 2000*
- *California State University, Sacramento – BS Civil Engineering, 1990*

Registrations

- *Professional Engineer, Civil, California*
- *Professional Engineer, Geotechnical, California*

Affiliations

- *CalGeo – California Geotechnical Engineers Association*
- *SAME – Society of American Military Engineers*
- *APWA – American Public Works Association*

Publications

- *Draft ASTM Specification for Lime-Treated Soil Compaction Using the Wet Method to Determine Maximum Density*

Presentations

- *CalGeo Loss Prevention Seminar on Pipeline Construction*
- *Geo Institute/Association of Engineering Geologists State-of-the Practice Levee Symposium*

Geotechnical

Geo-Environmental

Forensics

Construction Services

Mr. Lokteff is a Sr. Project Manager and Principal Geotechnical Engineer with Blackburn Consulting. He has over 26 years of geotechnical engineering experience in California with 18 of those years with Blackburn Consulting. He has a blend of geotechnical design, project management and construction management experience on levees, dams, bridges, roadways, pipelines, and water/waste water treatment facilities. Mr. Lokteff is Vice President of the California Geotechnical Engineering Association (CalGeo), participates in the USACE Sacramento-area Geotechnical Levee Design/Construction Group and Slurry Wall Design Round Table, and was a recent presenter at the Geo Institute/Association of Engineering Geologists State-of-the-Practice Levee Symposium.

Representative Experience

West Sacramento Area Flood Control Agency, Southport Levee

Improvements – West Sacramento, CA

Geotechnical Engineer-of-Record for 6 miles of levee improvements along the Sacramento River west levee in West Sacramento. Managed the geotechnical team during the design process, which included subsurface exploration, laboratory testing, engineering analysis and development of conclusions and recommendations for potential borrow sites, underseepage mitigation, slope stability, and levee settlement.

Sutter Butte Flood Control Agency Feather River West Levee Rehabilitation – Sutter and Butte County, CA

Managed Blackburn Consulting's geotechnical team in evaluation of the southern portion of the Sutter Butte Flood Control Agency's 44 mile levee improvements from the Thermalito Afterbay south to the Sutter Bypass. BCI completed subsurface investigation, laboratory testing, engineering analysis, and multiple reports containing recommendations for, seepage mitigation, and slope stability. Mr. Lokteff currently manages BCI's Materials Quality Assurance team and on-site USACE-approved testing lab during construction of the northern portion of the Feather River West Levee Rehabilitation.

Star Bend Setback Levee – Sutter County, CA

As Geotechnical Engineer of Record, performed a subsurface investigation along the Star Bend Setback Levee project alignment which consists of about 3,600 lineal feet of new levee construction along the west side of the Feather River in Sutter County. Investigation included laboratory testing and preparation of a report containing geotechnical findings and design recommendations. Analysis included finite element seepage analysis, slope stability analysis and settlement analysis for the new levee. Report included recommendations for seepage mitigation options including a slurry cut-off wall, seepage berm and pressure relief wells in accordance with current US Corps of Engineers design criteria.

Mayberry Slough Setback Levee, Sherman Island – Sacramento County, CA

As Geotechnical Engineer of Record, performed subsurface exploration (exploratory borings and down-hole vane shear testing), laboratory testing (including permeability, consolidation and triaxial shear) and engineering analysis, and prepared a Geotechnical Report that provided recommendations for design and construction of the proposed levee which consists of approximately 1.6 miles of levee upgrades including construction of landside setback levee and waterside slope flattening.

American River Common Features, Natomas Basin Reach H – Natomas, CA

Provided laboratory oversight on this USACE Project. Role included assistance in preparation of lab testing schedules and review of test results.

With BCI Since 1998

Education

- University of MO at Rolla, M.S. Civil Engineering 1984 Geotechnical/Materials
- University of MO at Rolla, B.S. Civil Engineering 1982

Registrations

- Professional Engineer, Geotechnical, California,
- Professional Engineer, Civil, California

Affiliations

- ACEC-CA –State President 2009-10, officer and chairman for various other committees
- BORPELS – Technical Expert for Enforcement Unit from 1999 to 2003, Geotechnical Exam Judge 2003
- ASTM – Technical Reviewer - Soil and Rock Committee since 1996
- ASCE – Elected Fellow 2010, Guest Lecturer 1996
- GBA – BOD – 2016, Peer Review Committee Chairman 2014-16

