Qualifications and Proposal to Provide Consulting Services for the

# Management of the Tulare Lake Basin Portion of the Kern County Integrated Regional Water Management Plan

FOR THE KERN COUNTY WATER AGENCY ON BEHALF OF THE KERN IRWMP REGIONAL WATER MANAGEMENT GROUP

GEI Consultants
Bookman-Edmonston Division

Submitted by

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October 13, 2011

Geotechnical
Environmental and
Water Resources
Engineering

Ms. Lauren Bauer, Water Resources Planner
Kern County Water Agency
3200 Rio Mirada Drive
Bakersfield, CA 93308

**Subject: Proposal for Program Management Consulting Services for the Kern Integrated Regional Water Management Plan**

Ms. Lauren Bauer:

GEI Consultants, Bookman-Edmonston Division (GEI/B-E) is pleased to submit this proposal to provide program management services for the Kern County Integrated Regional Water Management Plan (Kern IRWMP). GEI/B-E is particularly well qualified for this assignment by virtue of:

- Our understanding of regional issues and needs. Our proposed Project Manager, Rick Iger, has 34 years of experience working in Kern County, and knows the agencies, individuals, and issues to be addressed. With a continuous 50-year history of serving Kern County from our Bakersfield office, we are available and accessible.

- Our comprehensive understanding of the IRWM process. GEI/B-E managers have led or been integral to development of 10 IRWMPs, and are currently under contract to update two of them. We monitor and influence DWR IRWMP solicitations and are on the leading edge of statewide flood management, climate change, and other new IRWM planning issues. We have an understanding of and demonstrated success with IRWM grant programs.

- Our past cooperative work with local agencies throughout the Tulare Basin. GEI/B-E's team of IRWM project managers communicates insights and methodologies that improve methods and outcomes. Our local experience includes pioneering development of groundwater recharge and banking projects throughout Kern County. We have a unique understanding of projects and infrastructure and how they can link to form regional projects.

We recognize that the precise duties for this program management assignment are difficult to fully define and quantify. Our proposal presents a level of effort that we think will be highly efficient in crafting an IRWM Plan fully compliant with DWR requirements, coalescing stakeholder support, and placing the Kern IRWMP in a strong

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position to receive implementation grant funding. We have proposed optional supplemental studies to further strengthen the prospects of promising projects. We will work with the Executive Committee to be flexible in adapting the scope of services as warranted by changing requirements.

Thank you for the opportunity to propose on this important assignment. If you have any questions, please call Rick Iger at (661) 716-3024.

Respectfully submitted,

GEI Consultants, Inc., Bookman-Edmonston Division

Richard B. Iger, P.E.
Project Manager

Mark S. Williamson, P.E.
Vice President

Enclosures

# Cover Pages

## NAME OF THE CONSULTING FIRM

GEI Consultants, Inc., Bookman-Edmonston Division (GEI/B-E)

## PROJECT TITLE

Consulting Services for the Management of the Tulare Lake Basin Portion of the Kern County Integrated Regional Water Management Plan for the Kern County Water Agency on behalf of the Kern IRWMP Regional Water Management Group

## PERSON AUTHORIZED TO LEGALLY BIND THE FIRM

Mark S. Williamson, P.E., Vice President and Senior Principal Engineer

## SUMMARY OF THE SCOPE OF WORK

The Kern County Regional Water Management Group (Kern RWMG) has drafted its Integrated Regional Water Management Plan (Kern IRWMP), including recent updates to meet Proposition 84 criteria. The plan has not yet been adopted. The Kern County Water Agency (KCWA) has been acting as administrator throughout the IRWMP development. The Kern IRWMP Executive Committee is seeking consultant support to assume administration duties and to propel the IRWMP through completion and into a successful and durable implementation phase.

*"Kern County is home to what is one of the world's most innovative groundwater banking operations."*
*Mike Radon, President, Kern County Water Agency*

The GEI Consultants/Bookman-Edmonston (GEI/B-E) team is particularly well-qualified to take on these responsibilities through our:

- **Understanding of regional and local issues and needs.** Our proposed Project Manager, Rick Iger, has 34 years of experience working in Kern County, and knows the agencies, individuals, and issues to be addressed. With a continuous 50-year history of serving Kern County from our Bakersfield offices, we are available and accessible.
- **Demonstrated understanding and success with IRWM grant programs.** GEI/B-E managers have led or been integral to development of 10 IRWMPs, and are currently under contract to update two. We monitor and influence DWR IRWMP solicitations and are on the leading edge of statewide flood management, climate change, and other new IRWM planning issues.
- **Past cooperative work with local agencies throughout the Tulare Basin, including the Poso Creek RWMG.** GEI/B-E's team of IRWM project managers communicates insights and methodologies that improve methods and outcomes. Our local experience includes pioneering development of groundwater recharge and banking projects throughout Kern County. We have a unique understanding of projects and infrastructure and how they can link to form regional projects.

We see our Plan Management services fall into the following Scope of Work categories:

1. Administrative Services and Scoping
    a. Administration – invoices, dues, accounting
    b. Communication – data sheets, notice and conduct meetings, meeting summaries, websites, media releases

   c. Review and Planning – compare plan to the region's objectives, DWR requirements, statewide priorities and preferences
2. Plan Management and Updates
   a. Process Management – maintain schedules, review deliverables, manage data aggregation, and monitor DWR IRWM and other groups and advocate on Kern's behalf
   b. Education – produce special white papers on technical topics, attend or assist in community and sub-region meetings
   c. Ranking and Prioritization – develop or enhance project ranking criteria and prioritization criteria, perform uniform and unbiased application of criteria, develop consensus
3. Other Duties/Supplemental Tasks
   a. Special Studies – advanced engineering and environmental studies to develop promising projects toward grant-readiness
   b. Grant Application Assistance – developing and submitting complete grant application packages
   c. Other Specialty Services, as requested – we have excellent relationships with local consultants that can assist in any specialized service

We envision our role as:

- **Conveners.** We organize meetings, distribute materials, conduct or facilitate the meetings, produce meeting notes, maintain website, produce invoicing and accounting, and maintain mailing lists.
- **Integrators.** We bring a fresh perspective on solutions to the region's needs. We work to identify common needs and propose solutions that can bring parties together. We look for broad solutions to meet flood management, land use planning, climate change, and DAC needs that also provide environmental, recreational, and other values. We offer a team of experienced IRWMP project managers that have experienced what works firsthand and will adapt the best ideas to meet Kern RWMG needs. We understand local, state and federal project operations.
- **Advocates.** We believe Kern County is the statewide leader in conjunctive management. Though DWR doesn't always acknowledge it, groundwater banking relieves reliance on the Delta during critical periods, even if average diversions remain at current levels. We will emphasize the importance of Kern County as a key statewide water management hub.
- **Facilitators.** We have an intimate, comprehensive knowledge of Kern County water issues and needs. We have a vision that extends beyond district boundaries. We will help the community work together through constant communication, small group meetings, focused technical analysis, and information sharing. We believe in open, transparent processes with complete and open access to information. We ensure unbiased prioritization criteria are developed and applied.
- **Visionaries.** We keep the group focused on the overall goals of improving water supply, cooperative governance, and minimizing costs. We develop strategies targeting statewide priorities and preferences, and to develop projects with economies of scale. We will frequently check IRWMP progress against grant criteria to maximize outside funding.

In summary, the GEI/B-E team offers local knowledge, IRWMP experience, and technical expertise to elevate the Kern County IRWM Plan from an emerging planning document to a successful, high-functioning implementation platform.

# Organizational Information

## FIRM OFFICE PROVIDING SERVICES

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## HEADQUARTERS AND PLACE OF INCORPORATION

GEI Consultants, Inc. is an employee-owned Massachusetts corporation.

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## QUALIFICATIONS

GEI Consultants, Inc. is an employee-owned national consulting firm that has provided local, state, and federal agencies with geotechnical, water resources, environmental, and ecological services for more than 40 years. The firm's Pacific Region, comprising California and Oregon, includes offices of the former Bookman-Edmonston water resources and engineering consulting firm. Bookman-Edmonston has helped Kern County and other California water managers meet their water management challenges since 1959. Today, GEI employs 480 people in 23 offices nationwide, including California offices in Bakersfield, Sacramento, Santa Barbara, Oakland, Carlsbad, and Glendale.

GEI/B-E has a vibrant water resources practice in the western United States, providing municipal, state, and federal agencies with a full array of services. Our services include developing, planning, and designing the following:

- Integrated regional and urban water plans, and water management strategies
- Major flood control infrastructure
- Dam and levee safety evaluation and rehabilitation
- Water supply infrastructure
- Multi-purpose projects

- Feasibility studies
- Groundwater management
- Hydrologic and hydraulic studies
- Storage and conveyance system configurations
- Decision support systems
- System optimization analyses

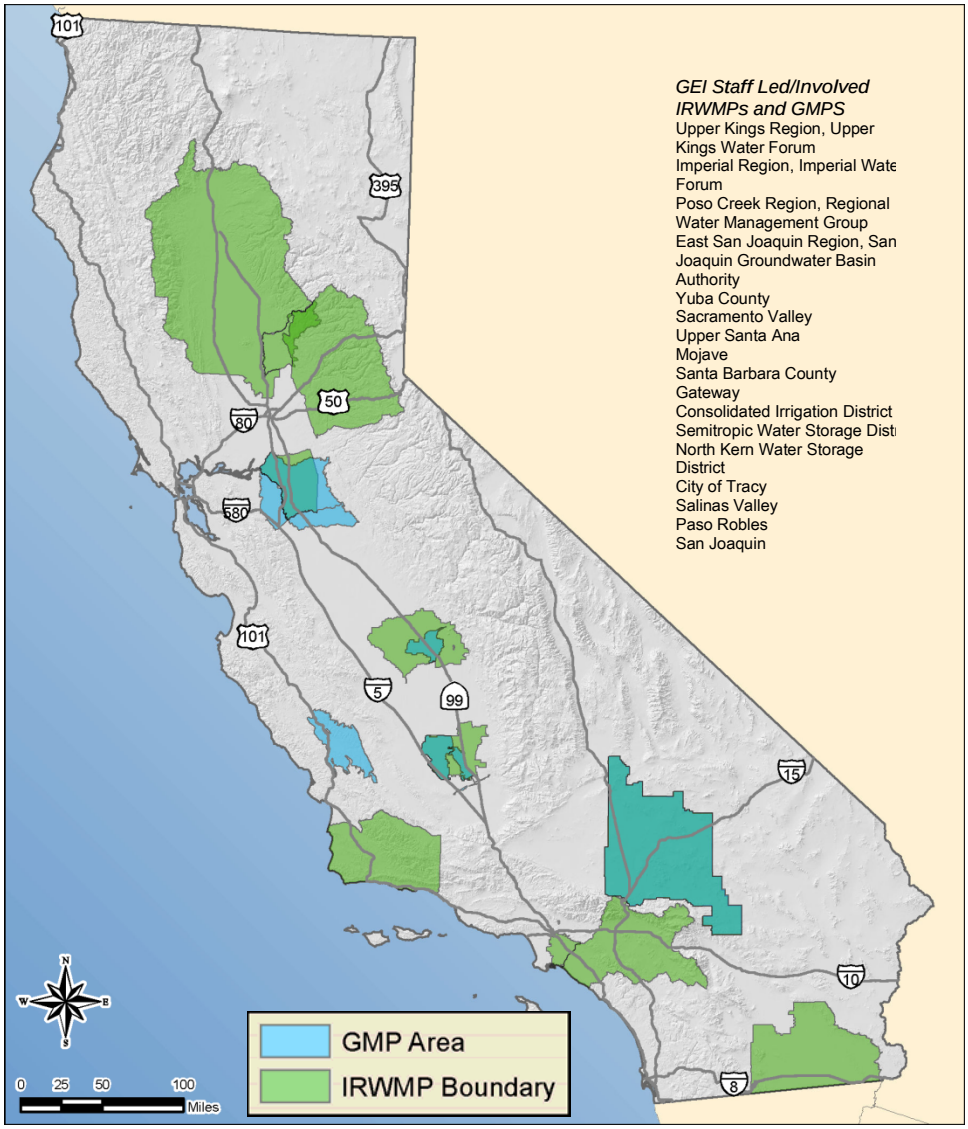
Our local experience includes pioneering development of groundwater recharge and banking projects throughout Kern County.

In-depth design and construction experience includes pipelines, canals, levees, dams and diversion works, pumping plants, power systems, wells, and other water resources management facilities.

## Integrated Management

Developing a comprehensive and coordinated Integrated Regional Water Management Plan (IRWMP) involves the cooperation of many parties. GEI/B-E is a trusted facilitator, knowledgeable in local and state laws, and highly experienced in navigating the institutional framework for managing water resources in California. We are expert at bringing together multiple parties with divergent objectives to form a unified whole—a critical foundational component to development of a sustainable IRWMP.

GEI/B-E has completed numerous IRWMPs, water use efficiency projects, major conjunctive use programs, and groundwater management plans. To date, 87 percent of our grant applications have been funded. GEI/B-E is known by the California Department of Water Resources (DWR) and clients for winning grant awards and then successfully delivering the projects. We have a track record of success with proposition-funded programs for groundwater and conjunctive use, water use efficiency, and IRWMPs, and have obtained $168 million in grant funds for our clients. Most recently, we assisted seven clients in successfully acquiring Proposition 84 grants totaling more than $19 million.




## EXPERIENCED AND COMMITTED PROJECT MANAGEMENT

Our project managers have led the development of numerous IRWMPs and completed implementation studies and designs. They are expert analysts and skilled communicators with experience developing cooperative regional partnerships.

Our proposed program manager, Rick Iger, P.E., worked for the Kern County Water Agency where he helped develop and operate the Kern Water Bank, the Kern County Water Agency's Thomas N. Clark (Pioneer) Groundwater Recharge and Banking Project, and the Berrenda Mesa Joint Water Banking Project, and has been responsible for groundwater monitoring and reporting for the banking projects as well as for the entire County of Kern. He has assisted the County of Kern in writing water well, groundwater export, and floodplain ordinances, and participated on land use planning committees coordinating long range visions for sustainable growth in Kern County.

In addition, he led the effort to develop the 2010 Regional Urban Water Management Plan for the Greater Tehachapi Area, as well as participated in the review and data gathering for the Kern County Water Agency Improvement District 4 2005 Urban Water Management Plan.

Proposed deputy program manager, Robert Almy, P.G., conceived and led development of the Santa Barbara IRWM Plan as manager of the Santa Barbara County Water Agency. Now with GEI-BE, he recently served as the project manager responsible for the preparation of revisions to the Santa Barbara County IRWMP to meet the requirements of Propositions 84 and 1E. Mr. Almy was instrumental in obtaining a grant to update the IRWM Plan as well as two grants totaling $27 million to implement projects in the Region.

## SPECIALIZED EXPERIENCE IN DEVELOPING WATER MANAGEMENT PLANS

Our proven individual and corporate capabilities were developed and tested on multiple integrated water resource planning projects. Our experience, combined with our extensive knowledge of Kern County water management issues will help the Kern IRWMP Regional Water Management Group deliver an IRWMP ready for successful implementation. GEI/B-E has assisted in the development and management of Kern County water resources for decades and early on called attention to the value of integrated management. An example of our local expertise can be seen in the "Report on Investigation of Optimization and Enhancement of Water Supplies of Kern County," completed in 1983. The Optimization Report — a joint effort of several consulting firms led by Bookman-Edmonston — included water district supplies and demands and a list of proposed projects. Some of these projects have been constructed while others are in the current IRWMP, awaiting funding opportunities. The Optimization Report not only demonstrates GEI/B-E's technical expertise, it shows the commitment of water districts in Kern County to lead comprehensive water management planning efforts decades before today's integrated water management planning concepts. GEI/B-E staff members who contributed to the Optimization Report are still available to help with the Kern IRWMP as needed.

### State-of-the-Art Planning Expertise

The new generation of IRWMPs incorporates storm and floodwater management, climate change, and other topics not previously required. GEI/B-E leads the DWR's Flood Emergency Preparedness, Response, and Recovery (FloodER) program and provides DWR with strategic support services for the FloodSAFE California initiative. GEI/B-E's climate scientists and hydrologists

employ current scientific research and modeling tools. In addition, a number of our senior managers are former DWR executive managers and understand evolving programs like the State Water Plan and FloodSAFE California. We are known for our strategic support and engineering services for groundwater banking and conjunctive use, and our staff has been integral in the state's most successful projects, including the Semitropic and Kern County programs. Web-enabled GIS/DMS systems are used to integrate public domain and local data sets used to support both the technical analysis and stakeholder process. These systems can provide long-term return on investments and support implementation, ongoing planning, transparency and data sharing for IRWMP, and other related programs (e.g.; SB7X compliance).

## Climate Change Modeling

GEI/B-E is involved in ongoing climate change investigations in the Colorado River Basin and nationally—investigating the impacts of climate change on the National Flood Insurance Program for Federal Emergency Management Agency (FEMA) headquarters. Data and methods from these efforts will contribute to the project to help the California Department of Water Resources develop climate change modeling systems that assess impacts on the operation of water management and flood control systems.

In addition, GEI/B-E provides the State Climatologist with analysis of possible future changes in the state's hydro-climate and participates in the Climate Thresholds Analysis Working Group, which is establishing guidelines for assessing flood control infrastructure vulnerability to climate change in the Central Valley.

*GEI/B-E has helped our clients with grant applications that have resulted in more than $168 million in awards.*

## Disadvantaged Communities (DAC) Needs

DACs have limited financial, technical and management capacity and special needs. GEI developed and coordinated disadvantaged community (DAC) needs analysis and outreach efforts in the Imperial Region to support these groups in defining and integrating these projects to provide a regional context and strategy. We are prepared to work with communities, Self Help, and the Community Water Center in the Kern Region as required and to support your existing DAC coordination effort as required.

## Successful Grant Writing

The Team understands the IRWM Grant funding application process and will configure the plan update to position County projects to receive implementation grant funding. GEI/B-E has helped irrigation and water districts, water forums, and stakeholder groups develop water management plans, successfully obtain funding, and implement projects identified in those plans. Fully 87 percent of the applications we have authored have been funded, including four recent, successful Proposition 84 planning grants and three Proposition 84 implementation grants. GEI/B-E has a track record of success with proposition-funded programs for groundwater and conjunctive use, water use and energy efficiency, and IRWMPs.

| CLIENT | PROJECT NAME | PROGRAM NAME (e.g., Proposition 13, AB303) | YEAR OF AWARD | AWARD AMOUNT | GEI STAFF | Reviewed/Wrote R | Reviewed/Wrote W |
|---|---|---|---|---|---|---|---|
| **Integrated Regional Water Management Plans** | | | | | | | |
| Yuba County Water Agency | Yuba County Integrated Regional Water Management Plan | Prop 50 - IRWMP Planning | 2005 | $499,640 | Naser Bateni<br>Michael Cornelius | | ✓ |
| Upper Kings Water Forum, Kings River Conservation District | Upper Kings Integrated Regional Water Management Plan | Prop 50 - IRWMP Planning | 2005 | $498,560 | Matt Zidar | | ✓ |
| Northeastern San Joaquin County Groundwater Banking Authority | Eastern San Joaquin Integrated Regional Water Management Plan | Prop 50 - IRWMP Planning | 2005 | $250,000 | Mark Williamson | ✓ | ✓ |
| Northern California Water Association | Sacramento Valley Integrated Regional Water Management Plan | Prop 50 - IRWMP Planning | 2005 | $500,000 | Naser Bateni<br>David Miller | | ✓ |
| San Bernardino Valley Municipal Water District | Upper Santa Ana Watershed Integrated Regional Water Management Plan | Prop 50 - IRWMP Planning | 2005 | $498,560 | Naser Bateni<br>David Miller<br>John Zoraster | | ✓ |
| Semitropic Water Storage District | Poso Creek Integrated Regional Water Management Plan | Prop 50 - IRWMP Planning | 2005 | $499,435 | Ron Eid<br>John Zoraster | | ✓ |
| Northern California Water Association | Sacramento Valley Integrated Regional Water Management Plan-Step 2 | Prop 50 - IRWMP Implementation | 2006 | $12,500,000 | Naser Bateni<br>David Miller | | ✓ |
| Mojave Water Agency | Mojave Water Agency Regional Water Management Plan | Prop 50 - IRWMP Implementation | 2007 | $25,000,000 | Mark Williamson | ✓ | ✓ |
| Semitropic Water Storage District Lead Agency | System Optimization Reivew for the Poso Creek IRWM Plan Area | USBR Challenge Grant Program: Water 2025 | 2008 | $300,000 | Sam Schaefer<br>Ron Eid<br>David Miller | | ✓ |
| Mojave Water Agency | Water Treatment and Collection Facilities (High Desert WD) and Recharge Basin and Associated Water Transmission (Joshua Basin WD) | Prop 84 - Implementation, Round 1 | 2011 | $6,000,000 | Mark Williamson | | ✓ |
| Mojave Water Agency | Cash for Grass Program | Prop 84 - Implementation, Round 1 | 2011 | $2,000,000 | Mark Williamson | | ✓ |
| Gateway IRWM Authority | Gateway Regional IRWMP Planning | Prop 84 - IRWMP Planning, Round 1 | 2011 | $950,000 | Bill Bennett | | ✓ |
| Northeastern San Joaquin County Groundwater Banking Authority | Eastern San Joaquin Integrated Regional Water Management Plan | Prop 84 - IRWMP Planning, Round 1 | 2011 | $545,925 | Mark Williamson | | ✓ |
| Santa Barbara County Water Agency | Santa Barbara County Integrated Regional Water Management Plan 2012 | Prop 84 - IRWMP Planning, Round 1 | 2011 | $555,737 | Robert Almy | | ✓ |
| Imperial Irrigation District | Imperial Integrated Regional Water Management Plan | Prop 84 - IRWMP Planning, Round 1 | 2011 | $1,000,000 | Matt Zidar | | ✓ |
| Semitropic Water Storage District | Poso Creek Integrated Regional Water Management Plan | Prop 84 - Implementation, Round 1 | 2011 | $8,215,000 | Rick Iger, Sam Schaefer, Aaron McWilliams | | ✓ |
| **Conjunctive Use** | | | | | | | |
| Butte Water District | Conjunctive Use Construction Grant | Prop 13 - Conjunctive Management Program Grant | 2004 | $1,400,000 | Naser Bateni<br>Richard Shatz | | ✓ |
| Sutter Extension Water District | Conjunctive Use Construction Grant | Prop 13 - Conjunctive Management Program Grant | 2004 | $1,500,000 | Naser Bateni<br>Richard Shatz | | ✓ |
| West Basin Municipal Water District | West Basin Seawater Barriers | Prop 13 - Conjunctive Management Program Grant | 2004 | $8,000,000 | Naser Bateni | ✓ | |
| Semitropic Water Storage District | Water Management and Measurement Improvements for Return of Stored Water from the Semitropic Water Storage District Groundwater Bank | USBR Challenge Grant Program: Water for America | 2009 | $300,000 | Sam Schaefer<br>Isela Medina | | ✓ |
| Shafter-Wasco and North Kern Water Storage District | Water Banking Improvement Project | USBR Challenge Grant Program: Water for America | 2009 | $300,000 | Ron Eid<br>Isela Medina | | ✓ |
| Semitropic WSD | Pond-Poso Spreading and Recovery Facility | USBR Challenge Grant Program: Recovery Act of 2009 Water Marketing and Efficiency | 2009 | $2,222,660 | Sam Schaefer<br>Isela Medina<br>Various Staff | | ✓ |
| Semitropic-Rosamond Antelope Valley Water Bank JPA | Antelope Valley Water Bank Initial Recharge and Recovery Facility Improvement Project | USBR Challenge Grant Program: Recovery Act of 2009 Water Marketing and Efficiency | 2009 | $5,000,000 | Lorena Ospina<br>Marc Rozman<br>Various Staff | | ✓ |

| CLIENT | PROJECT NAME | PROGRAM NAME (e.g., Proposition 13, AB 303) | YEAR OF AWARD | AWARD AMOUNT | GEI STAFF | R | W |
|---|---|---|---|---|---|---|---|
| North Kern WSD | Calloway Canal to Lerdo Canal Intertie | JSBR Challenge Grant Program: Recovery Act of 2009 Water Marketing and Efficiency | 2009 | $5,000,000 | Ron Eid, Sam Schaefer, Rick Iger | | ✓ |
| North Kern Water Storage District | Turnout No. 2 | Reclamation, WaterSMART | 2010 | $300,000 | Ron Eid, Isela Medina | | ✓ |
| Shafter-Wasco ID | South Intertie between North Kern WSD and Shafter-Wasco ID | Reclamation, WaterSMART | 2010 | $300,000 | Sam Schaefer, Rick Iger | | ✓ |
| Semitropic WSD | Planning, Design, and Permitting the Stored Water Recovery Unit of the Semitropic WSD GW Bank | JSBR: Groundwater Banking Improvements in NW Kern County | 2010 | $917,000 | Ron Eid<br>Sam Schaefer<br>Various Staff | | ✓ |
| **Water Use Efficiency** | | | | | | | |
| Biggs-West Gridley Water District | Regional Water Measurement Program | Prop 50 - Water Use Efficiency | 2005 | $50,000 | Naser Bateni<br>Michael Cornelius<br>David Miller | | ✓ |
| Los Angeles Department of Water and Power | Cooling Tower Conductivity Controller Replacement Program | Prop 50 - Water Use Efficiency | 2005 | $350,000 | Naser Bateni<br>Michael Cornelius | | ✓ |
| Los Angeles Department of Water and Power | Large Landscape Smart Irrigation Program | Prop 50 - Water Use Efficiency | 2005 | $183,750 | Naser Bateni<br>David Miller | | ✓ |
| Los Angeles Department of Water and Power | Los Angeles City Parks Irrigation Efficiency Program | Prop 50 - Water Use Efficiency | 2005 | $362,000 | Naser Bateni<br>David Miller | | ✓ |
| Oakdale Irrigation District | Tailwater Recovery Program | Prop 50 - Water Use Efficiency | 2005 | $731,500 | Naser Bateni<br>David Miller | | ✓ |
| Stevinson Water District | Lateral Canal Pipelining Project | Prop 50 - Water Use Efficiency | 2005 | $896,000 | Naser Bateni<br>David Miller | | ✓ |
| Central Basin Municipal Water District | Conservation Outreach Targeting Multicultural Communities | Prop 50 - Water Use Efficiency | 2007 | $100,000 | Bill Bennett | ✓ | |
| Central Basin Municipal Water District | High Efficiency Living Program | Prop 50 - Water Use Efficiency | 2007 | $1,563,900 | Bill Bennett | ✓ | |
| Central Basin Municipal Water District | Urban City Makeover Program | Prop 50 - Water Use Efficiency | 2007 | $113,746 | Bill Bennett | | ✓ |
| Consolidated Irrigation District | Canal Modernization Program | Prop 50 - Water Use Efficiency | 2007 | $250,000 | Matt Zidar | | ✓ |
| Los Angeles Department of Water and Power | Residential Smart Irrigation Controller Device Install | Prop 50 - Water Use Efficiency | 2007 | $1,650,000 | Bill Bennett | ✓ | |
| West Basin Municipal Water District | Green Garden | JSBR (Calfed) | 2007 | $231,000 | Bill Bennett | ✓ | |
| West Basin Municipal Water District | CII Incentive Program | Prop 50 - Water Use Efficiency | 2007 | $404,437 | Bill Bennett | ✓ | |
| West Basin Municipal Water District | CII Program | JSBR | 2007 | $66,000 | Bill Bennett | ✓ | |
| West Basin Municipal Water District | Conservation Master Plan | JSBR | 2008 | $100,000 | Bill Bennett | ✓ | |
| West Basin Municipal Water District | High-efficiency Toilet Full Service Multi-family Program | MWD | 2008 | $681,000 | Bill Bennett | ✓ | |
| West Basin Municipal Water District | Zero-runoff Street Median Water Conservation Program | MWD | 2008 | $100,000 | Bill Bennett | ✓ | |
| West Basin Municipal Water District | Food Facilities Audit, Incentive and Training Program | MWD | 2008 | $37,500 | Bill Bennett | ✓ | |
| Shafter-Wasco Irrigation District/ North Kern Water Storage District | South Interconnection between North Kern Water Storage District and Shafter-Wasco Irrigation District | JSBR - WaterSMART Water and Energy Efficiency | 2010 | $300,000 | Sam Schaefer, Rick Iger | ✓ | |
| North Kern Water Storage District | Canal Turnout to N. Kern Water Storage District | JSBR - WaterSMART Water and Energy Efficiency | 2010 | $300,000 | Ron Eid, Isela Medina | ✓ | |
| Semitropic Water Storage District | Water Use Efficiency and Energy Improvement for Semitropic WSD and Growers" | WaterSMART Program, Bay-Delta Agricultural Water Conservation and Efficiency Projects | 2011 | $711,000 | Sam Schaefer, Rick Iger, Isela Medina, Aaron McWilliams | | ✓ |
| **Groundwater Management/AB303/Local GW Assistance Program** | | | | | | | |
| Stevinson Water District | Groundwater Quality Investigations | AB 303 | 2004 | $225,000 | Naser Bateni<br>Richard Shatz | | ✓ |
| Kings River Conservation District, Lower Kings Groundwater Management Group, | Lower Kings Groundwater Management Plan (SB 1938) | AB303 | 2004 | $175,000 | Matt Zidar | | ✓ |
| Modesto Irrigation District | Well Field Optimization Project | AB 303 | 2005 | $250,000 | Naser Bateni<br>Michael Cornelius<br>David Miller | | ✓ |

| CLIENT | PROJECT NAME | PROGRAM NAME (e.g., Proposition 13, AB 303) | YEAR OF AWARD | AWARD AMOUNT | GEI STAFF | R | W |
|---|---|---|---|---|---|---|---|
| City of Tracy | Tracy Regional Groundwater Management Plan | AB303 | 2005 | $184,842 | Richard Shatz<br>Michael Cornelius | | ✓ |
| Sacramento Groundwater Authority | North Sacramento County Regional Groundwater Model Enhancements | AB 303 | 2005 | $249,840 | Michael Cornelius | | ✓ |
| Semitropic Water Storage District | Regional Subsidence Monitoring | AB303 | 2005 | $220,000 | Ron Eid<br>John Zoraster | | ✓ |
| Semitropic WSD | 2005 Groundwater Monitoring Improvement Project | LGA Program | 2005 | $218,141 | Ron Schnabel | | ✓ |
| Sutter County | Regional Groundwater Management Plan | DWR – General Fund | 2005 | $230,000 | Naser Bateni | | ✓ |
| Consolidated Irrigation District | Groundwater Management Plan Update | AB 303 | 2006 | $250,000 | Matt Zidar | | ✓ |
| City of Paso Robles | Paso Robles Regional Groundwater Management Plan | AB303 | 2007 | $220,000 | Michael Cornelius<br>Naser Bateni | | ✓ |
| Oakdale Irrigation District | Well Field Optimization Demonstration Project Phase II | AB 303 | 2007 | $250,000 | Naser Bateni<br>Matt Zidar | | ✓ |
| Consolidated Irrigation District | Groundwater Mitigation and Banking Program Site Characterization and Feasibility | AB 303 | 2007 | $250,000 | Matt Zidar | | ✓ |
| North Kern WSD | North Kern Groundwater Monitoring Program | LGA Program | 2008 | $250,000 | Ron Eid | | ✓ |
| **Flood Control** | | | | | | | |
| Three Rivers Levee Improvement Authority | Upper Bear-Western Pacific Interceptor Canal Design | Prop 13 - Design Grant | 2004 | $1,620,000 | Herb Greydanus | | ✓ |
| Yuba County Water Agency | Yuba-Feather Flood Protection Program | Prop 13, Flood Control Grant – Design of Forecast-Coordinated Operation | 2004 | $5,545,000 | Naser Bateni<br>Herb Greydanus | | ✓ |
| Yuba County Water Agency | New Colgate Tailwater Depression Project | Prop 13 – Design Grant | 2004 | $608,000 | Herb Greydanus | | ✓ |
| Three Rivers Levee Improvement Authority | Yuba-Feather Flood Protection Program | Prop 13 Design Grant – Levee Setback Project | 2004 | $3,257,000 | Naser Bateni<br>Herb Greydanus | | ✓ |
| Three Rivers Levee Improvement Authority | Yuba-Feather Flood Protection Program | Prop. 13 Construction, DFG Mitigation Grant | 2005 | $19,000,000 | Naser Bateni<br>Herb Greydanus | | ✓ |
| Three Rivers Levee Improvement Authority | Yuba-Feather Flood Protection Program | Prop. 13 Setback Levee Construction | 2005 | $22,443,000 | Herb Greydanus<br>Alberto Pujol<br>Dan Wanket | | ✓ |
| Three Rivers Levee Improvement Authority | Feather River Levee Improvement Project – Phase 4 | Prop 13 – Construction | 2005 | $1,303,000 | Alberto Pujol<br>Naser Bateni<br>Herb Greydanus | | ✓ |
| **Other** | | | | | | | |
| Stevinson Water District | Piping Irrigation Laterals Project | USBR FY 2004 Challenge Grant | 2004 | $300,000 | Naser Bateni<br>David Miller | | ✓ |
| Sutter Extension Water District | Conveyance System Improvements | DWR – General Funds | 2004 | $250,000 | Naser Bateni | | ✓ |
| Yuba County Water District | Forbestown Pipeline Rehabilitation | Prop 13 Infrastructure Rehabilitation Feasibility Study | 2004 | $4,200,000 | Naser Bateni<br>Nancy Pallister | | ✓ |
| Los Angeles Department of Water and | Seawater Desalination Pilot Project | DWR – General Fund | 2005 | $70,000 | Naser Bateni | | ✓ |
| Los Angeles Department of Water and Power | Seawater Desalination Pilot Project | USBR- Desalination Grant Program | 2005 | $250,000 | David Miller<br>John Zoraster | | ✓ |
| Stevinson Water District | Agricultural Drainage Control Program | Prop 50 - Agricultural Water Quality Grant Program | 2005 | $603,000 | Naser Bateni<br>David Miller | | ✓ |
| Los Angeles Department of Water and Power | Seawater Desalination Pilot Project | Prop 50 – Desalination Grant Program | 2006 | $1,500,000 | Naser Bateni<br>Michael Cornelius | | ✓ |
| Los Angeles Department of Water and Power | Water System Security Upgrades | Prop 50 – California DPH | 2007 | $10,000,000 | Bill Bennett | ✓ | ✓ |
| **Total Funds Awarded** | | | | **$168,156,173** | | | |

# Scope of Work

## INTRODUCTION

GEI/B-E can serve several roles to take the Kern IRWP to the implementable level. We have served this role for other programs and have a clear understanding of what is necessary. The following describes the approach the GEI/B-E team will take to keep the Kern IRWMP up to date and the projects therein ready to implement.

We have worked closely with the Kern IRWM process and understand the progress made by the RWMG and the challenges that remain. Because the Draft Kern IRWM Plan is under review, we recognize that the scope of work may need to be refined. However, as discussed in Tasks 1 and 2 we are able to define the key elements of the required program management services. We understand that the agencies involved in the RWMG will engage a contractor to perform program support services now provided by one or more agencies. We understand the program support services need to be delivered so as to satisfy the RWMG agreements, individual agency accounting and decision-making procedures as well as address the expectations of DWR and the IRWM stakeholders.

Because our role would bring a wide array of stakeholders together while managing a broad and complex process, we will need to provide more than technical services. To that end the GEI/B-E team sees its program management role as follows:

## PROGRAM MANAGERS

We bring extensive program management experience, specifically relating to successful development of IRWM Plans and related projects. Our Managers include individuals who have developed IRWM Plans and related projects under contracts for public agencies as well as individuals who have managed regional water agencies throughout formation and implementation of IRWM Programs. As a result, the GEI/B-E team understands both the program management needs of the RWMG and has also successfully delivered administrative and organizational services to efficiently develop IRWM Plans and maintain their utility.

### Conveners

We will organize meetings, distribute materials, conduct or facilitate the meetings, produce meeting notes, maintain the website, produce invoicing and accounting, and maintain mailing lists.

### Integrators

We bring a fresh perspective on solutions to the region's needs. We understand the needs of agriculture, large cities, and small communities and rural areas. We have demonstrated experience bringing these interests together to meet their needs cooperatively. We will work to identify common needs and propose solutions that can bring the parties together. We will look for broad and multi-regional solutions to meet flood control, land use planning, climate change, and DAC needs that also provide environmental, recreational and other values. We bring a team of experienced IRWM project managers that have experienced what works firsthand, and will explore with key local interests the best ideas to meet the Kern Region's needs. We have an intimate understanding of local, state and federal project operations and will apply that knowledge to development of both IRWM objectives and projects.

### Advocates

We believe Kern is the statewide leader in conjunctive management. Though DWR doesn't always acknowledge it, groundwater banking relieves reliance on the Delta during critical periods, even if average diversions remain at current levels. We will emphasize the importance of Kern and many of its proposed projects as a key to statewide water management interconnection.

### Facilitators

We have an intimate, comprehensive knowledge of Kern County water issues and needs. We have a vision that extends beyond district boundaries. We will help the community work together through frequent communication, small group meetings, focused technical analysis, and sharing of information. We believe in open, transparent processes with complete and open access to information. We will ensure that unbiased prioritization criteria are developed and applied.

### Visionaries

We will keep the group focused on the overall goals of improving water supply, cooperative governance, and minimizing costs. We will develop strategies targeting Statewide Priorities and Preferences, and to develop projects with economies of scale. We will frequently check Plan progress against grant criteria to maximize Kern's chances of outside funding.

Our scope of work, discussed below, focuses on the tasks outlined in the RFQ/P dated September 23, 2011. Based on our local experience we understand the needs of the Kern RWMG. We also provide a discussion of additional GEI/B-E capabilities that may be of service as the IRWM Plan is implemented and as related projects are developed. The overall program management approach was described in the Understand and Approach Section. This section describes the specific

approach to the scope of work, and how GEI/B-E will help the Executive Committee and RWMG to negotiate the IRWMP waters.

### DWR Schedule and Managing Uncertainty

Our approach to your scope of work recognizes that there are uncertainties created by the DWR Proposition 84 and 1E changing requirements and funding schedule. DWR has only recently released (September 26, 2011) and anticipated schedule of future IRWM Grant solicitations. The following figure shows the DWR External Milestones/Timeframes used to add a measure of certainty to the Kern IRWMP scope, schedule and budget. As discussed in the tasks below, our approach to the scope of work recognizes the relationship between the DWR milestones and the Kern IRWMP scope of work.

At the same time, GEI/B-E Team recognizes the complexity of the planning work to be conducted, and provides flexibility to the Executive Committee/RWMG to identify how to respond to unanticipated needs in a disciplined manner, as DWR clarifies what will be required to prepare the Kern IRWMP and meet state standards, pursue funding and implement your projects.

We will provide **strategic support** reduce the uncertainty, helping the Executive Committee and RWMG to define only what is truly important, make decisions, allocate resources to updating the current IRWMP scheduled to be adopted in December 2011, or to conduct analysis or write new sections to meet standards. There is a strategic element to Task 1.

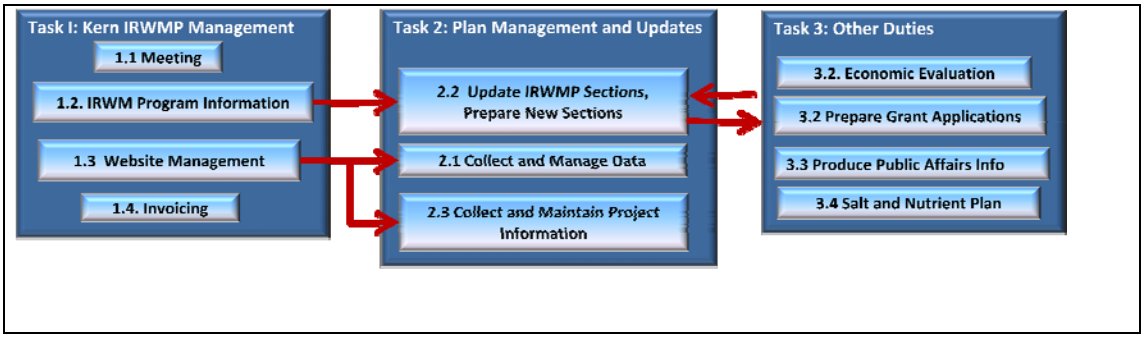
GEI/B-E will also provide the **tactical support** to execute on the specific strategies and more clearly defined tasks that respond to DWR Milestones. The link between the strategic review and development of tactical plans of action will keep the projects within the resource constraints and budget. Task 2 and 3 are 'tactical,' action-oriented work areas that should have specific scope, schedules, and budgets. Without the certainty that will come from the DWR release of a key document, the strategy for compliance will need to be revisited at the critical milestones to appropriately scope projects requirements, budgets, and final schedules.

| DWR External Milestones/Time Frame | | 2011 | | 2012 | | | | | | | | | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Winter | | | Spring | | | Summer | | | | Fall | | | Winter | Spring | Sum | Fall |
| Activity | Milestone | Nov | Dec | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | | | | |
| **Prop 84 Planning Grant Solicitation** | | | | | | | | | | | | | | | | | | | |
| Applications Due | Feb-12 | | | | | | | | | | | | | | | | | | |
| Announce Final Awards | Mid-2012 | | | | | | | | | | | | | | | | | | |
| **Revise Program Guidelines & PSP (Implementation & SWFM)** | | | | | | | | | | | | | | | | | | | |
| Stakeholder Workshops & Public Feedback | Late 2011 | | | | | | | | | | | | | | | | | | |
| Release Revised Draft Guidelines and PSP for Public Review & Comment | Spring 2012 | | | | | | | | | | | | | | | | | | |
| Release Final Round 2 Program Guidelines & PSP (Implementation & SWFM) | Summer 2012 | | | | | | | | | | | | | | | | | | |
| **Prop 1E Stormwater Flood Management Grant** | | | | | | | | | | | | | | | | | | | |
| Applications Due | Summer 2012 | | | | | | | | | | | | | | | | | | |
| Announce Draft Recommendations for Public Review & Comment | Early 2013 | | | | | | | | | | | | | | | | | | |
| Announce Final Awards | Spring 2013 | | | | | | | | | | | | | | | | | | |
| **Prop 84 Implementation Grant (2-Step Process Anticipated)** | | | | | | | | | | | | | | | | | | | |
| Step 1 - IRWM Plan Evaluation Phase | | | | | | | | | | | | | | | | | | | |
| Applications Due | Fall 2012 | | | | | | | | | | | | | | | | | | |
| Release Final Call Back List | Spring 2013 | | | | | | | | | | | | | | | | | | |
| Step 2 - Project Evaluation Phase | | | | | | | | | | | | | | | | | | | |
| Applications Due | Summer 2013 | | | | | | | | | | | | | | | | | | |
| Announce Final Awards | Fall 2013 | | | | | | | | | | | | | | | | | | |
| **Local Groundwater Assistance Grants** | | | | | | | | | | | | | | | | | | | |
| Release Revised Draft Guidelines & PSP for Public Review & Comment | Jan-12 | | | | | | | | | | | | | | | | | | |
| Applications Due | Spring 2012 | | | | | | | | | | | | | | | | | | |
| Announce Final Awards | Fall 2012 | | | | | | | | | | | | | | | | | | |

## Relationship Between the Tasks

The following figure shows how tasks are interrelated.

Task 1 includes two well defined management tasks (Tasks 1.1 /Task 1.4); and two tasks that require close coordination with the Executive Committee to clarify local expectations and requirements, define strategies, and refine the work plan to hit DWR's moving target and add certainty.




## Updating the Existing Plan, Preparing New Sections, and Responding to Unanticipated Needs

In Task 1.2, IRWMP Program Information, we will brief the Executive Committee and RWMG at key DWR milestones and evaluate the strategic implications. We will evaluate the DWR actions and the effect to the current Kern IRWMP, defining needed changes to current sections or new requirements that could require additional analysis and production of new sections (Tasks 2.1). With input from the Executive Committee, the information will be used to refine the scope, schedule, and budget.

If new analyses are required to meet the state standards, the revised scope of work would be prepared and the work conducted as part of Task 3, Other Duties. For example, if the state were to place greater emphasis on salt/nutrient plans or change the requirement for analysis of greenhouse gases. The list in Task 3 is an example only and specific unanticipated tasks need to be defined. Under the Program Management approach, a task order for a specific scope, schedule and budget could be issued to meet the unanticipated need, with funds allocated from contingency. The analysis would be used to provide input to plan updates or produce new sections (two way arrows).

## Website Support and Project Data

In Task 1.3, Website Management, the GEI/B-E Team will host the website on our server and maintain the existing level of functionality.

We also propose an optional task to work with the Executive Committee/RWMG to define the expectations and assumptions for the website, and to further scope the work tasks for Task 2.1, Collect and Manage Data and Task 2.3, Collect and Maintain Project Data. This will include a mini-user needs evaluation to define opportunities, present alternative strategies, and provide a recommendation for the best way to use the project website to cost effectively conduct Tasks 2.1 and 2.3.

For Task 2.3, Collect and Maintain Project Data, we propose to put the existing project information into a data management system that is accessible over the Web so that users can maintain and update their project information and upload supporting documentation. This will also help to update and maintain the project lists, match stakeholder projects to funding opportunities, define integration opportunities, ensure openness and transparency, and provide access to related data sets.

This evaluation conducted in Task 1.3 will also help the Executive Committee/RWMG define information management strategies to meet DWR standards during IRWMP implementation (e.g.; data management, tracking project performance, updating the plan, etc.), or to address areas of concern in the existing Kern IRWMP once the plan has been adopted. Depending on the objectives of the Executive Committee/RWMG, the website could support other regional activities during implementation for sharing monitoring, GIS data, and for meeting other state requirements (SB 7X-7, UWMP updates, etc.). Enhancements to the basic systems used to develop the IRWMP could be included in subsequent grant applications.

# 1.0 Kern IRWMP Management

GEI/B-E will bring its capabilities and experience to the Kern IRWM process through effective and adaptive program management that is based on our understating of the IRWM process and the needs of local agencies, close communication with the RWMG, maintenance of up-to-date information, and timely delivery of additional support services.

On behalf of regions throughout California GEI/B-E has successfully developed and managed several IRWM Plans and related grant applications. In these efforts we have provided:

- Clear and timely communication
- Effective process management
- Accurate administration
- Inclusive facilitation
- Appropriately focused education
- Comprehensive technical support to studies and project development

We will continue to focus on these fundamentals in our service to the Kern RWMG.

In order to provide effective management of the IRWM process, GEI/B-E will prepare, monitor, and maintain project budgets and schedules. The tools and techniques embodied in GEI/B-E's *Project Delivery Model* closely adhere to those of the Project Management Institutes' *Project Management Body of Knowledge*.

We will work with the Executive Committee and Kern RWMG consultants to first build a comprehensive schedule at an appropriate level of resolution, typically at a task level requiring 40 hours or more for completion. Key decision points and milestones will be identified. A critical path analysis will be conducted to determine crucial elements that will require special attention.

For each major task, a monthly summary of progress will be prepared in a format acceptable to the Kern RWMG and appropriate for submission to DWR for cost reimbursement under the grant contract. The summary will include, at a minimum, a tabulation of all costs by task for each consultant or Kern RWMG member seeking reimbursement and credit for in-kind services, a summary of progress and key milestones, a presentation of the schedule and a discussion of any deviations and a plan to correct any deviations identified. The summary will also include a projection of activities for the next month.

## 1.1 MEETING COORDINATION

*The purpose of this task is to provide all services necessary to schedule, notice, and conduct bi-monthly Executive Committee, quarterly RWMG, and other meetings as required by Executive Committee.*

### 1.1.1 Meeting preparation

This includes securing meeting location, determining most suitable date and time, keeping a meeting calendar, coordinating agenda items with co-chairs, sending out e-mail and hard copy notices and agendas, tracking meeting acceptance of attendees.

### 1.1.2 Conduct meetings

This includes facilitating determination of quorum, initiating introductions, tracking attendance, coordinating with meeting chairman on other items to be added to agenda, taking meeting notes, and following up with draft notes and action items for review, then finalize. For budgeting purposes, in addition to the 10 meetings identified in the RFQ, we anticipate up to 6 additional meetings.

Assumption: Specific deliverables and handouts will be prepared within the specific tasks.

Deliverables: Draft and Final Agendas; copy and distribute meeting handouts; draft and final meeting notes and action item list. Meetings: 6 Executive; 4 RWMG; 6 additional meetings as required for a total of 16 meetings.

## 1.2 IRWMP PROGRAM TRACKING AND INFORMATION

*The purpose of this task is to provide the Executive Committee and RWMG with all IRWM program information necessary to properly mange, maintain, and/or update the plan, either in part or entirety. This may include, but is not limited to, information regarding new program requirements established by DWR and/or the State Legislature, the availability or requirements of IRWM grants or other potential sources of plan management or project funding.*

Early coordination with the Executive Committee and RWMG is recommended to further refine expectations and define need. Since we work closely with DWR, we can help the Kern Region identify opportunities to meet local needs, develop work plans, and establish grant funding priorities that will compliment local resources (e.g.; DWR Proposition 84 Planning Grants; Local Groundwater Assistance Grants).

The scope of work to update the plan in its entirety or in part cannot be known with certainty. The purpose of this task is to add certainty and detail to the scope of work for subsequent tasks. We participate in statewide forums such as the Roundtable of Regions, and our Sacramento office makes it convenient to attend in person. We will use this exposure to monitor IRWM developments, incorporate the best ideas and most efficient approaches, and other groups and report to Executive Committee.

The GEI/B-E Team will:

- Track and update the DWR schedule
- Review DWR materials at key milestones. This includes review of draft and final:

  - Prop 84 Planning Grant Solicitation
  - Revised Program Guidelines & PSP (Implementation & SWFM)
  - Prop 1E Stormwater Flood Management Grant

- Prepare grant and guideline briefings that summarize the requirements; assess the strategic implications; assess the effects on the Kern IRWMP and scope, and include recommendations.
- Prepare draft and final comment for the Executive committee on draft DWR documents during the public review periods (e.g.; Revised Program Guidelines & PSP with input from the Executive Committee).
- Attend DWR Workshops and prepare summaries (assume three meetings).
- Provide draft and final work plans for revising the Kern IRWMP sections, preparing new sections, or conducting additional analysis to respond to unanticipated needs of the Executive Committee. We will produce draft and final revisions to the proposed work plan or new task orders for review and approval. No new work would be undertaken without approval.
- Prepare draft and final work plans or amendments to the proposed work plan to meet unanticipated needs as identified by the Executive Committee task orders or scope amendments.

Assumptions: No additional meetings are included and the briefings; and work products will be reviewed at regularly scheduled meetings or conference calls. Date of deliverables will be established when DWR schedules are better defined. Since the Executive Committee needs and DWR requirements are not defined, it is also assumed that the monthly hours allocated to these activities are appropriate.

Deliverables:

- Summaries of DWR workshops (three)
- Briefing on the draft and final Prop 84 Planning Grant Solicitation and strategic implications
- Draft and Final Executive Committee Comment on Planning Grant Solicitation
- Briefing on the Revised Program Guidelines & PSP (Implementation & SWFM)
- Draft and Final Executive Committee Comment Revised Program Guidelines & PSP (Implementation & SWFM)
- Briefing on Final Round 2 Program Guidelines & PSP including analysis of scope implications
- Draft and Final revised Work Plan

- Briefing on the Prop 1E Stormwater Flood Management Grant; work plan (scope, schedule to and cost) to prepare a Kern application for prioritized projects.
- Draft and final work plans for meeting unanticipated needs for Task 3 (up to three task orders)

### 1.3 WEBSITE MANAGEMENT

*The purpose of this task is to update the Kern IRWMP domain and website by updating documents, meeting notices, etc. as directed by the Executive Committee.*

The purpose of this task is to update and maintain the Kern IRWMP website.

Determine domain properties and transfer access and responsibility to GEI/B-E. Add documents and meeting information at least monthly or more often if directed by Executive Committee. This task is to maintain the existing level of functionality with relatively minor improvements made based on the capabilities GEI/B-E Team has as a result of our other work.

Assumption: For purposes of costing this task a fixed number of hours are assigned, and it is assumed that the site will be updated twice per month.

Deliverables: Posted meeting materials; final agendas; meeting handouts; final meeting notes and action item list; media releases, updated plan and/or plan subsections, and other documents as directed (e.g.; UWMPs, AWMPs, DWR standards and guidelines).

### 1.4 INVOICING/ADMINISTRATION

The purpose of this task is to *prepare invoices and progress reports for RWMG Members for the cost of the GEI/B-E Team's Consultant Services according to the Kern IRWMP funding allocation methodology, to be provided by the Executive Committee.*

Prepare, process, and maintain invoices, dues, accounting by using GEI/B-E's client and vendor accounting system and RWMG cost allocation formula.

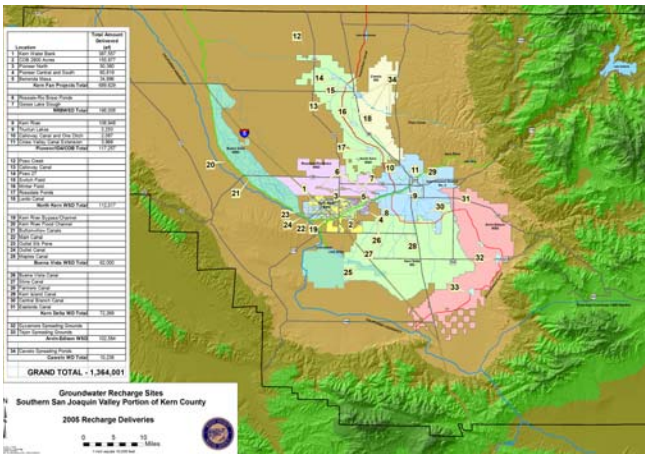
Deliverables: Monthly invoices containing progress reports and budget to actual summaries; invoices shall be split based on agreed to formulas for cost sharing among participating agencies; the summary will also include a projection of activities for the next month.

## 2.0 Plan Management and Updates

Task 2 will provide the Kern IRWM Plan a solid basis for future grant applications, in particular applications for Implementation Grants from Propositions 84 and 1E. Generally plan management duties would include:

- Collecting and managing IRWM Plan related information

- Updating the plan to address new requirements or incorporate new information
- Maintaining an up to date project list including the relationship to IRWMP objectives




Efficient compilation and analysis of available information are essential to focus planning efforts. As discussed below, GEI/B-E Team will apply its knowledge and capability to maintain an updated IRWM Plan and assist in developing projects to implement planning objectives. Our approach will maximize the opportunity to acquire outside funding for important projects.

We anticipate the Kern IRWM plan may be augmented to include more comprehensive discussion of risk due to flooding and climate change. Such discussion could support grants for projects to address identified risk in addition to the water management projects already incorporated in the Draft IRWMP.

We understand the Kern IRWM RWMG has acquired considerable information during development of the Draft IRWM Plan. As discussed below, GEI/B-E would utilize that information as the starting point for a database to serve the needs of Plan development and project definition.

## 2.1 DATA COLLECTION AND MANAGEMENT

*The purpose of a data management system is to obtain, manage and provide information required to manage and/or update the Kern IRWMP. Data includes information regarding water supply and demand, flood risk, population demographics, and/or financial information.*

We understand that substantial data have already been collected during development of the Draft IRWM plan. GEI/B-E will start with this data set and adapt or modify its management system to improve its functionality and utility.

GEI/B-E data management experts will compile, update, and maintain a database of key water management and related data. The resulting database will be built using standard tools such as Microsoft Access, and will have appropriate front-end data input and back-end reporting interfaces. The database will include spatial referencing for output to Geographic Information System mapping tools.

GEI/B-E is intimately familiar with available state and federal public domain data sets typically used for preparing IRWMP and have developed tools to document their use and produce meta data inventories. This includes available digital satellite and air photo imagery. These data sets are used for both reference and analysis purposes, including base mapping (e.g.; transportation, political boundaries, etc.) and discipline specific analysis (census, stream network, California Levees). Our

Web/GIS enabled tools allow us to rapidly mobilize and apply this information for purposes of the Kern IRWMP; and to make this information accessible and available to Kern Stakeholders in an understandable and useful format.

We will focus primarily on preparing an inventory of the information collected to date supporting the IRWMP effort and will work with the existing contractor, stakeholders, and agencies to document the data sources. We will collect the data, install it on the Kern IORWMP servers, and prepare a data inventory. A technical memorandum to document the data inventory will be prepared.

Under contract with the DWR, GEI is collecting and developing flood information such as levee, floodplain map, climate data, and flood facilities for FloodSAFE program. GEI is compiling a comprehensive Central Valley flood infrastructure inventory as part of the Flood Emergency Response Information System (FERIS).

The FERIS GIS information system overarches a number of existing data sources and includes California Data Exchange Center data, California Levee Database, flood warning and alerts, forecasting processes, flood system documentation, forecasting models and notification processes, and reservoir operations tools and information. Since the flood data and Web GIS applications development for DWR are public domain, our team is positioned and empowered to provide great efficiency to acquire flood/storm data for the Kern IRWM Region and access to the FERIS Web GIS application. A sampling of GEI-developed are linked below:

- California Flood Risk Notification - Levee Flood Protection Zone http://gis.lfpz.water.ca.gov/
- California Flood Best Available Map - BAM Web Viewer http://gis.bam.water.ca.gov/
- Climate data http://arcgis02.geiconsultants.com/climate/

Deliverable: Technical Memorandum – Data Inventory

Data to be compiled will include:

- Demographics. Included are population and income by census tract (for disadvantaged community identification). Data sources include the Draft IRWMP, water supplier 2010 Urban Water Management Plans, the State Department of Finance, and the federal Department of Housing and Urban Development.
- Land Use. Included are parcel data, water source(s), use classification (e.g. agricultural, urban, open space, etc.), and crop type. Sources include Kern County Water Agency, County, and City land use agencies, the County Agricultural commissioner's office, UC Extension, and DWR.
- Water Supply and Demand. Included are surface and groundwater use, surface water contract data, historical deliveries and projected future

reliability, estimates of demand based on 2010 Urban Water Management Plans, and consumptive crop use estimates. Existing water level data will be incorporated and mapped as appropriate.

- Project Data. Proposed projects will be compiled and mapped on using GIS tools. Associated data to be compiled includes ownership, capital and operating costs, status of design, permitting and environmental documentation, and level of financing identified. The project data will also include an assessment of Statewide Priorities and Preferences.
- At the request of the Kern RWMG, we will also develop web-based project submission tools for project proponents to post and update project descriptions and technical information.

We will also produce a user's manual for the data management system that will completely document data entry, analysis, and system management. The user's manual will allow the Kern RWMG to continue to use the data management tools long after the consultant contract is finished.

## 2.2 UPDATE PLAN TO MEET EVOLVING IRWM PROGRAM REQUIREMENTS

The development of IRWM plans is an ongoing and evolutionary process. The California DWR has issued three sets of new guidelines with IRWMP criteria in the last seven years. In addition, new information, defined needs, and conditions within regions will drive changes to existing plans after adoption. Based on the work in Task 1.2, IRWMP Program Tracking and Information, we will have identified specific requirements for updating or amending the Kern IRWMP.

This task generally describes the process to 1) update existing sections or 2) develop new sections. The new sections may be the result of additional analysis conducted in Task 3 to meet requirements. Where these other analysis or services are required, it is anticipated that stand alone and more detailed deliverables would be prepared as Technical Memorandums or Report, and that these would be summarized in this task and used to prepare new sections of the IRWMP so that the information is understandable to laypersons and stakeholders. Such stand alone technical reports would be appendices to the IRWMP. All would be available on the Kern IRWMP Website.

GEI/B-E will update sections of the plan to address changing criteria and/or new information as potential updates are identified and as directed by the Executive Committee/RWMG in final task orders or revisions to the Scope of Work. The timing of major changes is important so as to balance efficiency with meeting deadlines associated with the IRWM grant process. As part of this process, GEI/B-E will prepare supporting documentation to assist individual RWMG agencies in any formal action associated with updates.

Generally, the work flow to update the IRWMP Sections or produce new sections would be:

1. Define Requirements and Objective - provide peer review of the existing document against the revised DWR standard or requirements as they are available.
2. Define Scope
    a. Identify data inputs, analysis requirements (tools and techniques) required to meet the standard or requirement, and outputs/deliverables
    b. Outline of the deliverable whether updated section, new section, or technical report, including list of figures maps and tales
    c. Define tasks and sequence
    d. Develop schedule
    e. Identify and commit resources/staffing
    f. Cost estimate
    g. Confirm review and communications requirements
3. Review and approve scope by Executive Committee
4. Conduct Work
5. Provide internal Quality Control/Quality Assurance
6. Prepare Draft Section
7. Review Draft Section with Executive Committee or specific work group
8. Prepare Final Draft Section - Review by RWMG
9. Incorporate Final Section into the Kern IRWMP

Deliverables: Deliverables include draft and final sections of the IRWMP.