Publications/Awards

- International Levee Handbook Slope Stability subsection author, Const Section Technical Mentor, 2011-12
- ASCE's 2009 "Francis N. Heem Geotechnical Engineer Award"
- Peer Reviewed/Input for ASFE's "A Guide to Service as a Forensic Expert" 1995
- Co-author for "Shopping Center Saved by Short Aggregate Piers", 4th International Conference on Case Histories in Geotechnical Engineering
- Project Manager for South Napa Marketplace – 1995 Recipient of CGEA's Most Outstanding Project Award
- Co-author of "Wet Density Testing Method for Lime Treated Soil" (not published)

Geotechnical

Geo-Environmental

Forensics

Construction Services



Thomas W. Blackburn, CE, GE, F.ASCE

Principal in Charge

Tom Blackburn is proactive and results oriented. He strives for excellence both personally and professionally. Tom provides overall direction for Blackburn Consulting and a resource for employees. His style keeps employees energized.

Tom Blackburn is a seasoned geotechnical engineer and construction manager. He has worked on projects in California, Nevada, Missouri, and Texas. Projects include Caltrans inspection and testing for roadways, infrastructure for master planned communities, treatment plants, complex static/dynamic stability analyses for cut and fill slopes, seismicity studies, deep foundations for high rise structures, and retaining walls.

Representative Experience

Non-Urban Levee Project – Colusa and Yolo Counties, CA

Project Manager/Principal for Levee Evaluation for CA Department of Water Resources. Provided project management and QA/QC for Blackburn Consulting project area (Knights Landing to Colusa). Attended weekly conference meetings to report on project performance and issues, prepared weekly progress and budget updates, and provided oversight and review of project data compilation. Assisted in review of project documents and levee segments and reviewed subsequent investigations and analysis on senior review team.

Star Bend Setback Levee, West Side of Feather River - Sutter County, CA

Design Review and Input for project consisting of 3,600 lf of new levee with 3:1 side slopes, and 20 feet wide at the crest. Reviewed the proposed project, constraints, and design parameters and provided input for SEEP/W analyses and ultimate design.

Funks Creek and Wilson Creek Dam Design – Glenn County, CA

Preliminary design on Funks Creek resulted in a zoned dam about 70 feet high and 300 feet long with a side channel spillway (because of the hard rock abutment). Sited Funks Creek Dam so that it could serve as a cofferdam for the proposed Sites Dam. Preliminary design at Wilson Creek resulted in a zoned dam about 10 to 40 feet high and 3000 feet long with an abutment spillway. Mr. Blackburn's role: Project Director providing review and guidance for siting study, site reconnaissance, subsurface investigation (Wilson Creek), literature review, preliminary design preparation and review, identification of seismic constraints. Tom also performed the "desk audit" of previous material, estimated the inundation area for differing dam heights for Funks Dam, and presented siting and dam configuration options to the Colusa Basin Drainage District and USBR.

Lost Creek Dam – Butte County, CA

Lost Creek Dam is an 80-year old concrete arch on a tributary to the south fork of the Feather River that required spill, bridge deck, and abutment approach modifications. Retaining walls and approach modifications were required to accommodate the dam modifications. BCI completed a field investigation consisting of exploratory drilling, seismic refraction, and geologic mapping, and provided a geotechnical design report for design of the retaining walls and approach cuts and fills. BCI also provided extensive rock drilling and core logging at the base of the dam to evaluate a fault through the dam site and rock erosion/plucking at the toe. This project required coordination with the prime, SFWPA, DSOD, FERC, and State Fish and Game. Mr. Blackburn served as Senior Technical Reviewer. Tom reviewed and provided guidance for; development of BCI's initial and subsequent scopes of services and contracts; strategy for difficult site work issues; decisions/strategy on how to handle the fault investigation; the geotechnical report; and communications with prime and involved agencies.



David J. Morrell, PE, GE

Senior Project Manager

With BCI Since 2002

Education

- *University of Nevada, Reno - BS Geological Engineering, 1989*

Registrations

- *Professional Engineer, Civil, California*
- *Professional Geotechnical Engineer, California*

Affiliations

- *ASCE - American Society of Civil Engineers*

Geotechnical

Geo-Environmental

Forensics

Construction Services

Mr. Morrell has over 27 years of geotechnical engineering experience on levee, infrastructure, bridge, residential, commercial, school, and hospital projects in Central and Northern California. As a Senior Project Engineer, his experience includes geotechnical analysis and recommendations for shallow and deep foundation design, embankment settlement, retaining walls, slope stability and landslide repair, pavement design, and expansive soil mitigation.