As formal changes to the Plan are contemplated by the RWMG, we will consult with DWR to assure that the changes meet the relevant criteria and otherwise address the issues intended. This informal consultation expedites both the Plan revision process and development of related projects.

Based on our long experience in the area, GEI has full knowledge of the water resources, flood risk and climate change issues relevant to the Kern Region. We will apply this understanding to assist in the identification and development of projects that will address IRWM Plan objectives. We anticipate the important factors in project will include:

- Agricultural quantity, quality and reliability needs
- Urban quantity, quality and reliability needs
- Groundwater banking
- Flood risk management
- Environmental enhancement while managing adverse impacts
- Climate change risk management

GEI technical support will be provided as needed to support project development. Our support will be tailored to assist in development of projects that address IRWM plan objectives and have the greatest potential for funding. As the new IRWM

requirements are unknown at this time, we have allocated approximately 150 hours for these updates.

## 2.3 MANAGEMENT OF IRWMP PROJECT INFORMATION

Development of projects to meet regional objectives is essential to obtain maximum benefits from Implementation Grants. Because of the number and scope of potential projects, management of project related data is essential. GEI/B-E will collect, maintain, and, as appropriate, update project information to track development of projects, facilitate RWMG decision making, and expedite preparation of grant applications.

We will implement the final online Kern IRWMP Project Information Submittal and Review System. It is anticipated that the basic requirements or potential functions will include:

- Systems administration capabilities to assign access to specific information, reporting functions, and to manage other systems privileges based on user type (General User, Project Sponsor, Reviewer, Public, Systems Administrator, Analyst, etc.). Access to information and the ability to change information will be specific to the user and will be password protected.

Those project sponsors with limited internet access, will be able to submit hard copy or Adobe Acrobat forms. As part of the data management system discussed in Task 2.1, GEI/B-E will use or modify project data forms to simplify the process of submitting and managing information as projects evolve. The forms will be tailored to:

- Acquire and track project description information
- Track essential relationships to IRWMP, particularly meeting regional objectives
- Promote and track project evolution including engineering development
- Provide framework for prioritization of projects for grant submittal
- Identify grant opportunities and coordinate project proponents with opportunities

GEI/B-E will employ the following approach to gathering and maintaining project information:

- Develop straightforward project information format
- Structured data acquisition to accommodate increasing detail during project development
- Incorporate into overall IRWM database

Deliverables: The deliverables include:

- Collect and compile Kern IRWMP Project Information Submittal forms
- Develop detailed and summary project reports, which include maps of project locations and facilities, project schedules, and projects budgets
- Develop reports to support reviewers during evaluation

### 2.4 PROVIDE TECHNICAL SUPPORT TO AGENCIES FOR ENGINEERING AND ENVIRONMENTAL REVIEW

Some projects included in the Kern IRWM plan are well defined, with sound cost estimates, documented feasibility and, perhaps, current environmental documentation. For others that need additional information, the GEI/B-E team can prepare high-level estimates and limited impact analysis estimates for those projects to allow them to proceed in the filtering and prioritization. The GEI/B-E team will be prepared to update cost estimates for inflation, if necessary, so that a uniform cost basis can be maintained for later comparison between projects.

Deliverables:

As part of our management of project information GEI will provide the RWMG the following deliverables:

- Web-based project submission tools for project proponents to post and update project descriptions and technical information
- Project data forms to simplify the process of submitting and managing information as projects evolve
- As directed, project facilities locations posted on the Kern IRWMP website
- Draft criteria for RWMG consideration in prioritizing projects
- As requested, updated cost estimates for selected projects to account for inflation
- High-level estimates and limited impact analysis estimates for selected projects as requested by the RWMG

## 3.0 Other Duties

*Provide written descriptions of the duties to be performed and associated costs for Executive Committee approval. Complete approved duties.*

Some projects included in the Kern IRWM plan are well defined, with sound cost estimates, documented feasibility and, perhaps, current environmental documentation. For others that need additional information, the GEI/B-E Team can prepare high-level estimates and limited impact analysis estimates for those projects to allow them to proceed in the filtering and prioritization process, and

inclusion in grant applications. The GEI/B-E Team will be prepared to update cost estimates for inflation, if necessary, so that a uniform cost basis can be maintained for later comparison between projects. The GEI/B-E Team is also prepared to develop planning and implementation grant applications.

The objective for this Task is to bring priority projects up to a feasibility level of design and environmental documentation to position them for implementation grant funding. Additional projects identified as flood management efforts will be incorporated into the Plan. The feasibility level of design will provide a more accurate cost estimate and allow rapid transition to final design, and the preliminary environmental impact screening will identify critical environmental or permitting issues without a costly environmental documentation effort.

## 3.1 SUPPLEMENTAL DESIGN SERVICES

In this Task, selected projects of critical importance will be upgraded to a feasibility level of design. The projects to be more fully developed will be determined in consultation with the Kern RWMG Project Manager. For each of the selected projects, the GEI/B-E team will lay out project facilities on a GIS base map, and develop reliable concept-level cost estimates as detailed below.

### 3.1.1 Develop facility descriptions and concept level facilities layout and mapping

For each of the projects, the GEI/B-E team will prepare a concept level design of diversion, conveyance, recharge, and other facilities. The concept level design will include adequate detail to prepare a reliable estimate of costs and environmental impacts. This will include mapping of turnouts and conveyance routes, selection of pipeline materials and diameters, footprint requirements of flood management structures, pumping and energy dissipation requirements, metering, enumeration of crossings of transportation, watercourse, and major utility lines, land requirements, and promising locations of in-lieu and direct recharge sites. The design will be overlaid on the GIS base map for subsequent fatal flaw and surrogate environmental analysis.

### 3.1.2 Describe facility operation and maintenance

For this Task, we will determine water availability or surplus, how availability of reservoir and recharge facility capacity would be determined, and how responsibilities and coordination for operation of the various facilities would be determined. Descriptions of potential groundwater banking operations will be included, if such operations are included in the project descriptions. The magnitude and frequency of operations will allow assessment of O&M costs.

### 3.1.3 Provide concept level estimates of capital, operating, maintenance, and power costs

Based on the facility layout, water availability, and operations descriptions developed in the above Tasks, we will produce estimates of all identifiable cost factors,

including capital, operating, maintenance, power, and environmental mitigation costs. Potential revenues from groundwater banking operations will be included, if such operations are included in the project descriptions.

### 3.1.4 Develop qualitative comparisons of construction and implementation requirements including permits, land purchase, rights-of-way, etc.

For this Task, we will group common elements and their associated implementation requirements, and perform a critical path analysis to determine the likely on-line data, to determine whether early implementation of elements is possible, and to guide development and acquisition of the water right permits.

### 3.1.5 Evaluate the potential to integrate proposed Project facilities with other ongoing projects and diversions

For this Task, we will evaluate the compatibility, conflicts, and synergies of Project facilities and other existing, planned, or contemplated water supply facilities. We will consider integration of a greater breadth of water resources problems and solutions, including flooding from streams and storm drainage systems, floodplain restrictions, storm drainage and wastewater discharge restrictions, ecosystem preservation and restoration needs, fish passage, associated recreation opportunities, water-related energy use and production, land use planning, sustainable water supply and demand balance, and aquifer protection.

This analysis will be performed using available information on the timing, quantities, and implementation dates. Water supply opportunities will be assessed on a monthly or seasonal basis, as data warrants.

## 3.2 ENVIRONMENTAL SERVICES

In this Task, preliminary surrogate environmental analysis will be performed. It is assumed that additional environmental analysis will be conducted at a project level before implementing any significant construction activity.

### 3.2.1 Surrogate Environmental Analysis

The evaluation of projects conducted under Subtask 3.1will synthesize the results of the engineering studies, constraints analysis and preliminary surveys available. The requirements of NEPA, CEQA, Section 404 Clean Water Act, National Historic Preservation Act Section 106, and state and federal endangered species will be factored into the development of screening criteria and the design of the process. This will reduce the cost and allow for production of the information in formats that support the specific permits or environmental documentation requirements.

The GEI/B-E team will conduct a planning-level surrogate environmental analysis of the projects developed in Task 3.1 One of the goals of this task is to reduce the cost and allow for production of information in formats that support specific permits or environmental documentation requirements. For this reason, we recommend evaluating each resource that must be assessed for CEQA compliance

(aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology/soils, hazards and hazardous materials, hydrology/water quality, land use/planning, mineral resources, noise, population/housing, public services, recreation, transportation/traffic, utilities/service systems).

The steps in developing this analysis will be as follows:

1. Define Performance Measures – The Performance Measures developed in the IRWMP process will provide a set of indicators that can be used to help assess potential environmental impacts. We recommend having performance measures for each resource area; although a given performance measure may cover more than one resource. For example, it may be possible to assess geology, soils and mineral resources together under one performance measure.

2. Select Measurement Standard – Each performance measure will be rated using a quantitative assessment for each project. Where a quantitative measure is not available, a qualitative assessment is made based on judgment or a reasoned understanding of likely effects.

3. Select Data – The ranking process will use existing available databases, combined with a general site survey. We will be able to quickly and efficiently gather the available data in its most current form for application to the environmental review.

4. Overlay Projects with Resource Data – Potential project impacts will be assessed through review of the available data. Much of this analysis will be conducted through the use of GIS mapping.

5. Assess Results – The results of the overlay will be reviewed and a narrative summary of the results will be prepared. Where appropriate, a quantitative analysis will be prepared as well, showing such metrics as the number of acres impacted by each project or the number of miles of roads needed for access or the population within a specified distance. The results will be summarized in a ranking (high, medium, or low) of each project for each resource area. These rankings can be used to compare the relative environmental impact of each project..

6. Evaluate Potential Mitigation Measures – The primary goal of mitigation measures is to reduce or eliminate environmental impacts, while still meeting the goals of the project. Potential mitigation measures will be developed for each environmental impact to the extent that mitigation is feasible.

7. Assess the Potential for Significant Impacts – Not all environmental impacts are considered significant. We will develop a narrative summary of those impacts that have the potential to rise to the level of significance as defined in CEQA.

8. Review Permitting Challenges – The proposed projects will need a variety of federal, state, and local permits. We will first review the projects to assess the permits that are likely to be required. Then, based on the results of the surrogate environmental analysis, we will assess the level of difficulty that may be encountered during the permitting phase.

### 3.2.2 Environmental Justice Review

IRWMP projects will affect stakeholders throughout the region. For this Task, an environmental justice review will seek to identify and prevent disproportionate impacts to underrepresented or disadvantaged communities and develop strategies to avoid such impacts.

## 3.3 PLANNING GRANT APPLICATIONS

GEI/Bookman-Edmonston has prepared several DWR Planning Grant applications with a high level of success, as detailed in Organization Informational section of this proposal. Our understanding of the grant process coupled with knowledge gained through the Program Management responsibilities provide the Kern RWMG with an opportunity to offset a portion of Plan costs. In this supplemental task, we will work with RWMG members the Executive Committee and IRWMP consultants to develop all required exhibits and attachments, and submit the complete application to DWR. A level of effort estimate based on similar Planning Grant applications is included in our cost proposal as a supplemental task.

Deliverables: A complete DWR Proposition 84 Planning Grant application, including all attachments and submittal to DWR.

## 3.4 IMPLEMENTATION GRANT APPLICATIONS

GEI/B-E has also prepared several successful DWR Implementation Grant applications, as detailed in the Organizational Information section of this proposal. The knowledge and insights developed in managing the Kern IRWMP will allow GEI/B-E to efficiently work with stakeholders, the Executive Committee, IRWMP consultants and project proponents to describe projects ready for implementation and prepare the complete DWR Implementation Grant application. The level of effort required to assemble and submit the Implementation Grant application will depend in large part on the number and complexity of the projects to be included. The level of work estimate included in our cost proposal as a supplemental task includes approximately 530 hours as representative approximation of the cost of including three to four projects in the grant application.

Deliverables: A complete DWR Proposition 84 Implementation Grant application, including all attachments and submittal to DWR.

*Deliverables*: For 3.1 -3.4, technical memoranda containing concept-level layout of alternatives in sufficient detail to produce a reliable cost estimate and environmental assessment; planning-level cost estimates for each project; planning-level surrogate environmental analysis; environmental justice review.

# Cost Estimate
## Kern County IRWM Plan Management Services
### GEI Consultants / Bookman-Edmonston

### LABOR AND INDIRECT COSTS

| | | Grade 7 Principal Engineer QA/QC Manager | Grade 8 Principal Engineer Senior Advisor | Grade 7 Managing Engineer Project Manager, Outreach Manager | Grade 6 Senior Engineer Flood Control Engineer | Grade 5 Senior Engineer, Hydrogeologist Environmental Scientist, Climate Scientist | Grade 5 Senior Administration Fiscal Manager | Grade 3 Associate Engineer Water Mangement Specialist | Grade 3 Staff Engineer Design Engineer | Grade 2 GIS, Staff Engineer GIS Specialist, Web Development Specialist | Grade 1 Staff Engineer Design Engineer | Admin Administration Adminstrative Specialist | B-E Labor Subtotal | | B-E Indirect Costs[3] | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **CORE PROJECT TASKS** | $211 | $237 | $211 | $178 | $156 | $156 | $118 | $118 | $108 | $97 | $87 | Hours | Cost | | |
| 1 | **KERN IRWMP MANAGEMENT** | | | | | | | | | | | | | | | |
| | **Task 1.1 - Meeting Coordination** | **-** | **-** | **176** | **-** | **-** | **-** | **64** | **-** | **-** | **-** | **112** | **352** | **$54,432** | **$1,000** | **$55,432** |
| | Subtask 1.1.1 - Meeting Preparation and Summaries | - | - | *128* | - | - | - | *16* | - | - | - | *64* | *208* | *$34,464* | *$500* | *$34,964* |
| | Subtask 1.1.2 - Conduct Meetings | - | - | *48* | - | - | - | *48* | - | - | - | *48* | *144* | *$19,968* | *$500* | *$20,468* |
| | **Task 1.2 - IRWMP Program Information** | **2** | **2** | **40** | **-** | **30** | **-** | **-** | **-** | **15** | **-** | **-** | **89** | **$15,636** | **$0** | **$15,636** |
| | **Task 1.3 - Website Management** | **2** | **2** | **16** | **-** | **16** | **-** | **-** | **-** | **32** | **-** | **8** | **76** | **$10,920** | **$250** | **$11,170** |
| | **Task 1.4 - Invoicing and Administration** | **2** | **-** | **28** | **-** | **-** | **16** | **-** | **-** | **-** | **-** | **12** | **58** | **$9,870** | **$500** | **$10,370** |
| | **TASK 1 SUBTOTAL** | **6** | **4** | **260** | **-** | **46** | **16** | **64** | **-** | **47** | **-** | **132** | **575** | **$90,858** | **$1,750** | **$92,608** |
| 2 | **PLAN MANAGEMENT AND UPDATES** | | | | | | | | | | | | | | | |
| | **Task 2.1 - Data Collection and Management** | **4** | **2** | **10** | **-** | **40** | **-** | **130** | **-** | **30** | **-** | **-** | **216** | **$28,248** | **$250** | **$28,498** |
| | **Task 2.2 - Plan Updates and Additions** | **4** | **2** | **20** | **-** | **75** | **-** | **40** | **-** | **10** | **-** | **-** | **151** | **$23,038** | **$250** | **$23,288** |
| | **Task 2.3 - Project Submission** | **8** | **4** | **20** | **-** | **40** | **10** | **40** | **-** | **-** | **-** | **20** | **142** | **$21,116** | **$1,000** | **$22,116** |
| | **TASK 2 SUBTOTAL** | **16** | **8** | **50** | **-** | **155** | **10** | **210** | **-** | **40** | **-** | **20** | **509** | **$72,402** | **$1,500** | **$73,902** |
| | **Estimated Labor Hours** | **22** | **12** | **310** | **-** | **201** | **26** | **274** | | **87** | **-** | **152** | **1,084** | | | |
| | **SUBTOTAL CORE PROJECT COSTS** | **$4,642** | **$2,844** | **$65,410** | **$0** | **$31,356** | **$4,056** | **$32,332** | | **$9,396** | **$0** | **$13,224** | | **$163,260** | **$3,250** | **$166,510** |
| 3 | **OTHER DUTIES / SPECIAL STUDIES** | | | | | | | | | | | | | | | |
| | **Task 3.1 - Supplemental Design Services** | **4** | **4** | **60** | **-** | **200** | **-** | **45** | **25** | **-** | **35** | **40** | **413** | **$60,787** | **$0** | **$60,787** |
| | **Task 3.2 - Environmental Services** | **4** | **4** | **20** | **-** | **120** | **-** | **30** | **-** | **15** | **-** | **20** | **213** | **$31,632** | **$0** | **$31,632** |
| | **Task 3.3 - Planning Grant Application** | **4** | **4** | **40** | **-** | **140** | **20** | **75** | **-** | **8** | **-** | **40** | **331** | **$48,386** | **$3,000** | **$51,386** |
| | **Task 3.4 - Implementation Grant Application** | **4** | **4** | **80** | **20** | **200** | **20** | **130** | **-** | **20** | **10** | **40** | **528** | **$78,502** | **$3,000** | **$81,502** |

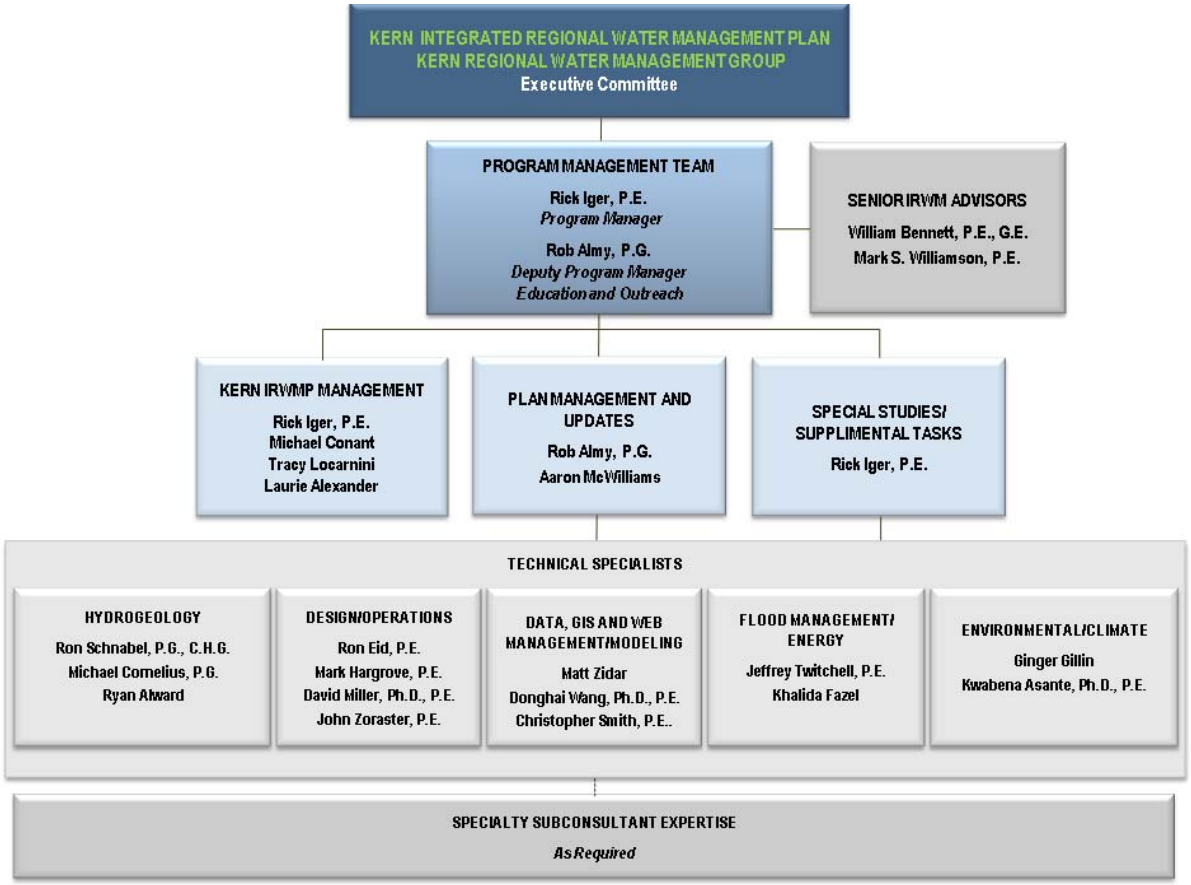
**Notes**

[1] Estimate based on holding 6 - Executive Committee Meetings, 4 - Facility Committee Meetings, and 6 - Development Meetings (as needed). Total of 16 meetings.

[3] Indirect Costs include lodging, meals, mileage, telephone, facsimile transmission, photocopying and blueprinting service expenses.

# Professional Team

Figure 1: Program Organization




***Rick Iger, P.E., Project Manager***

Mr. Iger is a registered civil engineer with 34 years of experience in water resources engineering projects. He has been managing project development and studies similar to those in the Kern IRWMP for the past twenty years. He completed DWR's cost benefit and water yield analyses for the successful Poso Creek IRWMP Proposition 84 application. Rick has also provided the water conservation yield and benefits analyses on several Bureau of Reclamation WaterSMART grant applications. Mr. Iger also led the effort to develop the 2010 Regional Urban Water Management Plan for the Greater Tehachapi Area, as well as participated in the review and data gathering for the Kern County Water Agency Improvement District 4, 2005 Urban Water Management Plan.

Mr. Iger is an expert in planning and evaluating short-term and long-term water supply projects; developing agreements with project participants and surrounding entities; implementing recharge and recovery projects; administering construction loans and grants from DWR; monitoring and reporting groundwater basin quality and water levels; tracking and coordinating recharge and recovery deliveries; maintaining and improving flood control projects; managing 2,300 acres of irrigated farmland used for spreading basins; preparing environmental documents; and preparing reports documenting groundwater conditions, stored water accounts, and with and without groundwater banking impacts. Prior to joining GEI/B-E, Mr. Iger worked for the Kern County Water Agency where he helped develop and operate the Kern Water Bank, the Kern County Water Agency's Thomas N. Clark (Pioneer) Groundwater Recharge and Banking Project, and the Berrenda Mesa Joint Water Banking Project, and has been responsible for groundwater monitoring and reporting for the Banking Projects as well as for the entire County of Kern. He has assisted the County of Kern in writing water well, groundwater export, and floodplain ordinances, and participated on land use planning committees coordinating long range visions for sustainable growth in Kern County.

***Robert Almy, P.G., Deputy Project Manager, Education and Outreach***

Qualifications: Robert Almy is a professional geologist with 25 years of water resources and coastal development experience. His experience includes managing water resources planning and development projects, groundwater investigations, creating a storm water quality program, establishing integrated regional water management, obtaining major grants for a wide range of water related projects, teaching UC Extension Short Courses and permitting and environmental review for offshore petroleum development.

Mr. Almy conceived and led development of the Santa Barbara IRWM Plan as Manager of the Santa Barbara County Water Agency. Now with GEI/B-E, he recently served as the project manager responsible for the preparation of revisions to the Santa Barbara County IRWMP to meet the requirements of Propositions 84 and 1E. This IRWMP incorporates a broad range of water supply reliability, ecosystem restoration, and flood management strategies to address both long-term objectives and emerging issues. Mr. Almy was instrumental in obtaining a grant to update the IRWM Plan as well as two grants totaling $27 million to implement projects in the Region. Included in these implementation Grants were projects directly benefiting for four disadvantaged communities that will address a range of water supply, water quality and efficiency concerns. Mr. Almy is currently part of the team updating t he IRWMP under the direction of a regional water management group (Cooperating Partners) that comprises over 20 public agencies with land and water management responsibilities, local stakeholders, and interested parties.

***Aaron McWilliams, Staff Engineer, Technical Support Manager***

Mr. McWilliams has almost a decade of experience in planning and design of water resource and conveyance system projects. His expertise includes the design of water distribution systems; hydrologic and hydraulic design and analysis; sewer system/lift station design and analysis; storm water conveyance systems, and floodplain modeling and analysis.

In addition to his design experience, he also provides planning services including the development of regional water management plans, master plans, and grant writing; report preparation for client, city, and county agencies; and residential, commercial, and industrial construction plan preparation. Mr. McWilliams is also proficient in AutoCAD with Civil 3D exposure, RiverCAD/HEC-RAS, WaterCAD, StormCAD, SewerCAD, and Hydraflow Utilities.

***Michael Conant, Staff Engineer, Technical Support***

Michael Conant has performed general engineering work that has involved performing analysis on watershed runoff characteristics, data QA/QC, producing plans and using AutoCAD. His special interests are in geotechnical and water resources engineering.

His experience with the California Department of Water Resources includes assisting with modeling watershed runoff for several river basins to better predict the watershed's response to hydrologic conditions. His work included research on available modeling programs and procedures, and preparation of data to be input into modeling programs. He has also performed cost analysis for project, project site plans and details, and site feasibility research for the department's Delta Flood Emergency Preparedness, Response, and Recovery Project.

***Tracy Locarnini, Regional Operations Administrator***

Tracy Locarnini is the Regional Operations Administrator with over 27 years of experience in administration. Tracy has worked more than 16 years in the Bakersfield office of GEI Consultants, Inc., Bookman-Edmonston Division. Tracy's duties include, but are not limited to, project support, Regional Health and Safety Officer, fleet management, facilities management, function organization, marketing support and administrative supervision. In her role as project support administrator, she has worked on numerous Kern County projects as wells as other project throughout the state.

***Laurie Alexander, Administrative Support***

Laurie Alexander is an Administrative Assistant with over 11 years of experience. Laurie has worked in the Bakersfield office of GEI/B-E for over 4 years. Laurie's duties and talents include spreadsheet and database creation, report and document preparation, graphic design, travel coordination, meeting and event planning, document design, and manages a multi-line phone system.

## SENIOR ADVISORS

***Mark S. Williamson, P.E.***

Mr. Williamson is a registered civil engineer with 30 years of experience in the public and private sectors. He has provided civil engineering expertise in numerous aspects of water resources, including hydroelectric, water supply, design, construction management, water distribution system modeling, dam safety, surface and groundwater hydrology, flood control, and project management. His entire career has been devoted to resolving disputes and developing solutions for California water supply agencies.

Mr. Williamson holds degrees in civil engineering with a water resources emphasis from U.C. Berkeley and the University of Washington and has studied water and environmental law. He is an expert analyst and skilled communicator. He has had long-term assignments developing cooperative regional partnerships in the San Joaquin Valley and Mojave River Basin as the lead for the Integrated Regional Water Management Plans (IRWMPs) for these areas. Mr. Williamson was the principal author of the Mojave Water Agency's Future Water Supply Study, a comprehensive analysis of supplemental supply options that included an in-depth analysis of the California Aqueduct conveyance capacity under a changing regulatory climate. This study led to a permanent transfer of 14,000 acre-feet per year.

Mr. Williamson led the development of an IRWMP for the Northeastern San Joaquin County Groundwater Banking Authority and served as project manager for the feasibility design study for the San Joaquin County Freeport Element.

Mr. Williamson has a broad view of statewide water resource issues, including analysis and facilitation of water supply from the State Water Project and the Central Valley Project. He has modeled the State Water Project, the Central Valley Project, large regional groundwater basins in the Central Valley and high desert, and the Pacific Gas & Electric hydroelectric system. He also studied, modeled, and effected improvements to San Francisco's Hetch Hetchy project and the East Bay Municipal Utility District's conveyance systems. He has been a negotiator in numerous multi-party agreements including the EBMUD-Sacramento County agreement on use of the American River. This agreement led to the Freeport Regional Water Project, completed in 2010. Mr. Williamson has helped secure more than $60 million in grant funding for his clients.

***William J. Bennett, P.E., G.E, Principal Engineer***

Qualifications: Mr. Bennett is a registered professional engineer with 36 years of experience in water resources and geotechnical engineering. His experience includes managing water resources planning programs and planning organizations for the California Department of Water Resources, including more than 7 years as an Office Chief and Division Chief. His responsibilities included major California water programs, like the California Water Plan

Update and California's Water Use Efficiency (WUE) programs including agricultural and urban water conservation, desalination, and water recycling grants and technical assistance. In 2006, the WUE programs distributed more than $100 million in grant funding under his guidance, and administered the review of all the state's urban water management plans (UWMPs) submitted by urban water suppliers every five years.

At GEI/B-E, Mr. Bennett was the program manager on two major studies for the California Public Utilities Commission (CPUC) on water-energy. The $1.2 million studies provided a statewide embedded energy model and profiles 22 retail water supply and wastewater agencies across the state for use by the CPUC in analyzing the impacts of water on the state's energy picture. He also prepared the water use efficiency elements of the Upper Santa Ana IRWMP. He prepared three successful Proposition 50 Water Use Efficiency Step 1 grant proposals and reviewed or prepared Step 2 proposals for those submittals for Central Basin Municipal Water District, yielding $1.78 million in grant funding for the District's water use efficiency projects.

Mr. Bennett has extensive experience in collaborative planning and controversial, stakeholder resource management decision-making. For five years he served as 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. He served on the State's Shasta-Scott Coho Recovery Team and he participated in the Klamath Stakeholders Collaborative Sessions (Chadwick Workshops) on Klamath River Watershed issues. Other collaborative efforts were the San Clemente Dam stakeholder discussions, the Glen-Colusa Irrigation District Fish Screen Agency Team, and the Trinity River Task Force.

## ADDITIONAL STAFF EXPERTISE AVAILABLE FOR PLAN UPDATES OR ADDITIONS

***Matt Zidar***

Mr. Zidar has 24 years of water resources planning and management experience in both the private and public sector. He is currently the GEI/B-E project manager for the Imperial Irrigation District's IRWMP, and was the project manager for the Upper Kings Basin IRWMP, and a technical reviewer and consultant on the CABY IRWMP. The Kings IRWMP was developed for the Upper Kings River Water Forum, a consortium of the Kings River Conservation District, Fresno Irrigation District, Alta Irrigation District, Consolidated Irrigation District, Fresno County, and the cities overlying the Kings Groundwater Basin. The Kings IRWMP was designed to address overdraft of the groundwater basin by expanding and managing the available surface and groundwater supplies through conjunctive use, groundwater management, reclamation and reuse of wastewater, and other structural and non-structural management approaches. The Kings IRWMP also better integrates the

water supply and land use plans and the planning process to avoid conflicts between water users. Matt is expert in groundwater planning and management, CEQA/NEPA, regulatory compliance, city and county land use planning, nitrate/salinity management, agricultural and urban water use, and development and screen of alternatives.

***Michael Cornelius, PG***

Michael Cornelius is a professional geologist and civil engineer with 22 years of water resources consulting experience in California. His experience includes managing water resources planning and management projects, and groundwater investigations and modeling for local and regional projects. These projects typically included an extensive public outreach component with presentations to advisory and stakeholders groups, and coordinating with multi-discipline/multi- firm project teams.

Mr. Cornelius recent experience includes serving as the project manager for the Yuba County IRWMP which was completed in 2008, and supporting efforts to maintain and update the Plan since then. Also in 2008, Mr. Cornelius served as project manager for the preparation of the Paso Robles Groundwater Basin Water Banking Feasibility Study which investigated the feasibility of banking surplus State Water Project water in the Paso Robles Basin. In 2010, he completed the Paso Robles Basin Regional Groundwater Management Plan which was the first GMP for the region. Mr. Cornelius completed several other groundwater management planning projects and numerous regional groundwater modeling projects in support of regional water management planning efforts.

***Ginger Gillin***

Ms. Gillin has been a project manager or a project scientist on assignments involving environmental permitting; fish and wildlife planning; environmental documents preparation; hydroelectric relicensing; fish passage; instream flows; literature reviews; fisheries monitoring; highway, canal, and pipeline projects; and fisheries research. She has worked on aquatic environmental issues in the western U.S. for the last 27 years.

***Kwabena Asante, Ph.D., P.E.***

Kwabena Asante has a decade of experience in hydrology and climate science. He is thoroughly skilled in modeling complex natural and man-made systems with successful applications in water, climate, renewable energy, and natural hazards. He has a record of delivering on projects and long-term support contracts with public and private clients.

Mr. Asante has extensive experience with hydrology and water resources, climate risk management, optimization and policy analysis, GIS and remote sensing, SQL

and statistical analysis, engineering economics, project cost controls, and developing client relationships.

As GEI/B-E technical lead for climate change, Mr. Asante is working with the California State Climatologist to update the rainfall and runoff event frequency data used for engineering design in California to incorporate the effects of climate change. The project involves recovering historical rainfall, temperature, and runoff data from disparate sources; computing updated event frequency distributions; and merging the results with climate predictions from federal and state sources to project future changes in the state's hydro-climate. The results of the analysis will be accessible to public engineers and planners performing climate change impact assessments through the online California Data Exchange Center database. Mr. Asante's responsibilities on this project include prototyping data algorithms, supervising analysts developing software applications, documenting work, and reporting to the client through monthly progress reports and presentations. He also serves as a member of the Climate Thresholds Analysis Working Group, which is establishing guidelines for assessing the vulnerability of flood control infrastructure to climate change in California's Central Valley.

***Christopher Smith, P.E.***

Mr. Smith is a senior engineer with two decades of experience working with irrigation and special district clients as an engineer to conduct water resources management and feasibility studies, technical assessments and to develop regional groundwater and surface water simulation models used to analyze water supply projects throughout California and Arizona. He has conducted technical studies for the Yolo County Flood Control and Water Conservation District, Glenn-Colusa Irrigation District, North Kern Water Storage District, Yuba County Water Agency, Butte County Water District, and South San Joaquin Irrigation District.

His work included assessment of existing water supplies and historical demands, quantification of future demands, developing supply and demand assumptions, and configuring the models to evaluate and compare alternative structural and non-structural management solutions. Mr. Smith has worked in the public and private sector, in water resources planning, engineering, management, groundwater analysis, and groundwater remediation. He has managed and assisted in developing water supply and demand studies, basin management plans, water rights investigations, groundwater yield analyses, and impact analyses to meet CEQA and NEPA requirements. In addition, he has developed, calibrated, and applied numerical models-including IGSM, FEMFLOW, MODFLOW, and SANJASM and applied the use of geographic information systems (GIS) and database management systems (DBMS) to support water resource management projects.

With the Monterey County Water Resources Agency, Mr. Smith implemented agricultural and urban water conservation strategies in the Salinas Valley. Activities included calculating agricultural and urban water demand, enforcing a water use and

extraction reporting program, and conducting water use efficiency tests. Mr. Smith served as project engineer for the Salinas Valley Basin Management Plan and was responsible for analysis of management alternatives designed to stop seawater intrusion and balance the basin. He calculated availability of American River water to San Joaquin County as part of the Freeport Element study and associated water rights support.

***Mark Fortner, P.E., P.L.S.***

Mr. Fortner has 22 years of broad engineering and project management experience, which includes providing services to reclamation, flood control, and irrigation districts, water companies, large and small agricultural businesses, gravel operators, and state and county agencies.

Mr. Fortner's primary expertise is in the area of drainage systems, flood control, flood insurance studies, and flood protection planning. His regulatory permitting experience includes USACE Section 404 and Section 10, Reclamation Board, Reclamation Districts, County Use Permits, Regional Water Quality Boards, and U.S. Department of Fish and Game Streambed Alteration Permits. Specific work includes hydrologic and hydraulic modeling, design, and preparation of master plans and applications for reclamation districts, water districts, levees, and infrastructure works. Hydraulic analysis of rivers and streams for a variety of projects involving adjacent habitat impacts, jurisdictional waters, evaluation of historic gage data, calibration, and monitoring water levels for flood operations.

Mr. Fortner's responsibilities include representing clients' positions at various agency and organizational meetings, and coordinating environmental issues and environmental documents.

***John Zoraster, P.E.***

Mr. Zoraster holds degrees in both economics and engineering and has 30 years experience in water resources planning and public works, including planning and implementation of capital improvement programs, conjunctive use projects, municipal water supply, wastewater collection, recycled water, and flood control. He has participated in water resources planning efforts for federal agencies, irrigation districts, cities, municipal water districts, water storage districts and non-profit corporations. He has extensive experience with the transportation facilities of the State Water Project including contractual issues, available capacity, and proposed extensions.

Within the Coachella Valley, he has participated in investigations of flood control, golf course irrigation, farm irrigation, recycled water, and imported water supplies. Mr. Zoraster has been a key participant in a 50,000 acre-foot conjunctive use project in the Coachella Valley since its inception in 1999. He has been responsible for the preparation of planning reports for the project and assisted with the management of pipeline and pump station design. Presently, he is investigating the feasibility of

extending the existing distribution system. The project, when fully implemented, will facilitate conjunctive use of imported groundwater and recycled water on golf courses in lieu of groundwater. He has developed economic and financial analysis of proposed conveyance projects and capital improvement programs for municipalities and non-profit corporations. Mr. Zoraster prepared the project financing analysis for San Joaquin County's Freeport Element study

***Mark Hargrove, P.E.***

Mr. Hargrove has a decade of civil engineering design experience on water resources projects, including water conveyance pipelines, canals, and pumping plants. He was the GEI/B-E project engineer for the recently completed Mid-Valley Pipeline Project for the Coachella Valley Water District. Mr. Hargrove prepared the final design for a 92-cfs pump station, screened intake, wet well, surge protection facilities, pump mechanical facilities, civil, site, and yard piping design at the pumping plant site, prepared plans and specifications, reviewed shop drawing submittals, and provided interpretations of design documents. Mr. Hargrove also participated in the preliminary design for the treated water pump station for Contra Costa Water District's Multi-Purpose Pipeline Project, which included a 25-mgd pump station. He served as lead designer for the County's Freeport Element study.

***Ronald A. Schnabel, PG, C.H.G.***

Mr. Schnabel's experience includes surface water and groundwater-related investigations, reservoir seepage and dam safety investigations, artificial recharge projects for aquifer storage and recovery, and well design, construction, and testing. His regulatory experience includes environmental permitting, plans of operation, CEQA, and compliance. Mr. Schnabel has over 35 years of experience in geology, and a decade of experience as a hydrogeologist. He has a thorough understanding of geology and hydrogeology and extensive knowledge and experience in GIS, statistics, surface water measurement methods, geophysics, and geologic computer modeling. Mr. Schnabel led the recharge siting investigation for the County's Freeport Element study.

***Jeffrey E. Twitchell, P.E.***

Jeff Twitchell has more than three decades of project engineering and project management experience in the areas of flood control planning and design, environmental planning, permitting, constructing, and maintaining flood control and water resource facilities. Mr. Twitchell is experienced in working with regulatory agencies, flood control districts, water supply agencies, at the local, state, and federal levels in permitting and operating projects, inclusive of securing DWR FloodSAFE grant funding and reimbursement agreements, and other related state and federal entitlements. Mr. Twitchell is a member of the DWR FloodSAFE Urban Levee Design Criteria Work Group, a

member of the Lower Sacramento Basin Work Group providing input to the Central Valley Flood Protection Plan, and an active member of Integrated Flood Management work group for the Lower Feather River Corridor Management Plan. He has served as a project manager and resident engineer on a wide variety of public works and private development projects, including eco-restoration projects.

***David Miller, P.E., Ph.D.***

David Miller has 25 years of water resource engineering experience in urban and agricultural water conservation, management of tailwater and agricultural drainage systems, and in irrigation and water management for urban and agricultural uses. He has worked with both urban and agricultural districts in conducting water supply and conservation studies, developing conservation plans pursuant to California or Central Valley Project requirements, and implementing conservation projects.

Dr. Miller's experience includes extensive and detailed cost/benefit analyses for projects he worked on overseas for the World Bank Organization and Asian Development Bank. He worked with the Northern California Water Association on the Sacramento Valley IRWMP and helped urban and agricultural agencies throughout the Sacramento Valley to prioritize and integrate projects; and for the Stevinson Water District Agricultural Drainage Control Project he helped to develop an enhanced wetland system for storage, treatment, and controlled release of agricultural drainage and stormwater. He performed cost/benefit analyses for these applications.

Other representative projects include working with the Placer County Water Agency to develop funding for a demonstration and education center to promote water conservation for landscaping in foothill areas of California; the City of Woodland to modernize and automate irrigation controls throughout the city's park system; the Oakdale Irrigation District Tailwater Recovery Project to conserve water and to control runoff from irrigated fields by capturing runoff from fields; Semitropic Water Storage District Water Management Plan to prepare the Agricultural Water Management Plan; and Stevinson Water District's Integrated Water Management Plan for water recycling and conservation, salinity control, water table management, management of flood waters, creation of wetlands to control non-point source discharges, and generation of water for transfers.

## MANPOWER PLAN

The firm's strategy to staff the plan is presented below. It is expected that the need for GEI/B-E specialty expertise will rise and fall as the project progresses – time allocations are thus expressed as a range. The availability of key personnel including the Project Manager and Deputy Project Manager are guaranteed for the duration of this priority project. GEI/B-E tracks time usage on a weekly basis, which provides an accurate portrayal of time available for new projects. Generally key staff

members are typically used about 50 percent of the time on direct client work and the other 50 percent on marketing. If awarded this contract less marketing will be done by the key staff chosen to work for this contract.

Table 1: Table of Organization

| Staff Name | Role | Time Proposed |
|---|---|---|
| Rick Iger | Program Manager | 30-50% |
| Robert Almy | Deputy Program Manager | 15-30% |
| Mark S. Williamson | Senior Advisor | Up to 30% as needed |
| William J. Bennett | Senior Advisor | Up to 30% as needed |
| Michael Cornelius | Hydrogeology | Up to 30% as needed |
| Ronald Schnabel | Hydrogeology | Up to 50% as needed |
| Dr. Donghai Wang | Data Management | Up to 30% as needed |
| Christopher Smith | Modeling Support | Up to 50% as needed |
| Matt Zidar | Data/Web Mgmt. | Up to 30% as needed |
| Jeffery Twitchell | Flood Management/Energy | Up to 30% as needed |
| Dr. David Miller | Agricultural Engineering | Up to 30% as needed |
| Michael Conant | Staff Engineer | 30-50% |
| Aaron McWilliams | Staff Engineer | 30-50% |
| Tracy Locarnini | Invoices and Dues | 10% |
| Laurie Alexander | Administrative Support | 20-30% |

Table 2: References

| Name | Reference 1 | Reference 2 | Reference 3 |
|---|---|---|---|
| Rick Iger | John Martin<br>Tehachapi Cummings County Water District<br>661.822.5504 Ext. 2010 | Dana Munn<br>North Kern Water Storage District<br>661.393.2696 | Will Boschman<br>Semitropic Water Storage District<br>661.758.5113 |
| Robert Almy | Matt Naftaly, Manager, Santa Barbara County Water Agency<br>805.568.3542 | William Brennan, Former Director, Central Coast Water Authority<br>805.688.2292 Ext 215 | Rick Sweet, Public Works Director, City of Santa Maria<br>805.925.0951<br><br>Richard Quant<br>Growers Shippers Assn.<br>805.343.2215 |

# Understanding and Approach

GEI/B-E can serve as program manager for several roles to take the Kern IRWP to the implementable level. As program manager we would act as adjunct staff to the Executive Committee and RWMG to support the other stakeholder staff, taking the lead on scoping, scheduling, contract and subcontractor management, and providing logistical support. We have also served as project manager to undertake the entire planning, management, engineering analysis role and prepare final documents. As a result of our relationship with DWR and experience on many IRWMPs, we have a clear understanding of what is necessary to prepare the IRWMP, and successful grant applications, and to facilitate the stakeholder process. The following describes the approach the GEI/B-E team will take to keep the Kern IRWMP up to date and the projects therein ready to implement.

We have been involved with the Kern IRWM process and understand the progress made by the RWMG and the challenges that remain. Because the Draft Kern IRWM Plan is under review, we recognize that the scope of work may need to be refined. However, as discussed in Tasks 1 and 2 we are able to define the key elements of the required program management services. We understand that the agencies involved in the RWMG will engage a contractor to perform program support services now provided by one or more agencies. We understand the program support services need to be delivered so as to satisfy the RWMG agreements, individual agency accounting and decision-making procedures as well as address the expectations of DWR and the IRWM stakeholders.

Because our role would be bring a wide array of stakeholders together while managing a broad and complex process, we will need to provide more than technical services. To that end the GEI/B-E team sees its program management role as follows:

## Program Managers

We bring extensive program management experience, specifically relating to successful development of IRWM Plans and related projects. Our Managers include individuals who have developed IRWM Plans and related projects under contracts for public agencies as well as individuals who have managed regional water agencies throughout formation and implementation of IRWM Programs. As a result, the GEI/B-E team understands both the program management needs of the RWMG and has also successfully delivered administrative and organizational services to efficiently develop IRWM Plans and maintain their utility.

## Conveners

We will organize meetings, distribute materials, conduct or facilitate the meetings, produce meeting notes, maintain the website, produce invoicing and accounting, and maintain mailing lists.

### Integrators

We bring a fresh perspective on solutions to the regions needs. We understand the needs of agriculture, large cities, and small communities and rural areas. We have demonstrated experience brining these interests together to meet their needs cooperatively. We will work to identify common needs and propose solutions that can bring the parties together. We will look for broad and multi regional solutions to meet flood management, land use planning, climate change, and DAC needs that also provide environmental, recreational and other values. We bring a team of experienced IRWM project managers that have experienced what works first hand, and will explore with key local interests the best ideas to meet the Kern Region's needs. We have an intimate understanding of local, State and Federal project operations and will apply that knowledge to development of both IRWM objectives and projects.

### Advocates

We believe Kern is the statewide leader in conjunctive management. We will emphasize the importance of Kern and many of its proposed projects as a key to statewide water management interconnection.

### Facilitators

We have an intimate, comprehensive knowledge of Kern County water issues and needs. We have a vision that extends beyond district boundaries. We will help the community work together through frequent communication, small group meetings, focused technical analysis, and sharing of information. We believe in open, transparent processes with complete and open access to information. We will ensure that unbiased prioritization criteria are developed and applied.

### Visionaries

We will keep the group focused on the overall goals of improving water supply, cooperative governance, and minimizing costs. We will develop strategies targeting Statewide Priorities and Preferences, and to develop projects with economies of scale. We will frequently check Plan progress against grant criteria to maximize Kern's chances of outside funding.

### Capable Team

In addition to the Program Management work described in The Scope of Work, (Tasks 1 and 2), GEI/B-E has extensive experience in identifying, defining, and developing projects for grant applications. We have successfully developed projects for over $168 million in IRWM Implementation Grants. Relevant service capabilities include:

- Conceptual engineering design
- Preliminary environmental scoping and final environmental review
- Evaluation of engineering alternatives

- Value engineering
- Final design and bid package preparation
- Contract administration and construction management
- Coordination and reporting of biological and cultural surveys, and compliance monitoring
- Grant administration and coordination with State and Federal Agencies

GEI/B-E will bring its capabilities and experience to the Kern IRWM process through effective and adaptive program management that is based on our understating of the IRWM process and the needs of local agencies, close communication with the RWMG, maintenance of up to date information and timely delivery of additional support services.

# Local Knowledge

GEI/B-E's familiarity with the Kern IRWMP region and regional water management, including regional objectives, and infrastructure, is unsurpassed in the consulting community. Mr. Iger's 34 years of experience in water management and flood management in Kern County provides a unique advantage to GEI/B-E to understand the needs and priorities of the Kern IRWMP. Through his career, Mr. Iger has developed working relationships with most of the Executive Committee members.

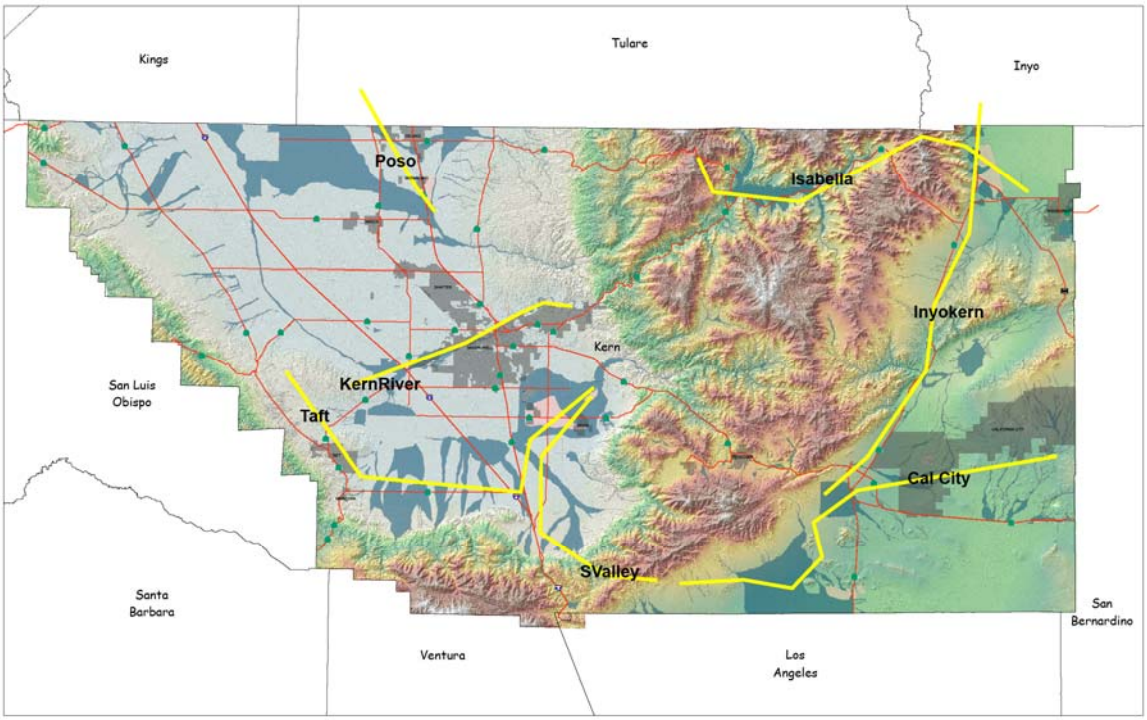



Figure 2: Kern County Floodplains

Mr. Iger is supplemented by staff with as much local experience on Kern River issues and who have participated in the creation of earlier water management reports, most notably, the Report on Investigation of Optimization and Enhancement of Water Supplies of Kern County Report completed in 1983. The Optimization Report, which was a joint effort of several consulting firms was lead by Bookman-Edmonston and resulted in a compilation of water district supplies and demands and created a list of projects many of which have been constructed and some of which are in the current IRWMP, awaiting funding opportunities.

Even after his retirement from Kern County Water Agency, Mr. Iger continues to participate in ACWA Committees dealing with groundwater and other water

management planning, participates in DWR and Water Education Foundation workshops and most recently lead a team helping DWR to gather flood management and flood risk information for several central valley and desert counties in California.

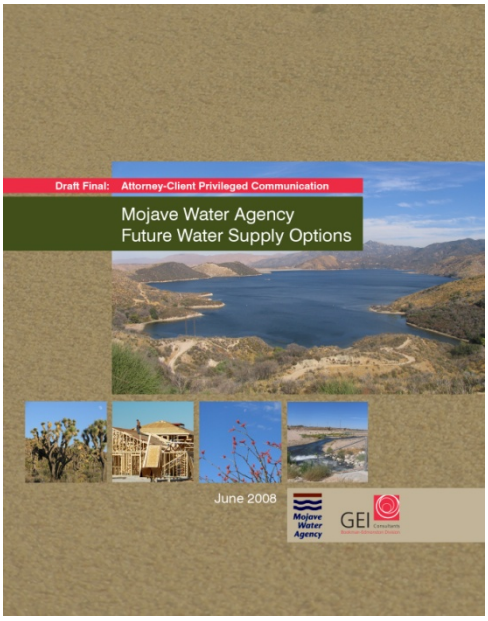
# Additional Information

## PROJECT EXPERIENCE

GEI/B-E water managers and engineers have a holistic understanding and experience in all aspects of California's water resource management, and stay current with new and emerging requirements, such as including plans for climate change and flood control. This knowledge has been instrumental to the successful development of several major multi-objective IRWMPs in the last seven years. These plans support increased local water supply reliability, and provide multiple benefits that help meet environmental and statewide water supply objectives, which have resulted in generous state and federal funding (Please see the table beginning on the following page).

During the last five years, GEI/B-E staff have also completed seven urban water management plans, 16 water use efficiency projects, three major conjunctive use programs, and six groundwater management plans, all financed by a combination of local monies and grant funds. Descriptions of integrated regional projects involving key staff follow. We encourage the selection committee to contact these clients for insight regarding our performance.

### Mojave Water Agency Integrated Regional Water Management Plan



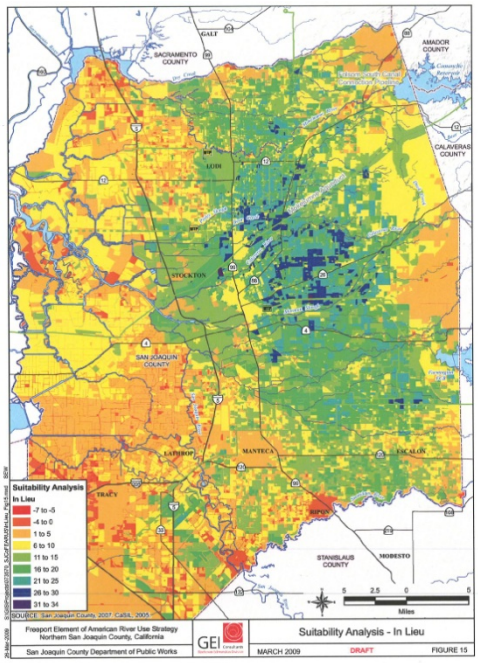

The Mojave Water Agency (MWA) Regional Water Management Plan is a dynamic planning document intended to guide future development and utilization of water resources in the area, which is presently in a state of overdraft. The MWA 2004 Regional Water Management Plan and the Programmatic Environmental Impact Report for the plan were adopted in February 2005. The 2004 plan was an update of the 1994 plan performed by Bookman-Edmonston.

Activities related to the preparation of the regional plan included preparing hydrologic inventories to evaluate the present and historical conditions of surface and groundwater supplies (including water quality) and groundwater production for agricultural and urban purposes; estimating future water demands; and developing water management strategies balancing demand with available supplies—including an imported water supply of approximately 75,800 acre-feet from the State Water Project. The 2004 plan describes 60 specific actions for plan implementation. Groundwater recharge, principally along the Mojave River, is the cornerstone of the plan and future management strategies.

The MWA 2004 Regional Water Management Plan was the result of three years of collaborative planning with 56 water agencies, municipalities, state and federal agencies, and other community interests to screen and select the best water management strategies to address regional issues. This effort included development of a Programmatic Environmental Impact Report. Follow-on tasks included development of a regional water quality model, making recommendations for and obtaining a post-2020 water supply, developing protocols for monitoring plan implementation, and assisting the MWA in obtaining Proposition 50 and Proposition 84 grant funding.

## Eastern San Joaquin Integrated Regional Water Management Plan

GEI/B-E led development of the IRWMP on behalf of the Northeastern San Joaquin County Groundwater Banking Authority. GEI/B-E staff drafted the scope for the plan, which led to a $250,000 grant for plan development. GEI/B-E staff members were involved in all aspects of plan formulation, development, analysis, public and stakeholder outreach, grant writing assistance, and environmental documentation.




Plan development was performed using a systems approach to the interlinked natural, urban, and agricultural water supply and demand components. A series of stakeholder workshops were held to formulate and develop consensus on the fundamental objectives and the universe of ways these objectives might be achieved. A set of performance measures were developed early in the process to provide an unbiased methodology to measure how well these fundamental objections were met.

The plan developed, screened, and prioritized four principal alternatives, each compiled from 30 individual project and management action alternatives. Each alternative provided from 140,000 to 160,000 acre-feet of average annual supply to recharge the overdrafted Eastern San Joaquin aquifer. The plan was certified in July 2007. GEI/B-E staff also prepared the successful Region Acceptance Process application for the region, and has developed implementation plans for some of the highest priority projects.

## Poso Creek Integrated Regional Water Management Plan

GEI/B-E was retained by Semitropic Water Storage District (SWSD) to formulate the Poso Creek IRWMP on behalf of seven agricultural water districts, one resource conservation district, and several participating stakeholders. GEI/B-E assisted SWSD in applying for a Proposition 50 planning grant, which was received and utilized to complete the IRWMP document.

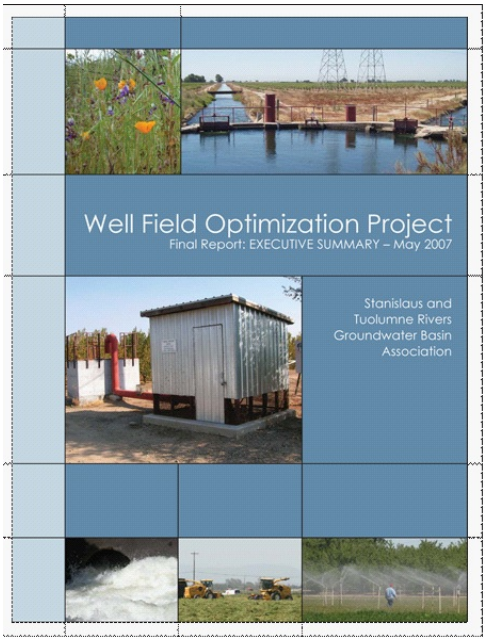
*Our work developing the Poso Creek IRWMP will enhance and jump-start our efforts in developing and integrating elements of the broader Kern County IRWM Plan.*

The Poso Creek IRWMP was adopted by the Regional Management Group in July 2007. During the plan development, GEI/B-E coordinated several related tasks that supported the plan. A water demand and supply and water budget was prepared for

the region to identify facilities needed to meet water needs. Specific facilities were formulated and evaluated to help meet the water needs of participating agencies.

The Poso Creek IRWMP had an aggressive schedule and was developed and completed ahead of the deadline. The plan helped balance the needs of in- and out-of-basin users and manage imports from State Water Project and Central Valley Project. The plan included expansion of groundwater storage and banking opportunities, preliminary design, and feasibility-level analysis of capital projects such as pipelines, pumping stations, well fields, and conveyances.

### Modesto Subbasin Integrated Regional Groundwater Management Plan




The Modesto Groundwater Subbasin is located in the northern portion of the San Joaquin Valley in Central California. The groundwater subbasin is bounded on the north by the Stanislaus River and on the south by the Tuolumne River. Rainfall runoff and snow melt support flows in these rivers and are used by the local water districts to irrigate crops grown on the valley floor.

The Stanislaus and Tuolumne Rivers Groundwater Basin Association was formed in 1994 to provide a forum in which the parties can work cooperatively to manage the Modesto Subbasin groundwater resources. The association combines the available talent and resources of the parties' respective organizations to provide coordinated planning to make the best use of available water resources of the basin to meet the needs of the parties, and to accomplish the association's stated purposes. Its member agencies include:

- Modesto Irrigation District
- Oakdale Irrigation District
- City of Modesto
- City of Riverbank
- City of Oakdale
- Stanislaus County

The GEI/B-E team worked with the association to develop an Integrated Regional Groundwater Management Plan (IRGMP) in compliance with the Groundwater Management Planning Act of 2002 (SB 1938) and the Integrated Regional Water Management Planning Act of 2002 (SB 1672).

The IRGMP provides the framework for the coordinated management of the groundwater and surface water resources to meet both urban and agricultural water needs, while protecting and enhancing the groundwater quantity and quality in the

subbasin. The long-term sustainability of the groundwater resources is addressed in the IRGMP sections, Groundwater Management, Groundwater Protection, and Plan Implementation.

GEI/B-E completed the IRGMP by working with association member agencies to develop objectives for the basin. The IRGMP was developed by expanding upon the available information with a more comprehensive view of conjunctive use opportunities in the subbasin. The IRGMP included the development of a groundwater management plan, an implementation plan, as well as a groundwater monitoring plan. The association will use the groundwater monitoring plan to coordinate the monitoring efforts of the more than 10 agencies that monitor 230 wells in the subbasin.

In addition to the technical components of the IRGMP, our team guided the association through the public process and stakeholder involvement efforts to complete an IRGMP compliant with SB 1938 and SB 1762.