Representative Experience

Southport EIP Levee Improvement Program – West Sacramento, CA

Performed subsurface exploration and hydraulic conductivity correlations/evaluations for the ongoing Southport Early Implementation Program (EIP) levee improvement project for the City of West Sacramento. Also performed settlement analysis for transverse cross sections.

Laguna Bypass Channel Weir Slope Mitigation - Elk Grove, CA

Managed and prepared a Geotechnical Report to address potential causes of existing weir damage that include excessive settlement, erosion and undermining of the weir slope. Evaluated seepage and slope stability, and provided geotechnical recommendations to mitigate the weir damage.

Feather River West Levee Improvements (Segment 7) – Sutter County, CA

Managed and assisted various components during completion of BCI's Draft Geotechnical Design Recommendations Report for approximately 5.8 miles of planned Feather River West Levee Improvements under a Sutter Butte Flood Control Agency project. These components included the subsurface exploration program, strength and hydraulic conductivity parameter evaluations, seismic vulnerability assessment, historic levee construction, performance and improvement history, transverse section preparation, reach selection, site geology and geomorphology.

Non-Urban Levee Evaluation (NULE) Program, Sacramento Delta Levees

Performed geotechnical evaluations of over three hundred levee sites on Tyler Island, Grand Island, Brannan-Andrus Island and Hastings Tract previously identified as "areas of concern" for seepage, slope stability, erosion and/or overtopping. Field evaluations included observing and documenting the limits of each area of concern, photo logging, and rating each site as critical, serious or observation using software developed for the project. Also attended senior review meetings including California Department of Water Resources staff to present the findings and recommended site ratings.

Morrison Creek Levee Evaluation - Sacramento, CA

Managed and prepared a Geotechnical Evaluation of Potential Levee Impacts report during BCI's preparation of a Foundation Report for the Cosumnes River Boulevard Overhead bridge. The evaluation report addressed potential impacts of placing bridge approach embankment fills on the landside levee slope and installing deep foundations within the landslide slope and adjacent to the waterside levee toe. Analysis included underseepage, differential settlement, slope stability and pile driving impacts. Corresponded and attended meetings with USACE during their review of the project.

Union House Creek Levee (SAC RT South Corridor Ph. 2 Project) - Sacramento, CA

Managing ongoing coordination/review for the planned Deer Lake Drive Pedestrian Bridge to be partially constructed on or adjacent to the Union House Creek Levee as part of Sacramento Regional Transit's South Corridor Phase 2 Expansion. This ongoing project will consist of evaluating slope stability and underseepage for existing conditions and for the bridge improvements, including design of slurry cutoff wall mitigation measures.



Nicole C. Hart, PE

Project Manager

With BCI Since 2006

Education

- *BS Civil Engineering
University of Arizona
1987*
- *MS Civil Engineering
University of Arizona
1989*

Registrations

- *Professional Engineer
Civil, California
Cert. No. 53289*

Geotechnical

Geo-Environmental

Forensics

Construction Services

Ms. Hart is a Senior Engineer with Blackburn Consulting. She has over 20 years of geotechnical engineering experience on flood control, residential, commercial, school, and infrastructure projects in the Northern California area. Her experience includes providing geotechnical recommendations for underseepage and slope stability evaluations of existing and new levees, seepage berms and cutoff walls, shallow and deep foundation design, retaining walls, pipelines, slope stability and landslide repair, pavement design, and expansive soil mitigation. Ms. Hart's experience also includes Phase I and Phase II Environmental Studies which often include projects with soil and groundwater remediation

Representative Experience

Southport Early Implementation Project - West Sacramento, CA

Nicole serves as Project Manager/Senior Engineer for geotechnical design of approximately 6 miles of levee improvements along the Sacramento River west levee in the West Sacramento Southport area. She Coordinated subsurface exploration and laboratory testing programs, performed engineering analysis and developed conclusions and recommendations for underseepage and slope stability mitigation, levee settlement, and borrow area evaluations. Assisted in the development of plan and profile sheets and reviewed project plans and specifications.

Feather River West Levee Rehabilitation, Segments B, C and D - Sutter and Butte Counties, CA

Nicole is currently providing materials testing quality control/engineering services for portions of the Feather River project. She is responsible for quality control review of all laboratory test reports, result summary tables, and daily field reports.