### Yuba County Integrated Regional Water Management Plan

GEI/B-E led all aspects of the development and preparation of the IRWMP, and worked closely with agency staff and Regional Water Management Group (RWMG) to address its water management issues. GEI/B-E prepared the draft, public draft, and final IRWMP documents; led approximately 20 RWMG meetings; made 12 presentations to RWMG agency boards; and coordinated planning efforts with the management of neighboring water agencies. GEI/B-E maintained flexibility to adapt the plan to changing conditions as directed by the RWMG, or by changes in state IRWMP requirements.

A primary purpose of the plan was to help implement the Yuba River Accord which seeks to settle water rights issues. The area also faces increased urbanization and conversion of agricultural land and water uses to municipal and industrial. The plan provided water demand/supply and water budgets for the region and coordination of activities with local agency technical staff and managers as needed. Multiple water management strategies—including flood control, water supply, conjunctive use, water quality, ecosystem, and recreation and extensive public outreach and communications with participating agencies—were part of the IRWMP. Based on evaluation criteria developed for this project, more than 60 potential projects were identified, evaluated, and ranked by priority for implementation.

### Upper Santa Ana Integrated Regional Water Management Plan

GEI/B-E helped the Upper Santa Ana Water Resources Association develop an IRWMP to address water management issues for the communities of the Upper Santa Ana River watershed. The area is dependent upon the San Bernardino Basin and imported water from the State Water Project. A primary objective of the IRWMP was to improve water supply reliability and self-reliance for future water supplies by identifying, defining, and establishing strategies to capitalize on all water management opportunities available today or that may become available. The process screened and identified water supply alternatives for this fast-growing

region. The Upper Santa Ana Plan was also designed to help participating agencies comply with a number of laws, judgments, and agreements, as well as, defining municipal and industrial projects. The plan will help the region reduce its dependence on imported water, while providing reliable, good-quality water for economic growth and enhancing the well-being of the residents of the Upper Santa Ana River region.

### Santa Barbara County Integrated Regional Water Management Plan

As former Santa Barbara County Water Agency Manager, Mr. Almy conceived and led initial development of the Regional RWMG and stakeholder process. This process was managed by the Water Agency and involved 28 public agencies and a wide range of stakeholders. The IRWM Plan addressed water supply, water quality, and environmental concerns. Three disadvantaged communities were included with project for water supply, water quality and water use efficiency. The resulting IRWM Plan was the basis for a Round 2 Proposition 50 grant of $25 Million. With GEI/B-E leading the team, the Region subsequently performed a biannual review and update of their projects. This review was the basis for a successful Proposition 84 Implementation Grant (of $6 Million) as well as a planning Grant to perform a complete revision of the Plan.

# Current Volume of Work

For purposes of budgeting a 12 month period was assumed, however based on current workload and backlog, the GEI/B-E staff listed herein will be committed to the Kern IRWMP for the duration of the contract with the Kern Executive Committee.

Mr. Iger is currently, and for the foreseeable future, committed roughly 50 percent on projects for DWR and Water Districts in Kern County.

Mr. Almy is currently, and for the foreseeable future, committed roughly 50 percent on projects in Santa Barbara and San Luis Obispo Counties.

# Addenda

There were no addenda issued.

# Appendix

Resumes of Principal Staff

# Richard (Rick) B. Iger, PE, Principal Engineer

**Education**
B.S. Applied Mathematics, California Polytechnic State University, San Luis Obispo, 1976

**Registration**
California, Registered Professional Engineer, No. C38272

## Background

Rick Iger is a civil engineer with over 34 years of experience in water resources engineering projects. His experience includes complete development and management of a variety of engineering projects including flood protection, floodplain management, conjunctive use and conveyance facilities. His technical experience includes planning, design, construction, maintenance/improvement, operations, monitoring and evaluation of flood protection systems such as channels and levees; groundwater recharge and recovery facilities; and water conveyance and storage facilities. Mr. Iger also has project administration skills including development of funding and participation agreements with multiple parties; grant writing, reporting and administration; preparation of reports documenting system performance, integrated regional and urban water management plans; overseeing and facilitating technical and policy related committees; and preparation of floodplain, water well, and groundwater ordinances.

## Experience

**US Bureau of Reclamation Grant Applications, Kern County, CA** (2009 to present). Mr. Iger worked as part of a team with GEI staff to prepare six grant applications for matching funding of conjunctive use projects pursuant to the U.S. Department of Interior Bureau of Reclamation Recovery Act of 2009, Water Marketing and Efficiency Grants and WaterSMART Program. In addition to overall review of the applications, Mr. Iger defined system performance and developed the benefit and cost analyses portion of the applications.

**Implementation of Poso Creek Integrated Regional Water Management Plan, Poso Creek Regional Water Management Group, Kern County, CA** (2008 to present). Mr. Iger has been providing technical assistance to a group of six agricultural water districts in the northern portion of Kern County to refine and implement the Poso Creek Integrated Regional Water Management Plan. Mr. Iger played a key role in providing DWR with enough information to approve the Poso IRWMP as a viable region during the Regional Acceptance Process (RAP). Mr. Iger defined system performance, developed project descriptions and provided the water supply, water quality and flood damage reduction benefits analysis for the Poso Creek IRWM Proposition 84 application.

**California Statewide Groundwater Elevation Monitoring (CASGEM) Program, Semitropic Water Storage District and Shafter-Wasco Irrigation District, Wasco, CA** (2011). Mr. Iger is assisting in gathering and uploading of district monitoring information to enable participation in the California Statewide Groundwater Elevation Monitoring (CASGEM) Program. Mr. Iger is working with district staff to develop the proper documents requested by DWR to be qualified as a monitoring entity and assisting in uploading the information into DWR's system.

**Environmental Assessment Pursuant to National Environmental Policy Act, Poso Creek Regional Water Management Group (RWMG), Kern County, CA** (2009 to present). Mr. Iger has been responsible for preparation of an Environmental Assessment to document the need and potential impacts of moving water between Poso Creek RWMG members.

**Groundwater Banking Evaluation, Bakersfield Area Farming Interests, Bakersfield, CA** (2010 to present). Mr. Iger is assisting in gathering and reviewing soils, geology, water level, water quality, aquifer testing information, conveyance facilities locations and capacities, local ordinances and policies, for use in evaluating the suitability of property the client is contemplating purchasing for groundwater banking projects.

**Groundwater Recharge and Hydroelectric Generating Evaluation, Tehachapi-Cummings County Water District, Tehachapi, CA** (2011). Mr. Iger is assisting in gathering and reviewing soils, geology, water level, water quality, aquifer testing information, conveyance facilities locations and capacities, local ordinances and policies, for use in evaluating the suitability of property the client is contemplating purchasing for groundwater recharge projects. In addition Mr. Iger is leading GEI staff in evaluating an existing idle hydroelectric facility for feasibility and potential upgrading.

**Regional Urban Water Management Plan, Tehachapi-Cummings County Water District, Tehachapi, CA** (2009 to 2011). Mr. Iger was project manager for preparing a regional urban water management plan for five entities in the greater Tehachapi area; City of Tehachapi, Golden Hills Community Services District (CSD), Bear Valley CSD, Stallion Springs CSD, and Tehachapi-Cummings County Water District. The project entailed coordination of data gathering and reporting for the five entities, interaction with the County of Kern and other stakeholders, and preparation of the plan consistent with State of California Guidelines.

**Banking Program Groundwater Model Update, Semitropic Water Storage District Wasco, CA** (2009 to present). Mr. Iger assisted in gathering and reviewing recharge, pumpage, water level, and water well completion information for use in a groundwater model used to demonstrate with and without project conditions. Mr. Iger also reviewed aquifer parameters and model output for consistency and comparison to key monitoring wells. Work was completed in 2009 for data trough 2008, and now under way to update through 2010.

**Groundwater Banking Evaluation, West Kern Water District, Taft, CA,** (2009). Mr. Iger has assisted in gathering and reviewing soils, geology, water level, water quality, and aquifer testing information for use in groundwater modeling used to evaluate the suitability of property the district is contemplating purchasing for a groundwater banking project. Mr. Iger also reviewed aquifer parameters and model output for consistency and comparison to results observed in other key banking facilities.

**Kern County Water Agency (KCWA)**. While serving as chief engineer and engineering and operations manager, Mr. Iger's work consisted of planning and evaluating long-term water supply projects; developing and administering agreements with project participants and surrounding entities; evaluating property for suitability and implementing recharge and recovery projects, where appropriate; administering agreements, construction loans and grants from the California Department of Water Resources (DWR); monitoring and reporting groundwater basin quality and water levels; tracking and coordinating recharge and recovery deliveries; maintaining and improving flood control projects; managing 2300 acres of irrigated farmland; preparing environmental documents and permits; and preparing reports documenting groundwater storage accounts and impacts. In addition to managing KCWA property, when DWR owned the Kern Water Bank, he coordinated farming leases and noxious vegetation control options, as well as Threatened and Endangered Species surveys and permitting.

## Professional Associations

- Agricultural Energy Consumers Association (AECA) – Past Board Member
- Association of California Water Agencies (ACWA) – Groundwater Committee Member
- Association of Groundwater Agencies (AGWA) – Past Vice Chairman
- American Society of Civil Engineers (ASCE) – Past President, Southern San Joaquin Branch

- Kern County Water Agency Board of Directors, Water Management Committee – Past Facilitator
- Kern County Water Agency Improvement District No. 3, Kelso Creek Advisory Committee – Past Facilitator
- Kern Fan Monitoring Committee and Technical Subcommittee – Past Facilitator
- Pioneer and Berrenda Mesa Project Participant Committees – Past Facilitator

## Publications

*Kern Fan Operations Report* - co-author annual reports on water recharge and recovery operations within the Kern Fan Projects and within districts adjoining the Kern Fan Projects, 1995 to 2004.

*Kern Fan Groundwater Monitoring Report* - co-author reports documenting changes in groundwater conditions associated with the Kern Fan recharge and recovery operations, 1991 to 2004.

*Report of Special Benefit Assessment for KCWA Improvement District No. 3* - prepare annual reports documenting maintenance activities and costs associated with a flood control project resulting in setting of an annual assessment.

*Kern County Flood Plain Management Ordinance* - co-authored an ordinance adopted by the County of Kern establishing building standards within flood plains.

*Kern County Water Well Ordinance* - co-authored ordinance amendments adopted by the County of Kern modifying water well standards.

# Robert B. Almy, Project Director

GEI Consultants

**Education**
M.S., Geology, Western Washington Unversity, 1977

**Registration**
Professional Geologist, California, No. 3802; Oregon, No. E-684

## Background

Robert Almy is a professional geologist with 25 years of water resources and coastal development experience. His experience includes managing water resources planning and development projects, groundwater investigations, creating a storm water quality programs, establishing integrated regional water management, obtaining major grants for a wide range of water related projects, and permitting and environmental review for offshore petroleum development.

Mr. Almy has been in the forefront of environmental assessment, mitigation compliance, water resources management, and regional planning in central California. He has led development of complex interagency water resources and watershed planning studies, award winning regional water conservation and storm water quality programs, as well as successful integrated regional water management plans. These projects typically included an extensive public outreach component with presentations to advisory and stakeholders groups, and coordinating with multi-discipline project teams. Mr. Almy has provided extensive testimony in court and public hearing settings.

## Experience

**Santa Barbara County Area-wide Integrated Regional Water Management Plan (IRWMP), Santa Barbara County Water Agency, Santa Barbara County, CA** (2005 to 2010). Mr. Almy served as the project manager responsible for the preparation of the Santa Barbara County IRWMP to meet the requirements of the Integrated Regional Water Management Planning Act of 2002 (SB 1672). In addition, he managed the process to apply for Planning, Implementation and Flood Management Grants pursuant to Proposition 84. The Santa Barbara County Region adressed water supply and demand imbalance, water quality in areas of urban growth, salinity and nutrient management and the need for improved flood protection. The Santa Barbara County IRWMP incorporates a broad range of water supply reliability, ecosystem restoration, and flood management strategies to address both long-term and emerging issues. The IRWMP regional water management group (Cooperating Partners) comprise over 20 public agencies with land and water management responsibilities, local stakeholders, and interested parties.

**Project Clean Water (surface-water quality) Program, Santa Barbara County, CA** (1998 to 2008). Mr. Almy established "Project Clean Water" to improve urban water quality throughout Santa Barbara County. He directed an initial water quality assessment and community-led problem definition process. Under his management the program 1) instituted comprehensive educational programs, 2) developed and instituted an illicit discharge detection and control program, 3) developed local land use and construction site regulations and monitoring for storm-water control, 4) performed a comprehensive survey of public facilities, and 5) installed and operated treatment control facilities at seven locations. Project Clean Water successfully integrated Phase II NPDES storm-water regulations with other community-based efforts including preparation of watershed plans; projects to divert non-storm flow to sanitary sewers; projects to convert areas of septic systems to sanitary sewer; and water conservation to reduce non-storm water runoff.

**NPDES Compliance Programs, Santa Barbara County, CA** (1999 to 2008). Under contract with 4 incorporated cities within Santa Barbara County, Mr. Almy led county staff in development of NPDES SWMP applications for each. As part of this process, he coordinated an initial water quality assessment and

community-led problem definition process in each city. Under his management the SWMP for each city 1) instituted comprehensive educational programs, 2) developed and instituted an illicit discharge detection and control program, 3) developed recommendations for integration with local land use and construction site regulations and monitoring for storm-water control, 4) performed a preliminary survey of public facilities, and 5) in two cities, installed and operated treatment control facilities.

**Watershed Planning, Santa Barbara County, CA** (2001 to 2008). Mr. Almy was instrumental in developing watershed plans in three critical streams on the South Coast of the Santa Ynez Mountains in Santa Barbara County. He established the proposed scope of each plan, assembled a local stakeholders' group, obtained funding, and managed the overall planning process.

**Development of CWA 303(d) listings and TMDLs, Santa Barbara County, CA** (2000 to 2008). Mr. Almy represented the County of Santa Barbara during state agency identification of impaired water bodies. He provided the basis for not listing certain water bodies due to actual conditions found in the watershed. When TMDLs were proposed for bacteria, nutrients, and Boron, Mr. Almy critiqued the basis of contaminant assessment and selection of models to be used in this far reaching regulatory process in favor of a more relevant and rational set of regulations.

**Development and Evolution of a Regional Water Efficiency Program, Santa Barbara County, CA** (1991 to 2008). Mr. Almy established and guided development of the county-wide regional water efficiency program involving both urban and agricultural users. The program included conjunctive use and drought cycle planning and evolved to satisfy emerging state mandates. Aggressive public outreach and education, consistent interagency coordination, and integration with supply planning led to the overall success of the program. Several program elements won awards including the "Green Gardener" certification program that was copied in several other regions. The US Bureau of Reclamation provided funding for development of a drought contingency handbook for use throughout the southwestern region. A combination of state and local funding was used to implement residential and commercial rebate programs.

**Modified Storm Operations for Cachuma Reservoir, Santa Barbara County, CA** (1998). Mr. Almy managed staff who developed modification to operations of a water conservation project to allow reduction of peak storm releases by as much as 40 percent. Mr. Almy prepared the technical report and operational guidelines for use by US Bureau of Reclamation. The operations included procedures to ensure that no water supply would be lost as a result of the modified operations to water districts utilizing the reservoir.

**State Water Project Table A Reacquisition Process Santa Barbara County Water Agency and Central Coast Water Authority, Santa Barbara County, CA** (2008 to present). Mr. Almy has assisted the county and CCWA in their development of a process to reacquire 12,214 AFY of suspended Table A allotment from the State Water Project. Mr. Almy has developed historical evaluations, provided cost assessments, and evaluated environmental issues associated with increasing the amount of Table A allotment available to CCWA pursuant to the contract between Santa Barbara County and the State of California.

**Regional Weather Modification Program, Santa Barbara County, CA** (1991 to 2007). Mr. Almy managed the regional weather modification program ("cloudseeding") that was estimated to increase the yield of local reservoirs and recharge to groundwater basins. Under his direction the program was expanded to include portions of watersheds in a neighboring county.

## Courses Taught

- *Environmental Impact Assessment,* Environmental Studies Program, University of California, Santa Barbara, 1990-2007 (4 Unit Upper Division Course)
- *Protecting Ground Water Quality,* University of California, Davis "Short Course" for Agriculturalists, 2005- 2007
- *Current Issues in Storm-water Regulation in California, Municipal Storm Water Programs (Phase I and II)*, Lorman Seminars, March 2004 and March 2005

# William J. Bennett, PE, GE, Executive Engineer

GEI Consultants

**Education**
B.S., Civil Engineering, University of California, Davis, 1973
M.S., Civil Engineering, University of California, Davis, 1975

**Registration**
California
Civil Engineer No. 26848
Geotechnical Engineer No. 137

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## Background

Mr. Bennett is a registered professional engineer with 35 years of experience in water resources and geotechnical engineering, including managing water resource planning programs and planning organizations for the California Department of Water Resources.

## Experience

Mr. Bennett's experience includes 18 years specializing in all aspects of dam safety work. His extensive experience in managing water resources planning programs and planning organizations for the California Department of Water Resources includes years of Division- and Office Chief- level responsibility for major California Water Planning Programs.

**Phase I Dam Inspections, Maui County, State of Hawaii, Department of Land and Natural Resources, Hawaii.** As part of the GEI Inspection Team, Mr. Bennett inspected, evaluated for safety, and prepared Phase I inspection reports for many of the 54 dams in the County of Maui as part of the State's Dam Safety Program in 2008.

**Fatal Flaws Analysis, Yokohl Ranch Dam, Yokohl Ranch, California.** Mr. Bennett was project engineer on the site analysis of a proposed 160 foot-high earth embankment dam in Tulare County, California.

**Impact Analysis of Caples Lake RSA Levels, El Dorado Irrigation District, California.** Mr. Bennett supervised the hydrologic analysis for the dam safety evaluation of new target lake levels (FERC requirement).

**Feather River Levee Improvement Project, Three Rivers Levee Improvement Authority, California.** Mr. Bennett is responsible for levee site exploration and design oversight of exploration for Above-Star Bend Setback Levee.

**Water Management Planning, California.** Mr. Bennett was responsible for the Statewide Planning and the California Water Plan Update in 1998, as well as elements of the 1993 plan update. He 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.

Mr. Bennett directed DWR's Fish Passage Program and managed the initial formulation of the first report on California fish barriers—DWR Bulletin 250. He led staff in aggressively developing opportunities for barrier removal and stream restoration projects, carefully coordinating those efforts with federal and state agencies and local interests.

For five years he 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, Mr. Bennett actively worked with federal, State, and local groups to successfully meld species recovery efforts with continued agricultural water use.

Mr. Bennett has extensive experience in collaborative planning and controversial, stakeholder resource management decision-making. He staffed and organized a California Water Commission Statewide Water Policy Consensus Workshop in 1986. He served on the State's Shasta-Scott Coho Recovery Team and participated in the Statewide Coho Recovery Plan compilation for the Department of Water Resources. He attended Klamath Stakeholders Collaborative Sessions (Chadwick Workshops) on Klamath River Watershed issues. Other collaborative efforts were the San Clemente Dam stakeholder discussions, the Glen-Colusa Irrigation District Fish Screen Agency Team, and the Trinity River Task Force.

**Water Transfers, California.** Mr. Bennett supervised the State's Water Transfers Office in 2005 and 2006. He oversaw water transfers in the California and was a part of the Calfed Environmental Water Account (EWA) team, negotiating statewide water acquisitions and transfers between various water districts and DWR to offset fish restoration actions within the Bay-Delta. He worked on the Yuba River Accord and was active with the Calfed Water Operations Management Team.

**Water Use Efficiency, California.** Mr. Bennett was in charge of California's Water Use Efficiency programs: agricultural water conservation, urban water conservation, desalination, water recycling related grants and technical assistance programs. In 2006 alone, the program distributed more than $100 Million in grant funding under his guidance. He also administered the review of all the State's urban water management plans (UWMP's) submitted by urban water suppliers every 5 years (more than 350 submittals).

**Dam Safety and Flood Management, California.** Specific to dam safety, Mr. Bennett performed or directed numerous independent engineering analyses on proposed or existing dams in California with the State Division of Safety of Dams. This includes the review and approval of plans and specifications, evaluations of structural design and construction specifications and procedures, independent analyses of hydrology, hydraulics, and structural adequacy of spillways, outlets and other dam appurtenant structures. As Design Review Engineer and Senior Engineer, he specialized in conducting seismic stability, liquefaction, and dynamic response analyses. Dams like Camanche, Lopez, Calaveras, Estates, Thermalito Afterbay and Forebay, Pilarcitos, San Andreas, and Oroville Dam required not only an analytical determination of dynamic response but a refined evaluation of the dam materials behavior, which further required a concise review of laboratory and field testing, cyclic soil strength evaluations, and even large scale gravel dynamic soil testing.

In his work he estimated the seismic settlement of many earth dams and analyzed the effects of near-fault and fault rupture for some structures.

As Regional Field Engineer, Mr. Bennett managed the construction supervision and provided oversight for several new major California dams including Seven Oaks, Los Vaqueros and Homestake Mine Tailings dams. For eight years he lead a team responsible for annual maintenance inspection program for 40% (450) of California's jurisdictional dams, reviewing instrumentation and identifying problems for high hazard, San Francisco Bay Area and Northern California dam structures.

Mr. Bennett has considerable on-the-ground experience in handling flood, earthquake, and other dam-related and levee emergencies. He was on the State's executive management 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 responses to potential loss of life and property. He was incident commander

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

**Professional Relationships**

From his planning, fisheries recovery and passage, and his Klamath, Trinity and other watershed work, Mr. Bennett maintains close relationships with DFG, NOAA Fisheries, USBR, U.S. Army Corps of Engineers, Resources Agency, Calfed Bay- Delta Program, the Klamath River Compact Commission, the Agricultural Water Management Council, the California Urban Water Conservation Council, the Northern California Water Association, and many agricultural and urban water suppliers. He has worked personally with various environmental advocacy groups and Tribes such as The Nature Conservancy, Caltrout, Friends of the River, and American Rivers.

**Selected Reports & Publications**

Fong, F.C. and W.J. Bennett, Paper, *The Effect of the January 1995 Storms on California Dams,* Western Regional Meeting and Workshop, Association of State Dam Safety Officials, Red Lodge, Montana, May 1995.

Draeger, R.G. and W.J. Bennett, Paper, *Transverse Cracking on Embankment Dams Due to Earthquakes,* Western Regional Meeting and Workshop, Association of State Dam Safety Officials, Red Lodge, Montana, May 1995.

Bennett, W.J., Paper *Henshaw Dam Repair,* Western Regional Meeting and Workshop, Association of state Dam Safety Officials, Sacramento, May 1989.

Bennett, W.J., D.H. Babbitt and R. D. Hart, Paper, *California's Seismic Reevaluation of Embankment Dams,* Annual Meeting, ASCE, Philadelphia, May 1983.

Vrymoed, J.L., W.J. Bennett, S. Jafroudi and C.K. Shen, Paper, *Cyclic Strength and Shear Modulus as a Function of Time,* International Symposium on Soils Under Cyclic and Transient Loading, Swansea, United Kingdom, January 1980.

Shen, C.K., L.F. Harder, J.L. Vrymoed and W.J. Bennett, Paper, *Dynamic Response of a Sand Under Random Loadings,* Geotechnical Division Specialty Conference, Earthquake Engineering and Soil Dynamics, ASCE, Pasadena, June 1978.

Bennett, W.J. and C.K. Shen. Paper, *A Parametric Study of Compacted Soils under Triaxial Cyclic Loading,* 5th Pan Am Conference of Soil Mechanics, Buenos Aires, 1975.

Bennett, W.J., *A Parametric Study of the Cyclic Triaxial Strength of Soils,* Master Thesis, August 1975.

**Miscellaneous Courses and Conferences (partial list)**

- Leadership for the Next Millennium Seminar Program, California State University, Sacramento, September-December 1999.
- U.C. Davis Executive Seminar, University of California Extension, Davis, Feb-April 1994.
- Seven Habits of Highly Effective People, Covey Leadership Training, Sacramento, Nov 1993.
- Federal Executive Development Seminar, Western Executive Seminar Center, Department of Personnel Management, Denver, June 1991.
- Department of Water Resources Executive Program, January-December 1991.
- Management Development School, State Training Center, Sacramento, January 1986.
- U.C. Extension Conference on Water Policy, Asilomar Conference Center, September 1986.
- Allen Management For The Public Sector, Louis Allen Associates, Sacramento, December 1981.
- Basic Supervision, Department of Water Resources, Sacramento, December 1985 & Jan 1979.
- Labor Contract Administration, Department of Water Resources, Sacramento, December 1983.

- Eighth World Conference on Earthquake Engineering, San Francisco, July 1984.
- Energy Fundamentals in Building Design, U. C. Extension, San Francisco, December 1979.
- Soil Mechanics in Engineering Practice - Course, U. C. Berkeley, March 1979.

**Activities and Special Committees**

Georgetown Divide Resource Conservation District, Director, 1993-2007, President 2007-present. (Elected Office)

High Sierra Resource Conservation and Development Council, Representative, 1993-present; Treasurer, Vice President, President from 2003 to present.

Cool/Pilot Hill Advisory Committee, Member: Board of Directors, 1989-present, Vice Chair 1992, Chairperson 1992-93, 97-2003. (Local committee advising on County planning).

Pilot View Drive Zone of Benefit Advisory Committee, Chair, 1987-present.(Road Zone).

Department of Water Resources IT Governance Board Chairperson (First Chair - 1999-2000)

DWR Employee Career Development Committee (ECDC) - Member 1984, 1996-98, 2001; Chair 2000.

DWR Emergency Management Committee - Member 1998-2000.

DWR Business Users Committee (SAP Project Development Oversight) (1998-99).

DWR IT Organization and Governance Task Force Chair (1998-99).

DWR SAP Purchase Negotiating Team Leader (1998).

DWR Business Information System Oversight Group (1997-98).

Statewide Emergency Planning Committee/Emergency Info Task Group (OES), 1990-1995.

DWR, Bulletin 160-93 Team, Technical Editor, Nov 93 - April 94; (Received Unit Citation, 1994).

DWR Program Status Reporting Devel. Group (PSTAT), 1988; (Received Unit Citation, 1989).

**Past and Current Affiliations**

- Member – United States Committee on Large Dams (USCOLD)
- Member – Association of State Dam Safety Officials (ASDO)
- Member – Tau-Beta-Pi Honor Society
- Member – Phi-Kappa-Phi Honor Society

# Mark S. Williamson, P.E., Principal Executive Engineer

GEI Consultants

**Education**
M.S. Civil Engineering, University of Washington, 1984
B.S. Civil Engineering, University of California, Berkeley 1979

**Registration**
California

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## Background

Mr. Williamson is a registered civil engineer with 28 years of experience in both the public and private sectors. He has provided civil engineering expertise in numerous aspects of water resources, including hydroelectric, water supply, design, construction management, water distribution system modeling, dam safety, surface and groundwater hydrology, flood control, and project management.

## Experience

### Water Management Planning

Mr. Williamson has significant experience managing water supply studies and water source investigations. Client services provided by Mr. Williamson include technical and policy assistance in water supply reliability, conjunctive use and groundwater banking, reservoir system analysis, and regulatory compliance.

- Mr. Williamson was project manager for development and environmental screening of a range of implementable supply and groundwater recharge options for use of San Joaquin County water rights filings as part of the Freeport Element of the American River Utilization Project.
- Mr. Williamson managed the Mojave Water Agency's Regional Water Management Plan Update, a stakeholder-driven process to screen and select the best water management strategy to match projected supplies with forecasted 2020 demands. The Plan was developed to meet the requirements of an Integrated Regional Water Management Plan, a Groundwater Management Plan, and an Urban Water Management Plan. This effort included development of a Programmatic Environmental Impact Report.
- Developed recommendations on long-term water acquisition options for Mojave Water Agency and facilitated a 14,000 acre-foot transfer to the agency.
- Mr. Williamson led the development of an Integrated Regional Water Management Plan for the San Joaquin County Groundwater Banking Authority, and is the project manager for the implementation study and design.
- Developed groundwater storage and conjunctive use projects to meet projected demands. Project Manager on the San Joaquin County/EBMUD Mokelumne Aquifer Recharge and Storage Project.
- Performed statistical and stochastic analyses and established confidence bounds for Mokelumne River streamflow.
- Developed economic criteria and performed economic evaluation and rate impact analysis of EBMUD Updated Water Supply Management Program.
- Performed EIR/EIS review of 130,000 acre-foot Pamo Dam and Reservoir for the City of San Diego to determine feasibility of supplying emergency supply to San Diego County.
- Provided support for San Joaquin County and Stockton East Water District water rights filings
- Provided successful grant writing assistance and prepared Region Acceptance Process applications for a variety of clients.

**Hydraulic/Water Supply Studies:**

- Principal for development of EBMUD's Water Supply Management Program Environmental Impact Report, an alternatives evaluation and integrated resources plan.
- Performed assessment of yield of American and Sacramento rivers to EBMUD using the Bureau of Reclamation's PROSIM model of the Central Valley Project and State Water Project.
- Project Engineer for the Mountain Tunnel Flow Study for the City of San Francisco's Hetch Hetchy Water and Power Department. The project involved the testing and modeling of this 20-mile tunnel to determine the reasons for decreasing flow capacity, and recommending and implementing remedial measures.
- Project Manager for the Balboa and Francisco Reservoirs Needs Assessment for the San Francisco Water Department. Future water demand estimates were updated and incorporated into KYPIPES and LIQSS (Stoner) distribution system models for pressure zones serving 80 percent of the City. Using these models, areas of deficient pressure or storage were identified and solutions formulated using both remedial piping or the presently unused Balboa and Francisco Reservoir sites.
- Performed surface and groundwater hydrologic balance of Salton Sea, California, in support of litigation.
- Project Manager for engineering alternatives analysis for replacement of Hetch Hetchy Reservoir.
- Project Manager for assessment of four competing desalination projects in the Monterey Bay area.

**Water Resource Development Projects**

Mr. Williamson was responsible for negotiation and development of surface water and groundwater development projects, including groundwater recharge/banking projects and major surface water diversion and conveyance projects.

- Directed technical studies and developed agreements for joint development of the Freeport Water Supply Project by EBMUD and Sacramento County Water Agency.
- Performed environmental analysis of groundwater recharge options for Joshua Basin Water District.
- Performed analysis of local groundwater banking projects for the Kern County Water Agency.
- Provided consulting services to Pacific Gas and Electric Company for hydro project management, economic and feasibility studies of new and upgraded hydroelectric power projects, computer modeling, and FERC relicensing applications.
- Performed Indian Public Trust (Winters) water rights quantification, groundwater depletion studies, flooding studies, surface and groundwater hydrology, irrigation and drainage system design, well design, and utility rate studies.

**Project Management**

- Performed program management for the design of a nine-mile irrigation canal for the Yuba County Water Agency.
- Overall responsibility for negotiation and development of groundwater storage/conjunctive use projects in San Joaquin County, Sacramento County, and on the East Bay Plain. Includes development of pilot groundwater injection facilities, permitting, and environmental documentation.
- Responsible for developing a negotiated multi-party agreement for implementing a $700 million joint American River diversion and conveyance project.
- Participated in program management team for $25 million DWR Central Valley Floodplain Evaluation and Delineation program.
- As acting Manager of EBMUD Water Supply Improvements, responsible for direction of 22 staff and multiple regional water development projects, environmental documents, and water supply contracts.
- Provided planning support for hydroelectric construction projects for Pacific Gas and Electric's Hydro Projects Management Department. Responsibilities included project scheduling, cost

estimating, monitoring of progress, and production of schedule updates for new powerhouses and powerhouse upgrades.
- For PG&E, responsible for scheduling and cost estimates for a five-year, $27 million addition/upgrade to the DeSabla/Centerville project on the Feather River.
- Acted as Scheduling Coordinator for 25 personnel and 40+ active jobs.

**Groundwater Hydrology**

- Team leader for development of groundwater storage and extraction facilities in San Joaquin and Sacramento counties, and in the East Bay Plain in EBMUD's service area. Responsibilities ranged from project conceptualization and partnership negotiation through pilot testing, design, permitting, construction, and environmental documentation.
- Performed evaluation of numerous proposals to store and extract groundwater in Kern County as part of the Kern Water Bank.
- Performed groundwater modeling of City of Bakersfield's 2800-acre groundwater recharge facilities.
- Performed groundwater depletion studies for the Gila River, San Xavier, Papago and San Carlos Indian Reservations in Arizona.
- Project Engineer for the study of Salinas River groundwater basin. Project was undertaken to determine feasibility of increasing yield for the City of San Luis Obispo, within restrictive legal constraints.
- Performed evaluation of well pump tests to establish the degree of interconnection in a complex multi-aquifer system in Kern County. Performed replacement cost estimate for City of Palo Alto water supply/well system. Evaluated evidence of seawater intrusion in coastal San Diego County. Directed regional pumping test and modeling of South East Bay Plain and Niles Cone groundwater basins.

**Design**

- Design Engineer for the North Stockton Water Pipeline, a nine-mile, 48-inch diameter transmission pipeline for the City of Stockton. Included design of 42- and 30-inch distribution mains. Project included preparation of plans, specifications, cost estimates and bid documents, and acquisition of permits, easements and agreements from more than 20 agencies and utilities. $8 million construction cost.
- Design Engineer for upgrade and 8 MGD expansion of two 20 MGD, 400-foot lift pump stations on the Whale Rock Water Conduit, San Luis Obispo County.
- Design of Farmington Canal Siphons, three twin bore eight-foot diameter inverted siphons approximately 500, 550 and 1300 feet long, together with intake and discharge structures and related facilities for the Stockton East Water District.
- Oversight for design and construction of groundwater recharge, recovery, and conveyance facilities in San Joaquin County and within the East Bay Plain, California.
- Preliminary design of stream diversion, intake, and pumping facilities for the Coastal Streams Project, San Luis Obispo County.
- Preliminary design of spillway modifications for Salinas Dam, San Luis Obispo County.
- Preliminary design of pipeline and pumping facilities to serve emergency storage reservoirs in San Diego County.
- Project Manager for engineering services for surface water treatment and groundwater recharge investigations for the City of Lodi, California.

**Construction Management**

- Construction Manager for the $8 million North Stockton Water Pipeline. Responsible for supervision of two Contractors, construction inspectors, and preparation of progress estimates.
- Consultant Project Manager for repair of Hetch Hetchy Water and Power's Mountain Tunnel.

**Hydroelectric Feasibility**

- Under contract with Pacific Gas and Electric Company (PG&E), developed, operated and modified numerous computer models to simulate operation of numerous new and existing hydroelectric projects. Model results were used to evaluate potential improvements and/or new in-stream requirements. Project benefits were optimized by balancing long-term energy production with dependable capacity.
- Prepared FERC relicensing exhibits for hydroelectric projects undergoing competitive relicensing.
- Evaluated feasibility of conventional and pumped storage hydro on the proposed Santa Margarita River Dams.

**Storm Drainage and Flood Control**

- Project Engineer for City of Scotts Valley Storm Drainage Master Plan. Included was mapping, hydrologic and collection network computer modeling, recommendation of new facilities, and design criteria. Also made policy recommendations for system maintenance, riparian corridor protection, and stormwater detention and recharge.
- Performed reconnaissance-level study of flood control alternatives on its tributaries in and around Roseville, California. Tasks included HEC-2 computer analyses of existing and potential channel configurations, and preparation of cost estimates.

**Modeling and Data Management**

Mr. Williamson has extensive experience in computer operations modeling and data management.

- Project Manager for modeling analyses of statewide water system impacts from development of Sacramento County/EBMUD Freeport Project
- Project Manager for modeling analyses for the State Water Project Monterey Amendment EIR.
- Project Manager for water quality database and modeling for Mojave Water Agency.
- Performed statewide water economics modeling for U.S. Bureau of Reclamation using the CALVIN model.
- Performed reservoir operations studies of Whale Rock Reservoir, San Luis Obispo County, to determine incremental reservoir yield resulting from interbasin diversions.

**Selected Publications**

- "Conjunctive Use Planning," June 1992. Proceedings of the American Water Works Association 1992 Annual Conference.
- "East Bay Municipal Utility District Conjunctive Use Planning in San Joaquin County," September 1995. Proceedings of the 20th Biennial Groundwater Conference. Water Resources Center Report No. 88.

# Matt Zidar, Senior Project Manager

**Education**
B.S., Watershed Sciences/Hydrology, Colorado State University

## Background

Mr. Zidar has 24 years of experience in water resources planning and management both the public and private sector. His experience includes management and technical assessment of a wide range of water resources projects, including flood management, development of regional water plans for conjunctive use, water resources planning, engineering, management, hydrology, groundwater analysis, and water quality programs and projects. He has managed basin assessment and characterization efforts, reconnaissance and feasibility studies, analysis of alternatives, and project design and development programs for surface and groundwater supply, including impact analysis to meet CEQA and NEPA requirements, including coordination of complex modeling efforts to evaluate project impacts.

Mr. Zidar has held several key positions in the water industry, including ten years as the Principal Hydrologist and Manager of the Water Resources Division at the Monterey County Water Resources Agency (MCWRA). More recently, he served for two years as Regional Director at an environmental planning firm, and for four years as Principal Hydrologist/Project Manager at another major environmental company located in Sacramento. In these positions he served as senior scientist, project manager, or project director for conducting technical or environmental analysis of water, wastewater, and water resources projects, including preparation of Environmental Impact Reports (EIR), Environmental Impact Statements (EIS), and documentation for project permits.

## Project Experience

**Project Manager, San Joaquin Valley Forecast- Coordinated Operations (F-CO) Program, California Department of Water Resources, Division of Flood Management.** Mr. Zidar is project manager for this element to identify real time gaging needs; improve reservoir inflow forecasts; develop reservoir operations models (ResSim); apply and further develop the F-CO Decision Support System to meet unique needs in the San Joaquin; coordinate with local reservoir operators; identify hydrologic and hydraulic issues and opportunities; and develop operational exercises to orient users and prepare for application of the system during real time operations.

**Project Manager, Yuba Feather Forecast- Coordinated Operations (F-CO) Program, Yuba County Water Agency.** Mr. Zidar is preparing the final project report documenting the multi- year program to improve real time reservoir operations and release scheduling. Program included improvements to the real time gaging network, reservoir inflow and downstream flood forecasts; development of ResSim models for New Bullard Bar and Lake Oroville; design, development and installation of the F-CO Decision Support System; coordination of the changes to operating protocols to meet objective flows; design and conduct of exercises; and support to the Interagency Management Team consisting of local, state and federal agency partners.

**Project Manager, Flood Operations Table Top Exercise and Functional Exercise, Yuba County Water Agency, California Department of Water Resources**. Designed and conduct different flood exercises to prepare for real time flood operations and use of F-CO decision support tools. Work included formation and coordination of the exercise design team, development of scenarios, facilitation of the exercise, design of evaluation methods, preparation of after action and improvement reports.

**Sr. Scientist, Wastewater Dilution Study, San Joaquin Water District, Town of Mountain House, California**. Conducted a wastewater dilution study using Delta Simulation Model (DSM2) for hydraulic and water quality modeling of the Sacramento/San Joaquin Delta. The Results were used to support CEQA determinations.

**Upper Kings Water Forum, Integrated Water Resources Management Plan (IRWMP).** California Department of Water Resources, Kings River Conservation District. Project Manager for a regional water planning effort to whose purposes is to develop an IRWMP consistent with state standards. Technical support was provided to the Upper Kings Water Forum, a group of stakeholders comprised of water districts, cities, overlying counties, environmental interests and other local and state agencies working to develop the IRWMP.

**Lower Kings River Groundwater Management Plan.** Kings River Conservation District. Project Manager to updated and integrated six prior AB 3030 plans and produce the Lower Kings Groundwater Management Plan (GWMP). The GWMP documented current groundwater conditions, evaluated historical and future water demands and supply components, assessed water quality and water availability, established Basin Management Objectives (BMOs), described governance and financing options, reviewed management options, and provided an implementation strategy to improve groundwater management and develop conjunctive use project. Work was coordinated through a Basin Advisory Panel of water district and land owner representatives.

**Consolidated Irrigation District Groundwater Management Plan.** Project Manager to develop the GWMP in this agricultural water district experiencing urban growth in an overdrafted groundwater basin.

**North Fork Group Technical Study and Groundwater Assessment**. California Department of Water Resources, Kings River Conservation District. Project Manager to evaluate current groundwater conditions, develop conjunctive use project concepts, and prepare the technical work plan program for site characterization, geologic exploration and drilling, and conduct of preliminary engineering of recharge project alternatives.

**Castroville Seawater Intrusion Project, Salinas Valley.** Monterey County Flood Control and Water Conservation District. Project Manager to evaluate engineering alternatives, coordinate regulatory permitting, and prepare of a joint EIR/EIS for CEQA and NEPA compliance. Directed all groundwater technical analysis and application of IGSM to evaluate of project alternatives, impacts, and benefits.

**Salinas Valley Basin Management Plan, Salinas Valley.** Monterey County Water Resources Agency. Principal Scientist for analysis and evaluation of structural and management alternatives designed to stop seawater intrusion and balance the basin. This included conceptual design of well systems, service areas, pipelines, stream diversions, and re-operation of Agency reservoirs. Basin plan goals and objectives were established and used to further develop and screen alternatives. IGSM was applied to evaluate the water budget, to screen alternatives, and to assess economic benefits and the geographic distribution of the benefits. Extensive public participation was part of the program.

# Aaron S. McWilliams, PE, Staff Engineer

GEI Consultants

**Education**
B.S., Civil Engineering, University of California at Davis, 2003

**Registration**
California, Registered Professional Engineer, No. C70346

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## Background

Mr. McWilliams has over seven years of experience in planning and design of water resource and conveyance system projects. His expertise includes the design of water distribution systems; hydrologic and hydraulic design and analysis; sewer system/lift station design and analysis; storm water conveyance systems, and floodplain modeling and analysis. In addition to his design experience, he also provides planning services including the development of regional water management plans, master plans, and grant writing; report preparation for client, city, and county agencies; and residential, commercial, and industrial construction plan preparation. Mr. McWilliams is also proficient in AutoCAD with Civil 3D exposure, RiverCAD/HEC-RAS, WaterCAD, StormCAD, SewerCAD, and Hydraflow Utilities.

## Experience

**Gateway Regional Water Conservation Alliance Report, Los Angeles Gateway Region Integrated Regional Water Management Authority, Paramount, CA (**February 2011 to Present). Performing 20x2020 Urban Per Capita Water Use reduction calculations for the Gateway Regional Alliance. Writing most sections of the Gateway Regional Alliance Report, agency coordination, data collection and management, coordination activities.

**Integrated Regional Water Management Plan, Imperial Irrigation District, Imperial, CA** (June 2010 to Present). Writing sections of the IRWMP, providing support to project managers, agency coordination, conducted information gathering interviews, coordination activities.

**Poso Creek Regional Water Management Group/ Poso Creek Integrated Regional Water Management Plan, Semitropic Water Storage District (lead agency), Kern County, CA** (July 2010 to Present). Assisted in development of Negative Declaration for South Interconnection, assisted in development of DWR Grant Application, assisted in RWMG meeting activities (running meeting, meeting minutes, meeting agenda, status reports, etc.).

**Urban Water Management Plan, Tehachapi-Cummings County Water District, Tehachapi, CA** (July 2010 to Present). Writing sections of the UWMP, providing support to project managers.

**Antelope Valley Water Bank, Semitropic Water Storage District and Rosamond Community Services District, Antelope Valley and Rosamond, CA** (June 2010 to Present). Writing 2010 Annual Report, analyzing water quality data, conducting well level measurements on private wells, coordination activities.

**Prior Experience**
**Project Engineer, MNS Engineers, Inc., Bakersfield, CA** (2007 to 2010). Completed three phases of Master Drainage Plan for the City of Buellton that involved hydraulic analysis of existing systems and floodplain modeling of Zaca Creek using RiverCAD (HEC-RAS). Represented MNS as project manager and design engineer for Kermit King Elementary School Expansion in Paso Robles (approved by the Division of the State Architect).

Conducted preliminary design and analysis for multiple service systems (water, sewer, septic, storm water) for proposed events center near Lake Isabella. Calculated demands and modeled domestic water and fire water distribution systems for Foxen Winery Expansion Project in Santa Maria. Carried out hydrologic calculations and designed parkway drains for San Fernando Road Median Improvements in Santa Clarita.

Performed hydraulic and scour analysis of Telegraph Road Bridge crossing over Ellsworth Barranca near Santa Paula. Size and depth of scour protection were specified in accordance with Caltrans and HEC-11.

Involved in hydrologic design and selection of 3-stage water treatment system, which included hydrodynamic separation, filtration, and UV disinfection for Paradise Cove in Malibu. Taught office courses on the use and application of: Pumping System Design, Streambank Rehabilitation, StormCAD, WaterCAD, and Hydraflow Hydrographs Utilities.

**Associate Engineer, Meyer Civil Engineering, Inc., Bakersfield, CA** (2006 to 2007). Provided design and analytical support, including HEC-RAS modeling and analysis, for Central Park at Mill Creek in Bakersfield. Calculated storm system runoff values and designed conveyance and detention systems for commercial development near East Hills Mall in Bakersfield. Designed water supply system for H.M. Holloway Gypsum Mine in Lost Hills for industrial/mining use. Performed mapping investigation for use in various project site surveys. Involved in survey data collection.

**Project Engineer, Cornerstone Engineering, Inc., Bakersfield, CA** (2003 to 2006). Performed runoff calculations for various commercial, residential, and industrial projects. Calculated demands and modeled water distribution systems for commercial and residential projects. Performed flood routing and storm drain calculations and analysis. Calculated sewer demand and designed sewer systems for residential projects. Developed street improvement plans and grading plans for residential developments. Prepared reports for water distribution systems, sewer systems, runoff analysis, and hydrology plans. Taught office course on HEC-RAS use and application.

**Engineer I, County of Kern, Waste Management Department, Bakersfield, CA** (2003). Performed spot checks of grades for various county landfills. Designed grading plans for intermediate structures (ramps and drive aisles) on and around landfills.

**Intern, State of California, Department of Water Resources, Engineering Division, Sacramento, CA** (2001). Checked plans for pipeline rehabilitation. Prepared maps for use by survey and construction crews during site visits. Organized and prepared plans for distribution throughout office.

# Michael Conant, Staff Engineer

**Education**
B.S., Civil Engineering, University of California, Davis, 2009

**Registration/ Certification**
Engineer-in-Training Certification, No. 132379
HAZWOPER 40-Hour Training

**Software Proficiency**
AutoCAD™ 2007, ArcMAP™ 9.2, Microsoft Excel™ 2007, Microsoft Word™ 2007, Visual Basic for Applications

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## Background

Michael Conant has performed general engineering work that has involved performing analysis on watershed runoff characteristics, data QA/QC, producing plans and details using AutoCAD. His special interests are in geotechnical and water resources engineering.

## Experience

**Delta Flood Emergency Preparedness, Response, and Recovery Project, California Department of Water Resources** (2010 to present). 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 cost analysis for project, project site plans and details, and site feasibility research.

**Embedded Energy in Water Statewide and Regional Water-Energy Relationship, California Public Utilities Commission** (2009 to 2010). The project characterized the energy associated with water conveyence within California. Using this information can maintain water reliability throughout California while minimizing the amount of energy required to do so. Assisted in preparing energy intensity associated with water conveyance as well as pump characteristics at major pumping plants.

**Remedial Investigation Work Plan, Operable Unit 2 Schenectady Non-owned Former Manufactured Gas Plant Site, Schenectady, NY** (2009). The purpose of the project is to characterize subsurface conditions of a former MGP site using sonic rotary boring equipment to determine the extent of contaminant migration. Assisted in the Community Air Monitoring plan (CAMP), monitoring for VOC, particulates, and emission controls as mandated by the New York State Department of Environmental Conservation (NYSDEC).

**Rehabilitation of the San Carlos Irrigation Project Diversion and Conveyance Features, San Carlos Irrigation and Drainage District, Coolidge, Arizona** (2009). The project is focused on making irrigation system improvements, including rehabilitating approximately 40 miles of main canal and improving the District's lateral canal system to remove and manage sediment, conserve water, and improve operational effectiveness. Mr. Conant's primary activity for this project was the preparation of plans and details of several project features using AutoCAD.

**Hydrologic and Meteorologic Consulting Services, California Department of Water Resources** (2009). This program is about developing a multifaceted, integrated flood emergency response plan in accordance with the FloodSAFE California initiative. As part of the Forecast-Coordinated Operations element, Mr.

Conant is assisted with modeling watershed runoff for several river basins to better predict the watershed's response to hydrologic conditions. His work included research on available modeling programs and procedures, and preparation of data to be input into modeling programs.

## Intern Experience

GEI Consultants, Rancho Cordova, CA — Summer 2007, Summer 2008

- Worked with GIS and AutoCAD to produce figures for varying reports.
- Cost out design for different methods of measuring groundwater flow from artesian wells.
- Researched various topics for projects including GIS standards and IRWMP's.

Student Assistant, Crocker Nuclear Lab, Davis, CA — Summer 2006 to 2007

- Responsible for maintaining electronic and mechanical equipment for use in national air quality program.
- Trained several others in equipment repair and calibration methods.
- Helped prepare samples for spectroscopy analysis.

Summer Intern, Arvin Edison Water Storage District, Arvin, CA — Summer 2004, Summer 2005

- Recorded and maintained records of groundwater levels and groundwater quality for the purpose of grant applications.
- Helped perform pump performance tests on pumping stations throughout the district.

## Professional Associations

- Member, American Society of Civil Engineers

# Ryan D. Alward, Project Geologist

GEI Consultants

**Education**
B.S., Geology, California State University, Chico, 2004
M.S., Hydrogeology, California State University, Chico, (Est. Dec 2011)

**Registration**
Geologist-In-Training, California, No. 100, 2007

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## Background

Ryan Alward has four years of experience and supervises well construction and development projects; and rehabilitation and destruction projects including well performance evaluations and development of hydro-stratigraphic frameworks for groundwater management programs. He is familiar with most geophysical logging techniques, water quality sampling methods and the CEQA process. He has been employed with GEI since graduating college in June 2006 and has constructed eight large water supply wells ranging from 500 to 4,000 gpm, including two flowing artesian wells.

Mr. Alward has conducted hydrogeologic evaluations for groundwater management. He has experience with several drilling and sampling techniques used for water supply and geotechnical evaluations. He is also familiar with water quality sampling methods, soil sampling, and air monitoring techniques and the CEQA process. Mr. Alward is 40-hour OSHA Hazwoper certified.

## Experience

**Mitigation Water Supply, Coachella Valley Water District, Dos Palmas Oasis, CA** (2007-Current). Performed hydrogeologic investigation based on historical geologic data, field mapping and data gathered from installation of new monitoring wells and production wells. Provided construction design and oversight for two new flowing artesian production wells and rehabilitation oversight for three flowing artesian production wells. Assisted in design and provided oversight for the destruction of two artesian flowing production wells. Conducted aquifer tests to interpret hydrogeology of the confined and unconfined aquifers to understand storage and recharge potential for water supply.

**Citizens Gas Works, Former MGP site, National Grid, Brooklyn, NY** (2009). Performed soil sampling, soil gas and ambient air sampling and monitoring, Geoprobe and mud-rotary subsurface investigation and assisted a hydrogeologic investigation using boring-logs, historical data and geology to select potential well sites for remediation.

**Hydrogeologic Investigation, San Juan Water District, Granite Bay, CA** (2008). Conducted a hydrogeologic investigation using well-logs, historical data and geology to select potential well sites. Prepared plans and specifications. Logged the test holes. Observed and documented construction of a 2-inch diameter monitoring well construction with annular seals to separate aquifers. Collected water quality samples for Title 22 analysis. Prepared preliminary well design. Prepared a Mitigated Negative Declaration for construction of the new well.

**Township and Schroeder Wells, Butte Water District, Live Oak, CA** (2007- wells completed in August 2008). Performed test hole logging, e-log interpretation, final monitoring well design and construction oversight for three nested monitoring wells that were constructed to a maximum depth of 600 feet. Supervised the logging, construction, development, aquifer testing and analysis, water quality sampling, and geophysical evaluations for two 20-inch diameter water supply wells to about 600 feet. Mr. Alward also wrote the well completion reports and developed recommendations.

**Well Rehab Assistance, California American Water, Sacramento, CA** (2007-present). Participated in the assessment, development and implementation of well rehab recommendations. Performed packer testing, aquifer testing, water quality sampling, video surveys, deviation surveys, liner installation, discrete point source sampling, chemical cleaning and report preparation for six municipal supply wells. These rehabilitations restored over 3,000 gallons per minute of source capacity to the California American Water distribution systems.

**Agricultural Supply Wells, Sutter Extension Water District, Yuba City, CA** (2007-2008). Supervised the construction, development, aquifer testing, water quality sampling, and geophysical evaluations for two agricultural supply wells. In addition Mr. Alward gathered data and performed aquifer test analyses along with participating in the hydrogeological analyses for both agricultural supply wells. Mr. Alward also wrote the well completion report for both wells.

**Bear River Levee Setback, Three Rivers Levee Improvement Authority, Marysville, CA** (2007). Mr. Alward supervised the development and final construction stages of several pressure relief wells for the setback levee.

**Feather River Levee Evaluation, Three Rivers Levee Improvement Authority, CA** (2007). Mr. Alward assisted in the supervision and logging of several boreholes for a geotechnical evaluation to assess levee quality. Mr. Alward also assisted in the completion of boreholes to vibrating-wire piezometers.

**Tracy Groundwater Management Plan, City of Tracy, Tracy, CA** (2006). Developed the hydro-stratigraphic framework of the San Joaquin valley near Tracy, California. Created and interpreted cross-sections to define the aquifers characteristics, groundwater levels and water quality in the region.

**Water Supply Well Replacement, Fair Oaks Water District, Fair Oaks, CA** (2006). Performed well construction oversight, production well testing and water quality sampling. Performed NPDES and Low Threat Discharge permit monitoring and reporting

**Wellfield Optimization Project, Modesto and Oakdale Irrigation District, Modesto, CA** (2006). Participated in the development of a Decision Support System to maximize efficient use of groundwater and surface water resources for agricultural water supply. Compiled well performance data to recommend whether the well, pump or motor needed rehabilitation.

**Aquifer Characterization, California American Water, Larkfield Water District, CA** (2006 - Current). Participated in hydrogeologic study to determine the connectivity of local aquifers.

**Well Assessment, California American Water, Sacramento, CA** (2006). Compiled information and participated in performance evaluations to recommend whether the well, pump or motor needed rehabilitation.

### Training

- 40-Hour OSHA Hazwoper Certification
- 8-Hour OSHA Annual Refresher Course

## Professional Associations

Groundwater Resources Association, Member
Geological Society of America, Member

## Publications

Fluvial Channel Architecture and Depositional Setting of The Tuscan Formation, Chico, California by Steven Springhorn and Morgan D. Sullivan (GSA Cordilleran meeting, 2006)

Outcrop Characterization of Channelized Deep-Water Deposits, Carmelo Formation, Point Lobos State Reserve, Northern California by Steven Springhorn, Ryan Alward, Morgan Sullivan, Bryan Demucha, Sean Spaeth, Margaret Skartvedt-Forte, and Nick Lawlor (GSA-AAPG Joint meeting 2005)

Paleogeographic Analysis of the Tuscan Formation, Chico, California by Morgan Sullivan, Steven Springhorn, Ryan Alward, Margaret Skartvedt-Forte (GSA-AAPG Joint meeting 2005)

# Kwabena O. Asante, PhD, PE, Senior Hydrologist

GEI Consultants

**Education**
Ph.D.,Water Resource Engineering, University of Texas at Austin, 2000
M.S., Construction Management, University of Texas at Austin, 1997
B.S., Civil Engineering, University of Nairobi, Kenya, 1995

**Registration**
Louisiana, Registered Professional Engineer, No. 0033913

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## Background

Kwabena Asante has more than a decade of experience in hydrology. He is thoroughly skilled in modeling complex natural and man-made systems with successful applications in water, climate, renewable energy and natural hazards. He has a record of delivering on projects and long-term support contracts with public and private clients. Mr. Asante has extensive experience with hydrology and water resources, climate risk management, optimization and policy analysis, GIS and remote sensing, SQL and statistical analysis, engineering economics, project cost controls, and developing client relationships.

Mr. Asante is involved in a number of projects within GEI's Sustainability practice. Current projects include compiling energy efficiency best practices for water and wastewater utilities for the California Sustainability Alliance water-energy project, conducting climate adaptation and mitigation analysis for the Imperial Irrigation District Integrated Regional Water Management Plan and assessing climate change impacts for the Santa Barbara Water Supply and Demand Report Update. He is also a member of the GEI Sustainability Working Group which is advancing sustainable business practices within the company.

## Experience

**Integrated Regional Water Management Plan, Imperial Irrigation District, Sacramento, CA**. Served as climate change specialist for the Imperial Integrated Regional Water Management Plan (IRWMP). Conducted a literature review and summarized prior studies on potential impacts of climate change on Colorado River water supply and demand in Imperial Valley. Developed a process for addressing ambiguity in relationships between climate -induced changes in water fluxes and socio-economic responses. Developing criteria for rating proposed projects in terms of their contributions to climate adaptation and potential greenhouse gas emissions migitation.

**Updating Hydrology with Climate Change, California Department of Water Resources, Sacramento, CA** (May 2010 to present)**.** As GEI technical lead for climate change, Mr. Asante is working with the California State Climatologist to update the rainfall and runoff event frequency data used for engineering design in California to incorporate the effects of climate change. The project involves recovering historical rainfall, temperature, and runoff data from disparate sources; computing updated event frequency distributions; and merging the results with climate predictions from federal and state sources to project future changes in the state's hydro-climate. The results of the analysis will be publically accessible to engineers and planners performing climate change impact assessments through the online California Data Exchange Center (CDEC) database. Mr. Asante's responsibilities on this project include prototyping data algorithms, supervising analysts developing software applications, documenting work, and reporting to the client through monthly progress reports and presentations. He also served as a member of the Climate Thresholds Analysis Working Group, which is establishing guidelines for assessing the vulnerability of flood control infrastructure to climate change in California's Central Valley.

## Prior Experience

**Climatus, Mountain View, CA** (2008 to 2010). As a climate risk management consultant, Mr. Asante performed hydrologic and coastal impact analysis as part of a multi-sectoral climate assessment team. He performed economic analysis of mitigation and adaptation options, summarized results in climate impact statements and response plans, controlled project costs and accounting, managed the development of a climate database and online portal with over 10 billion data records from 3 million locations around the globe, and developed software with extensive use of Excel Solver and Analysis Toolpak, MySQL, Matlab, R, GeoSFM, and GIS with nine GCM models.

**USGS EROS Center, Sioux Falls, SD** (2000 to 2008). As a surface water hydrologist, Mr. Asante developed geospatial hydrologic modeling applications for the USGS and partner agencies under a technical support services contract. Prepared water and renewable energy resource assessments for policy makers. Monitored water and weather hazards with satellite imagery and models in support of short-range resource allocations. Performed medium range forecasting of water resources using climate forecasts and stochastic hydrology methods. Performed geospatial analysis including terrain analysis, delineation, image processing, interpretation, clustering, classification, and change analysis. Undertook field assignments to assess and map floods, drought and hurricane impacts including damage to infrastructure and crops. Conducted training of partners. Software used includes HEC HMS/RAS, GeoSFM, GeoWRSI, ArcView, Arc Info, ArcGIS, ENVI, Fortran and C. Published 18 peer-reviewed papers and project reports. Participated in 15 scientific meetings and workshops as well as 3 press conferences. Maintained research funding through competitive proposals.

## Professional Associations

- American Geophysical Union (AGU)
- American Society of Civil Engineers (ASCE)
- Project Management Institute (PMI)

## Publications

Patt, A., Tadross, M., Nussbaumer, P., Asante, K., Metzger, M., Rafael, J., Goujon, A. and Brundrit, G. 2010. Combining climate and economic scenarios to estimate future vulnerability to extreme climate and weather events. Proceedings of the National Academy of Sciences, 107, 1333-1337.

Senay, G.B., Asante, K. and Artan, G., 2009. Water balance dynamics in the Nile Basin. Hydrological Processes, 23(26), 3675-3681.

Asante, K.O., Artan, G.A., Pervez, S. and Rowland, J. 2008. A linear geospatial streamflow modeling system for data sparse environments. Int. Journal of River Basin Management, 6(3), 233-241.

Goteti, G., Famiglietti, J.S., and Asante, K.O. 2008. A Catchment-based Hydrologic and Routing Model System (CHARMS) with Explicit River Channels, Journal of Geophysical Research, 113(D14116), 1-15.