Feather River West Levee Rehabilitation, Segment A - Sutter and Butte Counties, CA

Nicole performed geotechnical evaluation of the southern portion of the Sutter Butte Flood Control Agency's 44-mile levee improvements from the Thermalito Afterbay south to the Sutter Bypass. She managed the completion of subsurface investigation, laboratory testing, engineering analysis and multiple reports containing recommendations for borrow sites, seepage mitigation, and slope stability.

Davis Surface Water Pipeline Project – Davis, CA

Senior Engineer during preparation of geotechnical reports for the Davis Surface Water Pipelines Project (DSWPP), which consists of about 7.7 miles of new 12-inch to 30-inch transmission mains (TM) to deliver and distribute surface water supplied by the Woodland Davis Clean Water Agency Project to both the City of Davis and the University of California, Davis (UC Davis) campus. BCI prepared separate geotechnical reports for the City and UC Davis pipeline segments, which included recommendations for seismic design, pipeline design and trench construction, flow control vault support and trenchless pipeline crossings at Interstate 80, Highway 113, UPRR tracks, and several canal crossings.

Bear Valley Waste Water Treatment Plant - Bear Valley, CA

Conducted site evaluation and provided geotechnical report for modifications to the existing WWTP.

Orland Reservoir - Orland, CA

Conducted a site evaluation and assisted in preparing the geotechnical report for construction of a new water reservoir.



Juliana T. Fisher, PE

Senior Engineer

With BCI Since 2007

Education

- *BS Civil Engineering
Rice University
Houston, TX, 2001*

Registrations

- *Professional Engineer
Civil, California
Cert. No. 68154*

Affiliations

- *ASCE – American
Society of Civil Engineers*

Geotechnical

Geo-Environmental

Forensics

Construction Services

Ms. Fisher is a graduate of Rice University in Houston, Texas, with a Bachelor of Science degree in Civil Engineering. She worked on water resources and other civil works and military projects with the US Army Corps of Engineers, Sacramento District (USACE) for five years before joining BCI.

Representative Experience

Star Bend Setback Levee - Sutter County, CA

Completed two- and three-dimensional finite element seepage analyses of the levee cross-section at either end of a slurry cut-off wall that serves as a transition between the existing levee and the proposed setback levee section. Also performed seepage analysis to determine whether utilization of a waterside borrow area would negatively impact levee performance, employing both two-dimensional finite element analysis, and USACE blanket theory.

Non-Urban Levee Project – Colusa & Yolo Counties, CA

Senior Engineer for Levee Evaluation for CA Department of Water Resources. Provided data compilation and review for Blackburn Consulting project area. Prepared document summaries and interviewed regulatory personnel familiar with BCI area levee segments. Will assist in subsequent investigations and stability analysis.

Port of Sacramento, Primaguel Biodiesel Facility – West Sacramento, CA

Completed settlement analysis for a series of tanks, a production building, and new rail spurs to be constructed at the Port of Sacramento.

Port of Stockton, Primaguel Biodiesel Facility – Stockton, CA

Performed subsurface investigation and engineering analysis, and prepared a Preliminary Geotechnical Report for a proposed series of tanks, rail spurs, truck loading areas, and a production facility. The analysis included traditional and liquefaction-induced settlement evaluation, bearing capacity evaluation, pavement section recommendations, and recommendations for ground improvement alternatives.

Success Dam Seismic Remediation Project - Porterville, CA

Performed extensive seepage and slope stability analysis per USACE guidance, including simplified seismic analysis and subsurface investigation. The remediation project is an on-going analysis and design effort to address the liquefiable foundation and shell material of the 161 foot high, zoned earthfill dam.

Terminus Dam Reservoir Pool Raise Project - Lemon Cove, CA

Performed seepage and slope stability analyses and provided a Geotechnical Report, incorporating an analysis of the dam's filter and drain systems, research into construction and past performance of the project, and development of initial threshold values for piezometer and observation well readings at the raised reservoir pool elevation. The project site includes two zoned earthfill dams, 243 and 130 feet in height, and a fusegated spillway which, when the fusegate construction was completed in 2003, raised the reservoir pool elevation by 21 feet. Project involvement also included high reservoir pool elevation inspections of the project, evaluation of piezometer and observation well performance, and reevaluation of instrumentation threshold values for future fillings.