Artan, G., Asante, K. O., Smith, J., Pervez, S., Entenmann, D., Verdin, J. and Rowland J. 2007. Users Manual of the Geospatial Streamflow Manual (GeoSFM), USGS Open File Report, OF 2007-1440, Reston, Virginia.

Artan, G., Gadain, H., Smith, J. L., Asante, K.O., Bandaragoda, C. J. and Verdin J.P. 2007. Adequacy of satellite derived rainfall data for stream flow modeling, Natural Hazards, 43(2), 167-185.

Asante, K.O., Verdin, J.P., Crane, M.P., Sezin, A.T. and Rowland, J. 2007. Spatial data infrastructures in management of natural disasters, In Research and Theory in Advancing Spatial Data Infrastructure Concepts, 279-293. ESRI Press, Redlands, CA.

# Michael Cornelius, PG, Principal Hydrogeologist

GEI Consultants

**Education**
M.S., Civil Engineering, California State University at Sacramento, 1996
B.S., Geology, University of California at Davis, 1989

**Registrations/Licenses**
California, Professional Geologist, No. 6222

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## Background

Michael Cornelius is a professional geologist and civil engineer with 19 years of water resources consulting experience in California. His experience includes managing water resources planning and management projects, and groundwater investigations and modeling for local and regional projects. Mr. Cornelius has applied his background in hydrogeology and civil engineering to water resources planning studies and groundwater investigations for projects throughout California. This includes managing water management projects such as integrated regional water management plans and groundwater management plans as well as completing technical analysis required to support these projects. He has also prepared and managed water supply feasibility studies and hydrogeologic investigations which include the development of groundwater monitoring programs and groundwater modeling. These projects have been used to improve understanding of water resources management options, support environmental documentation, provide litigation support, and improve regional water management. These projects typically included an extensive public outreach component with presentations to advisory and stakeholders groups, and coordinating with multi-discipline project teams.

## Experience

**Tracy Regional Groundwater Management Plan, City of Tracy, CA** (2007): Mr. Cornelius served as the project manager for the preparation of the Tracy Regional Groundwater Management Plan (GMP) for the Tracy Subbasin. The project prepared an SB1938-compliant GMP for the Tracy Subbasin, a historically agricultural area that is undergoing rapid urban development. The GMP focused on actions to maintain and improve groundwater quality which is the primary concern of the water users in the subbasin.

**Yuba County Integrated Regional Water Management Plan (IRWMP), Yuba County Water Agency, Yuba County, CA** (2008): Mr. Cornelius is currently serving as the project manager responsible for the preparation of the Yuba County IRWMP to meet the requirements of the Integrated Regional Water Management Planning Act of 2002 (SB 1672). Yuba County has experienced several recent significant changes including water demand, a proposed water rights settlement, accelerated urban growth, new water quality issues, and need for additional/improved flood protection.

**Floodplain Mapping Project, California Department of Water Resources, CA** (2007): Mr. Cornelius was the GEI project manager responsible for leading the company's efforts to identify, map, and collect additional information on the existing levees and new levees in six counties in the Sacramento Valley.

**Paso Robles Groundwater Basin Water Banking Feasibility Study, San Luis Obispo County Flood Control and Water Conservation District, San Luis Obispo, CA** (2008): Mr. Cornelius is the project manager responsible for the preparation of this study to determine the feasibility of banking surplus State Water Project water.

**Engineering Feasibility Report of the Preferred Alternative for the Water Supply Enhancement Project, Madera Irrigation District, Madera, CA** (2005): As project manager, Mr. Cornelius was responsible for the refinement of the project configuration to recharge and store surface water from the San Joaquin and Fresno River at Madera Ranch.

**Merced Basin Data Assessment Report, Merced Area Groundwater Pool Interests, Merced County, CA** (2003): Project manager, identified and collected available data to: describe the regional hydrogeologic setting of eastern Merced County; investigated potential conjunctive use opportunities in the Merced Groundwater Basin; and developed a data management plan for MAGPI members.

**Hydrologic Analysis for the Zone 40 Water Supply Master Plan Update, Sacramento County Department of Environmental Review and Assessment, Sacramento County, CA** (2004): Project manager for the hydrologic analysis completed using the Sacramento County IGSM.

**Grant Application Preparation, Various Clients, CA** (2001-2008): Project manager responsible for the preparation of multiple grant applications for the Local Groundwater Management Assistance Grant Program (AB303), Proposition 50, Chapter 8 Integrated Regional Water Management Planning Grant, Proposition 50, Chapter 8 Integrated Regional Water Management Step 1 Implementation Grant, and Water Use Efficiency Grants.

**Upper Kings Basin Assessment Report, Upper Kings Basin ISI Participants, Fresno, Kings and Tulare counties, CA** (2002): Project manager for this project, which included evaluation of available hydrologic, hydrogeologic data as well as existing and future land use and water use conditions to develop the initial BMOs for the basin.

**AB 3030 Groundwater Management Plan, Calaveras County Water District, Calaveras County, CA** Project manager responsible for the development of the technical information. The study area in Calaveras County is part of the Eastern San Joaquin County Groundwater Basin.

**Camanche/Valley Springs Area Hydrogeologic Assessment, Calaveras County Water District, Camanche/Valley Springs, CA** (2003): Project manager for the first regional analysis of the hydrogeologic setting of the Camanche/Valley Springs area for Calaveras County Water District, which was funded by an AB 303 grant.

**Regional Water Master Plan, American River Basin Cooperating Agencies, Sacramento County, CA** (1998): Project manager for the groundwater analysis of the American River Basin Cooperating Agencies (ARBCA) Regional Water Master Plan.

**Modeling Goals and Objectives, Several DWR ISI Project Participants, Yolo, Tehama, Glenn, and Colusa counties, CA** (2002): Senior geologist as part of the work completed as the DWR Integrated Storage Investigation modeling contractor.

**American River Water Resources Investigation, U. S. Bureau of Reclamation and Sacramento Metropolitan Water Authority, Sacramento, Placer, San Joaquin, and Sutter counties, CA** (1998): Project engineer to redevelop and recalibrate the San Joaquin County IGSM as part of the American River Water Resources Investigation (ARWRI).

**Mokelumne Aquifer Recharge and Storage Project, East Bay Municipal Utility District, CA** (1998): Project engineer to link the Sacramento County and San Joaquin County IGSMs and analyze potential conjunctive use alternatives in the Eastern San Joaquin County Groundwater Basin.

**Conjunctive Use Project Assessments, Various Clients, CA** (2002): Project manager for several pre-feasibility analyses of potential recharge projects for the Upper Kings Basin ISI Participants, Merced Area Groundwater Pool Interests (MAGPI), Pleasant Valley Water District (PVWD), and Calaveras County Water District.

# Harold "Ted" Dunsford Jr., PhD, Project Professional

GEI Consultants

**Education**
Ph.D. Engineering and Applied Science Idaho State University, Pocatello, ID, 2010
M.S. Physics, Mississippi State University, Starkville, MS, 2001
B.S. Physics, Mississippi State University, Starkville, MS, 1998

**Registration(s)**
Licensed Engineering Intern, Idaho, E-6982
Formerly HAZWOPER 40 Hour Florida (2004-2006)

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## Background

Mr. Dunsford recently joined GEI as a project professional, who is responsible for GIS programming, GIS analysis, and database and geodatabase development; especially with respect to the Flood Emergency Response program. He will take the P.E. Civil exam in 2011. His range of services currently includes programming (C#, ASP, VB.Net, VB6, VBA, C++, Fortran, Java), developing GIS desktop software, GIS enabled web applications, geodatabase development, GIS Analysis, ArcGIS, Excel, and Access automation (using VBA). He has extensive experience in open source GIS software development in C#, having been the principal architect of the DotSpatial project, which serves as the core GIS library support for the Environmental Protection Agencies D4EM Project, as well as HydroDesktop run by the Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI). He also developed original algorithms to speed up automatic watershed delineation, and a number of side projects that involve GIS and analysis.

## Experience

**Flood Emergency Response, DWR, Sacramento, CA** (2010). Developed ArcGIS geodatabase for a web mapping system, and translated a Fortran program called CorrTide to C#.

**BCAL MapWindow - Virtual Watersheds, NOAA, Boise, ID** (2010 to 2013). Began work to develop GIS tools that enabled the construction of virtual watersheds using LiDAR datasets. Assisted Dr. Ames and Dr. Yang in devising stratagem for working with huge datasets and building efficient KD trees to work with huge datasets.

**HIS Desktop Software and Community Development, National Science Foundation via University of Texas, Austin, TX** (2009 to 2011). Designed the GIS visualization software and coordinated efforts by other graduate students to implement the "Web-Aware" catalog of hydrologic datasets that can be viewed and retrieved for analysis into a C# client application.

**Linked Watershed Modeling LDRD Project, Idaho National Lab, Idaho Falls, ID** (2009 to 2010). Coordinated with Brian Marchionni to integrate a process flow control system into a GIS framework for managing a modeling process for watershed modeling, and devised specialized watershed modeling algorithms to speed up the process.

**CZO Desktop – NSF Critical Zone Observatories, NSF w/University of Colorado, Boulder, CO** (2009 to 2010). Worked on the development of open source C# GIS visualization and analysis libraries.

**Water Resources Steering Committee, DOE/Inland Northwest Research Alliance (INRA) Idaho Falls, ID, AK, WA, MT, UT** (2008 to 2009). Providing technical insight related to water resources interests that overlapped with our open source GIS framework. Collaborated with Ames, D.P., Savage, B., and Crosby, B. to coordinate funding and research objectives associated with water resources for the Northwest United States.

**Improving Diversion Systems and Monitoring Arctic River Processes and Fluxes, DOE/Inland Northwest Research Alliance (INRA), Idaho Falls, ID, AK, WA, MT, UT** (2009 to 2011). Worked on C# GIS visualization tools, but for the INRA ICEWATER project, which focuses on GIS systems for hydrologic modeling. Collaborated with Ames, D.P., Savage, B., and Crosby, B. to develop research and design parameters for watershed modeling in the Northwest United States.

**CDI – Type II Collaborative Research, National Science Foundation. Idaho Falls, ID** (2009 to 2010). Understanding social networks within complex, nonlinear systems: geographically-integrated history and dynamics GIS [acronym: SOCNET] Coordinated with Dr. Ames and Mark Van Orden to develop documentation for the use of open source GIS systems in a historical, social-network analysis context. The history expertise was provided by Jack Owens and the networking algorithms by Kantabutra, V.

**Integrated Environmental Modeling Software Systems Innovative Working Group, NSF/Western Tri State EPSCoR Working Group, Idaho Falls, ID** (January 2010 to May 2010). Worked on C# GIS Software development and integration of modeling frameworks. Grant obtained by Ames, D.P. and Glenn, N.

**Carbon Sequestration Atlas – Web Mapping Tools, Montana State University, Big Sky Carbon Institute. Bozeman, MT** (May 2007 to December 2007). Kriged basalt borings to interpolate storage capacities with Chris Forsgren. Project Managed by Ames, D.P.

**Watershed Modeling at BCAL and the Geospatial Software Lab, NOAA, Boise, ID (**2009 to 2012). Worked on the development of watershed analysis tools, and GIS architecture, especially for working with LiDAR datasets. Grant obtained by Ames, D.P. and Glenn, N.

**Idaho NSF EPSCoR: Idaho EPSCoR RII: Water Resources in a Changing Climate, NSF, Idaho Falls, ID** (2008 to 2013). Development of C# GIS tools, this time focused on water resource modeling related to climate change. Developed with Baxter, C., Glenn, N., Germino, M., Ames, D.P., Crosby, B.

**Big Sky Regional Carbon Sequestration Partnership: Development of a National Mafic Rock Atlas, DOE, Idaho Falls, ID** (2008 to 2009). Assisted Chris Forsgren with setting up an ArcGIS Server project, ASP development for web mapping related to online catalog of Mafic Rock. Geologic expertise from Dr. Scott Hughes. Project managed by Ames, D.P.

**Geospatial Analysis Tools for Limnological Analysis of Fishing Suitability, Strategic Fishing Systems, Idaho Falls, ID** (2008 to 2009). Assisted with the development of faster data access and GIS display systems related to identifying optimal locations for fishing. Co-developed with Ahmad Aburizaiza and Jiri Kadlec. Work directed by Ames, D.P.

**FEMA Flood Rate Insurance Maps: New Tools for Delivery and Visualization, FEMA in collaboration with Dewberry, Inc., Idaho Falls, ID (**2008 to 2009). Developed some of the core GIS and analysis tools used by FEMA and assisted Brian Marchionni with the development of professional cartographic printing from open source GIS libraries. Funding obtained by Ames, D.P.

**Development of Tools for Ship Tracking and Navigation Nautical Charts, SoftOrigins, Inc., Idaho Falls, ID** (May 2008 to December 2008). Assisted graduate students with planning and problem solving for translating navigational charts into a modern georeferenced framework, and developed image catalog like behavior for C# GIS systems. Project Managed by Ames. D.

**UDOT GPS MapWindow Extensions, Utah Department of Transportation, Salt Lake City, UT** (May 2007 to December 2007). Assisted graduate students in problem solving performance issues related to real-time GPS integration into open source GIS software.

**INRA: Collaborative Water Resources Program Development, Inland Northwest Research Alliance, Idaho Falls, ID, AK, WA, MT, UT** (Mar 2007 to October 2007). Worked on C# GIS watershed modeling framework development. Collaborated with Ames D.P., Inouye, R. and Van Kirk, R. to develop ICEWATER project framework.

**INRA: Collaborative Water Resources Program Development, Inland Northwest Research Alliance, Idaho Falls, ID, AK, WA, MT, UT** (2006 to 2007). Worked on C# GIS watershed modeling framework development. Worked in conjunction with Inouye, R for establishing research objectives.

**Data for Environmental Modeling, EPA, Atlanta, GA** (2006 to 2007). Developed original C# GIS framework to provide a core for GIS analysis (overlay, buffering, raster clipping) required for EPA modeling.

**ISU EPSCoR RII: Carbon Export, Nutrient Cycling, Watershed Modeling, NSF, Idaho Falls, ID** (2005 to 2008). Developed a faster "Pitfill" calculation that drastically reduced the time required to automatically delineate a watershed. Other aspects of the project were addressed by Inouye, R., Ames, D.P., Baxter, C.

**Technical Support for BASINS and the Water Quality Standards Program, EPA. Idaho Falls, ID** (2005 to 2010). Worked with Allen Anselmo to develop automatic watershed delineation tools, developed custom pitfilling tools, and assisted with bug fixes and help with the MapWindow 4.0 GIS system. Project Managed by Ames D.P.

D**evelopment of GIS and Watershed Modeling Tools for BASINS including HSPF and SWAT Graphical user Interfaces integrating with SWAT, Idaho Falls, ID** (2005 to 2007). Assisted J. Veluppillai with translating database tools used by the SWAT modeling framework to work with MapWindow 4.

**MACTEC Operation and Maintenance for Pump and Treat Systems, Tallahassee, FL** (2006). Handled plumbing, electrical and mechanical maintenance of pumps, blowers, and pipes for systems located in the Florida Pan Handle. Numerous Projects.

**MACTEC Development of Custom GIS for Marketing, Tallahassee, FL** (2004 to 2005). Developed custom GIS software to identify sites that might have increased in significance because of changes in well locations, schools, or other factors that influence the remediation scoring system. Managed by Frank Lesesne.

**MACTEC Monitoring Well Installation Oversight, Tallahassee, FL** (2004 to 2006). Participated as oversight for the installation of numerous monitoring wells near the sites of known petroleum spills.

**MACTEC Well Sampling and On Site Soil Assessment, Tallahassee, FL** (2004 to 2006) Assisted with field soil and water sampling, oversight of DPT rigs, used field equipment such as FID.

**MACTEC DOT Airport Pavement Assessment, Tallahassee, FL** (2005) Assisted with planning, ArcGIS mapping and scheduling for pavement inspections of DOT regulated airport runways. Project managed by Frank Lesesne.

**MACTEC Field Oversight for Remediation Construction Project, Suwannee County Road Department, Live Oak, FL** (March to October 2004). Managed Safety, supervised and planned drilling locations. Developed 3D plume model from measurements and developed software to aid with mapping and planning. Project managed by Eric Blomberg.

**Inventory Data Management, Sun Orchard of Florida, Haines City, FL** (2002 to 2004). Inventory Management, Access database development, Excel Macro automation. Developed automation software to connect to telnet accounting software and created lots of systems to improve functionality.

**Mississippi Space Commerce Initiative (MSCI) Award, Starkville, MS** (2000 to 2001). Designed software to extract roads from 1 meter IKONOS satellite images as well as from old county maps in order to isolate intersections. The old maps were then transformed to reduce the errors in the maps.

## Professional Associations

- Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI)
- American Water Resources Association (AWRA)

## Publications

Dunsford H. 2010. MapWindow 6 - "Programming with the .Net MapWindow 6 Libraries: Map, Legend, Plugins, Data Providers, Tools" 1st International MapWindow GIS Users and Developers Conference, Orlando Florida, April 2010.

Dunsford H., Ames. D.P. 2009. MapWindow 6.0: An Extensible Architecture for Cartographic Symbology. Free and Open Source Software for Geoinformatics (FOSS4G), Sydney Austraila, October 2009.

Dunsford H., Ames, D.P. 2009. Restructuring of the MapWindow GIS Project, PositionIT ISSN:1818-2097, ee. Publishers, Muldersdrift, South Africa pp. 54-58, May 2009.

Marchionni, B., Ames D., Dunsford, H. 2009. MapWindow Modeler – A modular Spatial Modeling Environment for GIS. Free and Open Source Software for Geoinformatics (FOSS4G), Sydney Australia, October 2009.

Ames, D.P., Michaelis, C., Anselmo, A., Chen, L., and Dunsford, H. 2008. MapWindow GIS. Encyclopedia of GIS. Sashi Shekhar and Hui Xiong (Editors). Springer, New York, pp. 633-634, 2008.

Dunsford, H. and Ames, D.P. 2008. An Extensible, Interface-Based, Open Source GIS Paradigm: MapWindow 6.0 Developer Tools for the Microsoft Windows Platform. Free and Open Source Software for Geoinformatics (FOSS4G), Cape Town, South Africa, September 2008.

Marchionni, B., Dunsford, H., and Ames, D.P. 2008. Getting started with GIS programming using Microsoft .NET. Free and Open Source Software for Geoinformatics (FOSS4G), Cape Town, South Africa, September 2008.

Ames, D.P. and Dunsford, H. 2008. An OpenMI Model Interface Implementation for Hydrologic Modeling in an Open Source GIS. AWRA Spring Specialty Conference GIS and Water Resources V, San Mateo, California, March 2008.

Dunsford, H., Ames, D.P., Laniak, G., and Kittle, J. 2008. Community Code Development: A New Paradigm for Geospatial Software in Support of the Data for Environmental Modeling (D4EM) Project. AWRA Spring Specialty Conference GIS and Water Resources V, San Mateo, California, March 2008.

Dunsford, H. and Ames, D.P. 2007. A New, Faster, Scalable PitFill Algorithm, 6th International Symposium of Environmental Software Systems (ISESS07), Prague, Czech Republic, 2007.

Dunsford, H. and Ames, D.P. 2007. Development of an Open Source Geoprocessing Function Library for Microsoft .NET – Based Environmental Modeling Applications. International Symposium on Environmental Software Systems. Prague, Czech Republic, May 2007.

Ames, D.P., Michaelis, C., and Dunsford, H. 2007. "Introducing the MapWindow GIS Project." OSGeo Journal, Vol. 2, pp 13-16, August 2007.

Dunsford H., and Lestrade, J.P. 2001. Fully Automated Boundary Isolation in High-Resolution Satellite Images. Journal of the Mississippi Acadamy of Sciences, Tupelo MS., January 2001.

Dunsford H, Lestrade, J.P., Bandi, David. 2000. Space-Based Images of Earth: A new Era of High Resolution. Journal of the Mississippi Acadamy of Sciences, Tupelo MS., January 2000.

Dunsford T. and Lestrade, J.P. 1999. A Wavelet Analysis of Gamma-Ray Burst Time Profiles, Journal of the Mississippi Acadamy of Sciences, Tupelo MS, February 1999.

# Ronald J. Eid, PE, Principal Engineer

GEI Consultants

**Education**
B.S., Civil Engineering, University of California, 1977

**Registrations**
California, Registered Civil Engineer, No.31636
Arizona, Registered Civil Engineer

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## Background

Mr. Eid has over 30 years of experience with the firm, principally in the areas of water resources planning and construction management. Planning assignments have been related to project feasibility studies (including technical, economic, financial, and institutional feasibility); water supply operations studies; alternatives analysis and screening; groundwater management; groundwater banking and monitoring; water rights; environmental compliance; and surface water hydrology and hydraulics. Construction management has included contract administration, which has been related to the firm's work with irrigation distribution systems and has included the construction of buried pipeline distribution systems, pumping plants, canal lining, water-spreading facilities, and water wells.

## Experience

**Integrated Regional Water Management Plan, several water agencies in the southern San Joaquin Valley, California.** Supervised the preparation of an integrated regional water management plan on behalf of seven water agencies and one resource conservation district (with adoption by the agencies in 2007). Collectively, these agencies face reductions in both surface water supplies and the reliability of those supplies in the future. Continuing assistance is being provided to the Regional Management Group as it seeks to implement projects to mitigate the loss of water supply reliability in the Region.

**Groundwater Banking Feasibility Study, San Luis Obispo County Flood Control and Water Conservation District, San Luis Obispo County, California.** Providing support to a feasibility-level investigation of developing water banking in the Paso Robles basin, including formulation and evaluation of alternatives.

**Water Banking Project, North Kern Water Storage District, Kern County, California.** Assisted the North Kern Water Storage District in the preparation of a pre-feasibility report respecting a proposed water banking arrangement with the State of California.

**Agricultural Water Management Plans, Camrosa Water District and Pleasant Valley County Water District, California.** Prepared agricultural water management plans based on a review and evaluation of efficient water management practices identified by the Agricultural Water Management Council.

**Water Management Plan, Mojave Water Agency, Mojave, California.** Contributed to development of Mojave Water Agency's Regional Water Management Plan through the preparation of the surface water hydrology element.

**Groundwater Resources Study, City of Tracy, Tracy, California.** Evaluated existing and projected water demands and existing and prospective surface water supplies in the context of evaluating groundwater recharge and management strategies.

**Proposed Water Banking Project, North Kern Water Storage District, Kern County, California.** Evaluated the technical and economic feasibility of a water banking project and coordinated the preparation

of a comprehensive state grant application for funds to construct the required improvements (a canal turnout and deep wells).

**Groundwater Storage Projects, Semitropic Water Storage District and Arvin-Edison Water Storage District, Kern County, California.** Assisted in feasibility-level studies of groundwater storage projects to regulate available surface water supplies for the Semitropic and Arvin-Edison Water Storage Districts.

**Water Storage and Exchange Program, Arvin-Edison Water Storage District, Kern County, California.** Participated in the development of a groundwater model for a proposed groundwater storage project between the Arvin-Edison Water Storage District and the Metropolitan Water District of Southern California. The model was used in the evaluation of the water level impacts of project operations.

**Temporary Water Banking Program, Metropolitan Water District of Southern California, California.** Secured compliance with the California Environmental Quality Act (CEQA) for a temporary water banking program between Semitropic Water Storage District and the Metropolitan Water District of Southern California, through the preparation of an Initial Study. This project evidenced the groundwater storage of 50,000 acre-feet in 1993.

**Water Storage and Exchange Program, Arvin-Edison Water Storage District, California.** Coordinated water marketing activities, including landowner contacts and water service contracts, for the expansion of irrigation distribution system facilities for the Arvin-Edison Water Storage District.

**Water Rights Evaluation, North Kern Water Storage District, Kern County, California.** Conducted operations studies of irrigation district operations to evaluate several possible scenarios regarding the District's surface water rights. Participated in negotiations between water right holders.

**Groundwater Management Plans, Tulare Irrigation District and North Kern Water Storage District, California.** Prepared groundwater management plans to formalize existing groundwater management activities under available legislation.

**Groundwater Management Plan, Semitropic Water Storage District, Kern County, California.** Under available legislation, prepared groundwater management plan to formalize existing groundwater management activities and identify basin management objectives.

**Groundwater Management, Santa Paula Basin Groundwater Pumpers Association, California.** In conjunction with two other parties (a city and a water conservation district), evaluations of the Santa Paula groundwater basin included consideration of historical fluctuations of groundwater levels, historical production of groundwater, recharge mechanisms, relationship to adjacent basins, and conceptual operation of the basin.

**Groundwater Recovery Project, Semitropic Water Storage District, California.** Prepared a report on the technical feasibility of constructing and operating a well field to enhance the recovery element of an existing water banking project.

**Water Conservation Project, Tulare Irrigation District, Tulare, California.** Investigated the feasibility of avoiding or recovering conveyance losses from the Tulare Irrigation District's unlined Main Canal.

**Groundwater Model, North Kern Water Storage District and Semitropic Water Storage District, Kern County, California.** Supervised collection and development of historical water supply (i.e., recharge and pumpage) data for groundwater model development and calibration.

# Ginger G. Gillin, Principal Environmental Scientist

GEI Consultants

**Education**
M.S., Wildlife Biology, University of Montana, 1983
B.A., Geography, University of Colorado, 1979, Phi Beta Kappa

**Certifications**
Certified Fisheries Professional: American Fisheries Society

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## Background

Ms. Gillin has been a project manager or a project scientist on assignments involving environmental permitting; fish and wildlife planning; environmental documents preparation; hydroelectric relicensing; fish passage; instream flows; literature reviews; fisheries monitoring; highway, canal, and pipeline projects; and fisheries research. She has worked on aquatic environmental issues in the western U.S. for the last 27 years. She manages GEI's Portland, Oregon office.

## Experience

### Federal Energy Regulatory Commission Licensing

**Mystic Lake Hydropower License Compliance, Custer National Forest, Absarokee, MT** (2009 to present). Ms Gillin is assisting PPL Montana with license compliance for the Mystic Project in areas of water quality, fisheries monitoring, wildlife management, and riparian vegetation monitoring. She supervises preparation of technical evaluations, monitoring plans, and reports to comply with the requirements in the FERC license.

**Eagle Mountain Pumped Storage Hydropower Licensing, Palm Desert, CA** (2007 to present). Ms. Gillin is project manager for licensing the proposed 1,300 MW Eagle Mountain Pumped Storage Project in California. She is managing a team that is working on licensing this project using the Traditional Licensing Process through the Federal Energy Regulatory Commission (FERC). A Draft and Final License Application has been submitted to FERC, along with responses to FERC's requests for additional information request. A licensing decision on this project is anticipated in early 2010.

**Mystic Lake Hydropower Relicensing, Custer National Forest, Absarokee, MT** (2003 to 2009). Mystic Lake Hydropower Project is a 10 MW electrical generating project located entirely within the Custer National Forest, Montana. The project is licensed by FERC and operates under a Special Use Permit from the U.S. Forest Service. Ms. Gillin was the project manager for the GEI team working for PPL Montana on the Mystic Lake Hydropower Re-licensing. She was responsible for coordinating FERC submittals, including a License Application that included an Applicant Prepared Environmental Assessment (EA) for compliance with the National Environmental Policy Act and a Biological Assessment for the Endangered Species Act (ESA) Section 7 consultation. She also coordinated stakeholder collaboration and technical evaluations for environmental and engineering issues.

### California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA)

**Delta Flood Preparedness, Response and Recovery Project, Sacramento, CA** (2010).
Ms. Gillin managed a team to prepare the Initial Study and Mitigated Negative Declaration for compliance with the California Environmental Quality Act for a proposed Project to prepare for the emergency response needed in the event of flooding in the Sacramento-San Joaquin River Delta. The proposed Project requires several facilities that will be able to provide the repair material needed to respond to such an emergency event. These facilities will be located at strategic locations in the Delta and will contain rock stockpiles and

material transfer facilities for the emergency response. The environmental documentation was prepared on five potential sites in the Delta on behalf of the Department of Water Resources.

**Poso Creek Integrated Regional Water Management Plan, Kern County, CA** (2009). Prepared a draft environmental assessment of the proposed programmatic modifications to water use in the Poso Creek planning area.

Fish and Wildlife Management Planning, Fish Passage

**Intermountain Province Subbasin Plan, Northwest Power and Conservation Council, Portland, OR** (2003 to 2005). Ms. Gillin was the assistant project manager for a fish and wildlife mitigation planning project for the Columbia River Basin upstream of Chief Joseph Dam and downstream of the Montana/Idaho border, including portions of the Coeur d'Alene National Forest and Colville National Forest. The project involved preparing an assessment of the current conditions of fish and wildlife resources in the six subbasins of the Intermountain Province of the Columbia River, based upon a compilation of existing data, an inventory of current and recent fish and wildlife protection and restoration measures, and measureable biological objectives and strategies to restore fish and wildlife.

**Bull Trout Restoration Plan, MT** (1996 to 1998). Ms. Gillin served on the Governor of Montana's Bull Trout Restoration Team, and served as a technical assistant to the Montana Bull Trout Scientific Group. She has prepared numerous biological assessments (BAs) of project impacts to bull trout to comply with the Endangered Species Act. She is, or has been, involved in fish passage planning for bull trout at four major hydroelectric facilities on the Clark Fork River, Montana.

**Clark Fork Aquatic Habitat Problem Assessment, Kootenai National Forest, MT** (2005 to 2007). Ms. Gillin was project manager for a literature review and problem assessment for native salmonids in the lower Clark Fork River in Montana on behalf of Avista Corp. This project was designed to prioritize native salmonid restoration projects in a large watershed, largely located on National Forest System Lands. The purpose of the project was to assist with implementation of Protection, Mitigation, and Enhancement measures for Avista's Clark Fork Hydropower Project.

**Fisheries Monitoring Plan, East Boulder River, Gallatin National Forest, Big Timber, MT** (2000 to present). Ms. Gillin designed and implemented a fisheries monitoring plan for the East Boulder River related to monitoring the impacts of a platinum/palladium mine on behalf of the Stillwater Mining Company. The project was a collaborative effort with the Forest Service; Montana Fish, Wildlife, and Parks; Stillwater Mining Company; and stakeholder groups. She also implemented the monitoring including field collection of data, data analysis, and preparation of annual reports.

**Thompson Falls Hydropower Project – Fish Passage Project, Location, MT** (2002 to present). Ms. Gillin is the project manager for the fish passage program at Thompson Falls Dam. The goal of this project is to establish upstream adult fish passage for bull trout, and other native species, at this hydropower project. This project evaluated fish behavior in the tailrace of the dam, physical and biological factors that affect fish passage at this facility, and determined the best location for the fish passage facility, the best configuration for the facility, and permitting. A full height fish ladder is currently in construction.

**Fish Passage at Cabinet Gorge and Noxon Rapids Dam Location, MT** (1999 to 2004). Ms. Gillin was responsible for an assessment of bull trout use of an existing fish ladder as a component of a fish passage program at Cabinet Gorge Dam. She also prepared a fish passage facilities development plan for Cabinet Gorge and Noxon Rapids Dam, with bull trout being the target species. She participated in the design team to develop a fish trap for a trap and haul program at Noxon Rapids Dam and prepared the fish trap evaluation plan for that trap.

# Mark Hargrove, P.E., Senior Engineer

GEI Consultants

**Education**
B.S., Civil Engineering, California State University, Sacramento; 1998

**Registration**
Professional Civil Engineer, California, No. C63762

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## Background

Mr. Hargrove's has 11 years of civil engineering design experience on water resources projects, including water conveyance pipelines, canals, and pumping plants.

## Experience

**Wells 1 and 2, Butte Water District, California (2008 - 2009).** Mr. Hargrove was the project and design engineer for the design of Wells 1 and 2 for the Butte Water District. The project consisted of equipping two new wells with a pumps, motors, piping, valves, and meters. Well 1 pumping plant had a design capacity of 3,500 gpm and Well 2 pumping plant had a design capacity of 4,000 gpm. Each well site also included some site grading, a concrete pump foundation, concrete equipment pads, and fencing. Duties included civil site design, pump selection, mechanical piping and valve design and selection. Additional duties included project team coordination, attending client meetings, utility coordination, preparation of plans and specifications, review of shop drawing submittals, leading construction meetings, coordinating with Contractor and providing interpretations of the design documents. Mr. Hargrove used AutoCAD™ in production of drawings for this project.

**Phase II Lateral Pipelines, Stevinson Water District, California (2007 - 2008).** Mr. Hargrove was the project and design engineer for the design of the Phase II Lateral Pipelines for the Stevinson Water District. The purpose of the project was to replace existing earthen irrigation ditches with cast-in-place concrete pipe (CIPP) as part of an overall water conservation project. The project consisted of 1.5 miles of 30-inch CIPP, 2 miles of 36-inch CIPP, and 1 mile of 42-inch CIPP. The project also included concrete junction boxes, manholes, turnouts, and County road crossings. Duties included performing design calculations, preparing plans and specifications, and communicating with the Client. Mr. Hargrove used AutoCAD™ and Land Development Desktop Civil Design™ in production of drawings for this project.

**Wells 1 and 2, Sutter Extension Water District, California (2007 - 2008).** Mr. Hargrove was the project and design engineer for the design of Wells 1 and 2 for the Sutter Extension Water District. The project consisted of equipping two new wells with a pumps, motors, piping, valves, and meters. Both pumping plant capacities were 2,500 gpm. Each well site also included some site grading, a concrete pump foundation, concrete equipment pads, and fencing. One well site included a prefabricated enclosure for housing the pump discharge head and motor. Duties included civil site design, pump selection, mechanical piping and valve design and selection. Additional duties included project team coordination, attending client meetings, utility coordination, preparation of plans and specifications, review of shop drawing submittals, leading construction meetings, coordinating with contractors and providing interpretations of the design documents. Mr. Hargrove used AutoCAD™ in production of drawings for this project.

**Mid-Valley Pipeline Project, Coachella Valley Water District, California (2006 - 2008).** Mr. Hargrove was the project engineer for the final design of the Mid-Valley Pipeline Project for Coachella Valley Water District. The project consists of a 92-cfs pump station, screened intake, wetwell, surge protection facilities, 4.5 miles of 54-inch pipeline, and two 50 acre-ft reservoirs at the District's Water Recycling Plant Number 10. Duties include design of the pump mechanical facilities, civil, site and yard piping design at pumping plant site, project team coordination, government coordination, client coordination, preparation of plans and specifications, review of shop drawing submittals and

providing interpretations of the design documents. Mr. Hargrove used AutoCAD™ and Land Development Desktop Civil Design™ in production of drawings for this project.

**Town and Heather Well Pumping Plants, Fair Oaks Water District, California (2005 – 2007).** Mr. Hargrove was the project engineer for the Fair Oaks Water District's Town and Heather Well Pumping Plants. The project consisted of equipping two new wells with a pumps, motors, piping, valves, meters, and hypochlorite injection system. The pumping plant capacities were 2,000 gpm and 2,500 gpm. Each well site also included a concrete masonry unit building, site grading, and drainage facilities.. Duties included civil site, yard piping, and drainage design, pump selection, mechanical piping and valve design, and hypochlorite injection system design. Additional duties included project team coordination, attending client meetings, permitting, utility coordination, review of easement descriptions, preparation of plans and specifications, review of shop drawing submittals, and providing interpretations of the design documents. Mr. Hargrove used AutoCAD™ and Land Development Desktop Civil Design™ in production of drawings for this project.

**Fox Hills Raw Water Pump Station, San Luis Water District, California (2004).** Mr. Hargrove was the project engineer for the San Luis Water District's Fox Hills Raw Water Pump Station. The project consists of a 2.0-cfs pump station with permanent facilities size for future expansion to 10-cfs. Duties included design of the pump mechanical facilities, design of the wetwell configuration, project team coordination, preparation of plans and specifications, review of shop drawing submittals and providing interpretations of the design documents. Mr. Hargrove used Bentley Microstation™ and InRoads™ in production of drawings for this project.

**American River Pump Station, Placer County Water Agency, California (2001 – 2005).** Mr. Hargrove was the project engineer for the American River Pump Station Project for Placer County Water Agency. The project consists of a 100-cfs pump station, 130-foot long intake tunnel, 105-foot long wetwell, 1000 feet of 72-inch and 60-inch pipelines, over 4000 feet of access roads, drainage facilities, the closure of a 33-foot diameter river bypass tunnel, diversion dams, fish screens, and the restoration of an existing dried river channel bed. Duties include design of the pump mechanical facilities, project team coordination, government coordination, client coordination, preparation of plans and specifications, review of shop drawing submittals and providing interpretations of the design documents. Mr. Hargrove used AutoCAD™ and Land Development Desktop Civil Design™ in production of drawings for this project.

**Loomis Basin Pipeline, Placer County Water Agency, California (2001).** Mr. Hargrove was the project engineer. The project consisted of approximately 3 miles of 24-inch diameter pipeline and two creek crossings, one of which utilized an existing bridge and the other utilizing the bore and jack method. Duties included alignment selection, government coordination, utility coordination, preparation of design plans and specifications and review of easement descriptions. Mr. Hargrove used AutoCAD™ in production of drawings for this project

**Watt Avenue and American River Drive Transmission Pipelines, Sacramento Suburban Water District, California (2000 - 2001).** Mr. Hargrove was the project engineer for the Watt Avenue and American River Drive Transmission Lines for Sacramento Suburban Water District (formerly Arcade Water District). The project consisted of approximately 3 miles of 24-inch and 18-inch diameter pipelines. Duties included alignment selection, pipe material evaluation, government coordination, utility coordination, preparation of design plans and specifications, review of shop drawing submittals, and providing interpretations of the design documents. Mr. Hargrove used AutoCAD™ in production of drawings for this project

# David Miller, PE, PhD, Principal Engineer

GEI Consultants

## Education

Ph.D., Biological and Agricultural Engineering, 1988, North Carolina State University, Raleigh
M.S., Irrigation Engineering, 1982, Utah State University, Logan
B.A., English Literature, 1973, University of North Carolina, Chapel Hill

## Registration

Licensed Professional Engineer, Illinois (00620-045998)

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## Background

David Miller has over 25 years of water resource engineering experience. He has worked throughout the United States and overseas with the past twelve years of his career focusing on California water resource issues. He has worked with both urban and agricultural districts in preparing successful grant applications for funding from a range of state and federal sources.

## Water Conservation and Water Use Planning

**Modesto Basin Groundwater Management Plan, California** (2004 to 2005). Dr. Miller participated in development of a groundwater management plan for a group of agencies overlying the Modesto Groundwater Basin including the Modesto Irrigation District, the City of Modesto, the Oakdale Irrigation District, the City of Oakdale, the City of Riverbank and Stanislaus County. The plan conforms with the requirements of the California Groundwater Management Planning Act (SB1938) and the Integrated Regional Water Management Planning Act (SB1672).

**CALFED Water Use Efficiency Monitoring and Verification Project, California** (2002 to 2004). In an effort to improve its procedures for project selection and for monitoring and verification of funded projects, the CALFED Water Use Efficiency Program requested that a group of protocols be developed that can be applied to monitoring and verification of agricultural and urban Water Use Efficiency projects. As project manager, Dr. Miller worked with NRCS, USBR, and CALFED staff to assist in development of monitoring and verification protocols for on-farm and district-level agricultural projects as well as for an urban Water Use Efficiency project.

**Sacramento Valley Integrated Regional Water Management Plan** (2006 to 2007). Dr. Miller was actively involved in development of the Sacramento Valley IRWMP and led development of the grant application that resulted in DWR funding to support implementation of key projects included in the plan. In this work, Dr. Miller participated extensively in meetings involving plan formulation, in technical analysis of individual projects presented in the plan, in economic analysis, and in detailed production of the plan and the supporting grant application.

**Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead** (2006-2007). Dr. Miller led the Water Delivery team responsible for modeling and analyzing operational alternatives considered in this important EIS. Work involved extensive modeling of Lake Powell and Lake Mead to determine how changes in operations would affect reservoir elevations and storage, releases, and hydrologic conditions downstream of Lake Mead. This modeling and analysis was used to examine how alternatives would alter environmental conditions, flood response and water deliveries to the

Lower Basin States and to Mexico. This work was completed on schedule enabling the ROD to be signed in December 2007.

**Semitropic Water Storage District Water Management Plan** (2005 to 2007). Dr. Miller was project manager who initiated preparation of an Agricultural Water Management Plan that portrays water management and water conservation initiatives undertaken by Semitropic. This plan describes the intricate water banking and conjunctive water management programs operated by the district as well as detailing the district's facilities and irrigation operations. The plan helped Semitropic comply with the requirements of California's Agricultural Water Suppliers Efficient Water Management Practices Act.

**Stevinson Water District Integrated Water Management Plan, California** (2004 to 2005). Participated in development of this integrated program for managing water at Stevinson Water District located at the confluence of the Merced and San Joaquin Rivers. Elements of this integrated plan included water recycling and conservation, salinity control, water table management, management of flood waters, creation of wetlands to control non-point source discharges and generation of water for transfers.

**Stevinson Water District Lateral Pipelining Program, California** (2004 to present). To support implementation of the Integrated Water Management Plan, Dr. Miller prepared two successful grant proposals to fund replacement of open ditch laterals with pipelines. Funding was received from the Bureau of Reclamation's 2025 Challenge Grant Program for FY 2004 and from the Department of Water Resource's Water Use Efficiency Program. Dr. Miller is project manager for both phases of construction. Environmental, permitting and design studies are complete and construction is expected to be completed in October of 2008.

**Los Angeles Department of Water and Power, California** (2005 to present**).** Prepared successful grant applications for two water conservation projects that were approved for funding from the Department of Water Resources Water Use Efficiency Program. One project involves installation of irrigation controllers and upgrading of irrigation facilities at city parks; the second project supports installation of irrigation controllers on large commercial and public landscaped areas within the city. Work is expected to begin on both projects in early 2006.

**Sonoma County Water Agency – Russian River GIS, California** (2002 to 2004). The Sonoma County Water Agency developed a GIS of the Russian River Basin to assist in carrying out its modeling and management responsibilities. Dr. Miller served as project manager for development of techniques to be used to estimate water consumption within the Russian River Basin. The project focused on estimation of actual water use by wine grapes. Because wine grapes are typically deficit-irrigated to improve quality and because cultural practices such as trellis configurations affect crop water demand, state-of-the-art techniques were applied to estimate water consumption from vineyards and riparian areas.

**Oakdale Irrigation District – Water Measurement Study, California** (2003). As Project Manager, assisted the Oakdale Irrigation District perform a study of options for developing a comprehensive program for measuring spillage, drainage and stormwater outflows from its service area. The measurement program will support strategic planning on how best to manage and utilize these outflows.

# Ronald A. Schnabel, PG, CHG, Principal Geologist

**Education**
B.S., Geology, California State University, Sacramento, 1981

**Registration**
Registered Geologist: Arizona No. 39745, California No. 7836, Oregon No. 2020, Washington No. 463
Certified Hydrogeologist, California No. 867

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## Background

Mr. Schnabel has over 25 years of experience in geology and eight years of experience in hydrogeology. He has a thorough understanding of geology and hydrogeology and extensive knowledge and experience in GIS, statistics, surface water measurement methods, geophysics, and geologic computer modeling. Mr. Schnabel's experience includes surface water and groundwater related investigations, reservoir seepage and dam safety investigations, artificial recharge projects for aquifer storage and recovery, and well design, construction and testing. His regulatory experience includes environmental permitting, plans of operation, CEQA, and compliance.

## Experience

**Evaluation of Groundwater Banking Project Impacts, Environmental Science Associates, Kern County, CA** (2009). Provided evaluation of groundwater impacts of the proposed West Kern Water District Groundwater Banking Project on groundwater levels and water quality for an EIR. Used the WinFlow modeling software to estimate drawdown impacts of different proposed well configurations, well pumping amounts, and recharge amounts and locations. Examined historic groundwater level and water quality data to estimate project impacts on baseline conditions, and characterized the groundwater basin. Reviewed pumping tests to obtain aquifer parameters for modeling.

**Santa Ana River Groundwater Recharge Optimization Study, San Bernardino Valley Water Conservation District and San Bernardino Valley Municipal Water District, San Bernardino, CA** (2008). Conducted recharge infiltration rate studies as part of a team to evaluate potential recharge and optimization for the upper Santa Ana River. Conducted falling-head and constant-rate recharge tests on existing recharge basins and help plan new facility locations.

**Groundwater Evaluation, Blackwell Land Company, Kern County, CA** (2008). Evaluated the quality and availability of groundwater for approximately 45 square miles of the Berrenda Mesa Water District in western Kern County. Examined historic groundwater levels and water quality, Characterized the groundwater basin and provided estimates of current groundwater quantities and quality. Performed pumping tests to obtain aquifer parameters and for water quality testing.

**Yokohl Ranch Groundwater Study, The Yokohl Ranch Company, Tulare County, CA** (2008). Evaluated the potential impacts to groundwater levels from the proposed development of a master planned community. Reviewed and worked with water quality consultants on the potential impacts of the planned community to groundwater quality.

**Semitropic Ridge Groundwater Quality Investigation, Semitropic Water Storage District, Wasco, CA** (2007 to 2007). Studied historical water uses, groundwater quality and production information, oil and gas production data, and well construction information to evaluate the nature and occurrence of high saline groundwater.

**Semitropic Groundwater Model, Semitropic Water Storage District, Wasco, CA** (2003 to 2007). Project Manager for the development of a groundwater model used to estimate groundwater-banking affects on adjacent water districts. The model required the development of an Access database capable of manipulating large amounts of data on a monthly basis.

**Ocotillo-Coyote Wells Hydrology and Groundwater Modeling Study, US Gypsum, Ocotillo, CA** (2002 to 2007). Reviewed available reports, well information, groundwater level and quality data, and conducted field work to generate a conceptual geologic model used for a groundwater model. The work was the major part of an EIR/EIS to estimate future groundwater conditions with increased production from the basin. Work included environmental documentation and responses to comments on the project's hydrogeologic affects.

**Groundwater Banking Investigation, Kern-Tulare & Rag Gulch Water Districts, Kern County, CA** (2006 to 2007). Conducted groundwater recharge basin tests to estimate recharge rates for a proposed groundwater banking operation. Drilled exploratory borehole to determine the viability of conducting a groundwater storage and recovery program.

**2005 Groundwater Monitoring Improvement Project, Semitropic Water Storage District, Wasco, CA** (2005 to 2007). As the Project Manager, equipped 21 wells with continuous groundwater level measuring devices (data loggers), and conducted two aquifer tests to estimate aquifer parameters within unconfined and semi-confined aquifers.

**Centennial Hydrogeologic Investigation, Centennial Founders LLC, Los Angeles and Kern Counties, CA** (2003 to 2006). Conducted an extensive hydrogeologic study that included drilling and installing eight monitoring wells, designing and constructing a groundwater recharge test basin, and estimating the safe groundwater yield for local groundwater supply. This investigation was part for the water assessment study for a major planned community.

**Groundwater Storage and Recovery Pilot Project in White Wolf Basin, Wheeler Ridge-Maricopa Water Storage District, Kern County, CA** (2003 to 2005). Conducted a detailed hydrogeologic investigation on recharging State Water Project water in the White Wolf Basin for groundwater banking. The investigation included field work and reviewing reports, well construction information, groundwater quality and level data, oil and gas well information, and geophysical investigations. The investigation included surface recharge pond tests, design and construction of monitoring wells, water quality sampling, and conducting three aquifer pumping tests to estimate storage aquifer parameters.

**High Desert Power Project, High Desert Power Project LLC, San Bernardino County, CA** (2003 to 2004). Collected and analyzed surface and groundwater quality data and incorporated USEPA statistical guidance procedures to prepare the drafts "Statistical Analysis of Background Water Quality Data and Proposed Approach to Determine SWP Water Treatment Levels" "Sampling and Analysis Plan" (SAP) and the "Draft Treatment and Monitoring Plan" for groundwater banking operations.

**Groundwater Recharge Pilot Project, U.S. Bureau of Reclamation and Centennial Founders LLC, Los Angeles County, CA** (2005). Designed and constructed a test pilot recharge basin to estimate recharge rates for the proposed Centennial groundwater banking operation. This investigation was part of a larger groundwater investigation conducted by GEI for water supply assessment.

**Groundwater Storage and Recovery Pilot Project in White Wolf Basin, Wheeler Ridge-Maricopa Water Storage District, Kern County, CA** (2003 to 2005). Performed well pilot hole lithologic logging and sampling, oversaw isolation zone water quality sampling, and performed well design and construction management on four 1,000 to 1,200 foot deep monitoring wells, and one 1,800 gpm production well.

# Christopher Smith, PE, Senior Engineer

GEI Consultants

**Education**
B.S., Environmental Resources Engineering, Humboldt State University, Arcata, CA (1991)
M.S., Civil Engineering, California State University, Sacramento, CA (1997)

**Licenses/Certifications/Special Training**
Professional Civil Engineer, California, No. C56131

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## Background

Mr. Smith has over 17 years of water resources and energy management and technical assessment experience, including development and analysis of regional groundwater and surface water simulation models to analyze conjunctive use plans throughout California and Arizona. Mr. Smith has worked in both the public and private sector, in water resources planning, engineering, management, groundwater analysis, and groundwater remediation; and he has managed and assisted in developing water supply and demand studies, basin management plans, water rights investigations, groundwater yield analyses, and impact analyses to meet CEQA and NEPA requirements.

In addition, he has developed, calibrated, and applied numerical models; including IGSM, FEMFLOW, MODFLOW, and SANJASM and applied the use of geographic information systems (GIS) and database management systems (DBMS) to support water resource management projects.

## Experience

**Flood Emergency Preparedness, Response, and Recovery Program, California Department of Water Resources** (2008 to present) Mr. Smith was the project manager responsible for documenting the Sacramento River and San Joaquin River flood control project integrity and system. Mr. Smith was responsible for leading a team to research, locate, digitize, evaluate, and georeference data that would be made available for use during flood emergencies. Mr. Smith was the principal author for several reports regarding the development of the flood library, status of recommendation implementation of after-action reporting, and for improving and modernizing high-water event staking and monitoring.

**Integrated Water Resources Management Plan, Imperial Irrigation District** (2008 to 2009) Mr. Smith was the project engineer responsible for evaluating historical and forecasted municipal and industrial water demand for Imperial Irrigation District.

**San Joaquin County Freeport Element of the American River Use Strategy, San Joaquin County Department of Public Works** (2008) Mr. Smith was the project engineer responsible for evaluating the American River water supply, in accordance with the San Joaquin County water right to the American River. The evaluation included updating previously developed models with data from more updated versions of CALSIM.

**Study of the Role of Recycled Water in Energy Efficiency and Greenhouse Gas Reduction, sustainability Alliance, San Diego, Riverside, and Los Angeles Counties, CA** (2007). Mr. Smith was a principal author of the "Role of Recycled Water in Energy Efficiency and Greenhouse Gas Reduction" study. The purpose of the study was to estimate the energy and carbon benefits that could be achieved by accelerating and increasing development and use of recycled water in Southern California. Mr. Smith was responsible for developing a case study used in the study and to provide technical support for evaluating and determining recycled water energy use.

**Long-term Electric Load Forecasting Model, Power and Water Resources Pooling Authority, Carmichael, CA** (2007 to 2008). Mr. Smith was the project engineer responsible for the data collection effort to build the long-term electrical load forecasting model. This model is designed to estimate power requirements of fifteen irrigation districts and municipalities based on expected hydrologic conditions.

**Feather River Setback Levee, Three Rivers Levee Improvement Authority, Yuba County, CA** (2007 to 2009). Mr. Smith was the project engineer responsible for the modifications to a 115-kV power line and distribution network intersecting the levee and setback area. Mr. Smith was the point-of-contact for TRLIA in coordinating and managing activities associated with the modifications to the power networks.

**High Desert Power Plant Groundwater Banking Program, Constellation Energy Group, Victorville, CA** (2000 to 2001). Mr. Smith was the project manager that developed a FEMFLOW application to evaluate the water quality implications for a groundwater banking and extraction program at the High Desert Power Plant in Victorville, California. The power plant designs called for cooling water to be provided by the State Water Project where the cooling water supply would be injected in the groundwater system and extracted when needed. Using FEMFLOW with its water quality module, the impacts of alternative water injection and extraction scenarios were evaluated.

**Evaluation of Seawater Desalination Projects Proposed for the Monterey Peninsula, Monterey Peninsula Water Management District, Monterey County, CA** (2007). Mr. Smith was the project engineer responsible for evaluating the costs associated with several desalination projects that could be used to provide potable water for Monterey Peninsula Water Management District.

**Groundwater Banking Program MODFLOW Model Development and Application, Semitropic Water Storage District, Wasco, CA** (2006). Mr. Smith was a member of the review team to provide QA/QC of the MODFLOW development and application. Mr. Smith reviewed the datasets used in the development of the model, results of the modeling effort and critically evaluated the interpretation of results made by others on the project team. Findings from the study were used to expand the groundwater banking program.

**Madera Ranch Groundwater Bank, Enron/Azurix, Madera, CA** (1999 to 2000). Mr. Smith was a member of the review team to provide QA/QC of the MODFLOW development and application. Mr. Smith reviewed the datasets used in the development of the model, results of the modeling effort and critically evaluated the interpretation of results made by others on the project team.

**Semitropic Groundwater Banking Project, Semitropic Water Storage District, Kern County, CA** (2000 to 2001). Project Engineer responsible for evaluating alternative water banking scenarios for Semitropic Water Storage District. The scenarios included operating the existing water bank at different maximum volumes. The effects on the simulated groundwater elevations and boundary conditions were analyzed. Developed FEMFLOW data and provided an interpretation of model results.

**North Kern Groundwater Model Evaluation, North Kern Water Storage District, Kern County, CA** (2007 to 2008). Project Engineer to evaluate a spreadsheet-based groundwater flow simulation model for its applicability in evaluating conjunctive use projects. The model was originally developed for litigation purposes. Identified limitations of the spreadsheet model and recommended a course of action to develop a model that could evaluate conjunctive use projects.

**Yolo County IGSM Model Development and Calibration, Yolo County Flood Control and Water Conservation District, Yolo County, CA** (2005 to 2006). Mr. Smith was the project manager and was responsible for all aspects of the project. This is included the development, calibration and application of the Yolo County IGSM. Performed quality control and quality assurance of Yolo County IGSM input and output data, and developed the baseline conditions and model input files.

# Jeffrey E. Twitchell, PE, Senior Consultant

**Education**
B.S., Civil Engineering, California State University Chico, 1978

**Registration**
California, Registered Civil Engineer, No. 33653

## Background

Jeff Twitchell has over 30 years of project engineering and project management experience in the areas of flood control planning and design, environmental planning, permitting, constructing and maintaining flood control and water resource facilities. Mr. Twitchell is experienced in working with regulatory agencies, flood control districts, water supply agencies, at the local, state, and federal levels in permitting and operating projects, inclusive of obtaining Army Corps Section 404 permits, Section 104 and 408 Approvals, State 401 Certifications, state water rights, DWR FloodSAFE Early Implementation Program (EIP) and Local Levee Assistance Program (LLAP) grant funding and reimbursement agreements, and other related state and federal entitlements. Mr. Twitchell is an active member of the DWR FloodSAFE Interim Levee Design Criteria (ILDC) Work Group and a member of the Lower Sacramento Basin Work Group providing input to the Central Valley Flood Protection Plan. 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.

## Experience

**Levee District No. 1 of Sutter County District Engineer, Sutter County, California**. Former Levee District Engineer responsible for overseeing all engineering improvements and encroachments to 16.67 miles of levee along the right bank of the Feather River protecting Yuba City and communities in Sutter County west of the Feather River.

**Levee District No. 1 of Sutter County Star Bend Set-Back Levee on Lower Feather River, Sutter County, California**. Project manager for feasibility study investigations, design documents, and successful DWR Prop. 1E/84 grant funding in the amount of $20.5 million for the implementation a new setback levee to reduce flood stage levels in the Lower Feather River Basin. The setback levee eliminated one of the weakest links in the District's levee system protecting Yuba City and the communities located to the south in Sutter County. Project assignments included CEQA documentation, hydraulic modeling investigations, geotechnical investigations and final plans and specifications. Project manager responsible for interfacing with DWR, affected landowners, the Corps of Engineers technical and regulatory staffs, the Yuba Feather Work Group, local cost-sharing partners and the regulatory resource agencies. The setback levee also potentially serves as an expansion of the O'Conner Lakes wildlife, habitat enhancement, recreation area that is managed by California Department of Fish and Game.

**Reclamation District 2103 Bear River and Grasshopper Slough Levee Rehabilitation, Wheatland, Yuba County, California.** Responsible for obtaining regulatory approvals and permits for levee improvements and overseeing quality control of environmental sub-consultant work products. Proposed levee improvements include 3.5 miles of slurry cut-off walls along the Bear River and isolated improvements on Grasshopper Slough to obtain a 200-year level of flood protection for large portions of the City of Wheatland.

**Sacramento Area Flood Control Agency (SAFCA) and Three Rivers Levee Improvement Authority (TRLIA) Levee Improvement Projects, Yuba County, California.** As a Sub-Consultant to SAFCA and TRLIA, provided assistance to design and construction teams, responsible for acquiring all Central Valley Flood Protection Board Permits and selective CDFG and Corps 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..

**San Joaquin Area Flood Control Agency (SJAFCA), Stockton, San Joaquin County, California.** Secured all state and federal regulatory approvals (1996 – 2003) for flood control modifications and as-built documentation for over 56 miles of flood control levees in the Stockton Metropolitan area. Primary regulatory consultant over three year construction period (1996-1998) in obtaining all Central Valley Flood Protection Board encroachment permits, Corps of Engineers Section 404 individual and Nationwide permits, Caltrans encroachment permits, UPPR encroachment approvals, and CDFG Section 1600 streambed alteration permits for levee improvements extending over 56 miles in the Stockton metropolitan area.

**San Joaquin River, Lathrop, California**. Assisted with development of strategic plan for improving RD 2062's existing agricultural levees to meet FEMA and DWR levee improvement standards for urbanized areas. Worked with reclamation districts, landowners, developers, the Central Valley Flood Protection Board, and California Department of Fish & Game.

**Nevada Irrigation District 20-Year Raw Water Master Plan, Nevada County, California.** Project Manager and primary consultant that assisted NID with updating their Raw Water Master Plan (RWMP). The RWMP Update serves as NID's 20-year planning road map that: (1) estimates the quantity and location of future water demands in 5-year increments; (2) evaluates future water supply yields based upon extremely variable hydrologic conditions, reservoir storage capacities and water rights constraints; (3) provides an inventory all major water supply and capacity-constrained conveyance facilities; (4) prioritizes canal/pipeline improvements; and (5) developed a capital improvement program and District-wide improvements, inclusive of an Automated Mapping and Facility Management (AM/FM) pilot project.

**San Joaquin Area Flood Control Agency (SJAFCA), Stockton, California**. Managing NPDES aquatic weed control program from 2003 to present for Five Mile Slough in Stockton, including preparation of CEQA/NEPA documents, NPDES monitoring and reporting plans. Directing, monitoring, and reporting on aquatic herbicide application activities and mechanical removal of aquatic weeds.

**Browns Valley Irrigation District (BVID), Yuba County, California**. Small Hydro feasibility studies, participation in California Energy Commission (CEC) and PG&E's 2004 Request For Offers (RFO) for renewable energy resources; assisted BVID with ongoing water rights licensing and place of use modifications; managed design modifications to Yuba River fish screen/pumping facility; assisted with performing Probable Maximum Flood (FMF) analysis for Virginia Ranch Dam – Collins Lake.

**Water Management Plan Bear River – Sutter & Placer Counties, California.** Developed draft Conjunctive Use Water Management Plan and BMPs for South Sutter Water District encompassing over 50,000 acres of agricultural lands. Reviewed historical operations and usage of surface-water supplies and delivery systems, and historical groundwater uses. Developed plans to increase surface irrigation water delivery efficiencies and improve opportunities for groundwater recharge.

# Donghai Wang, Ph.D., P.E., Senior Engineer

GEI Consultants

**Education**
Ph.D., Hydrology and Water Resources, University of Arizona, Tucson, Arizona, 2002
M.S., Civil and Environmental Engineering, Tsinghua University, Beijing, China 1997
B.E., Chemical and Environmental Engineering, Beijing Institute of Light Industry, Beijing, China, 1994

**Registration**
California: Professional Engineer No. 69491

## Background

Mr. Wang is a professional civil engineer with six years of consulting experience in spatial analysis, geospatial data management, web-based GIS application development and database-driven website maintenance. He has extensive experience in GIS-related hydrology, hydraulics, and water management projects in Northern California. He is also familiar with Bay-Delta issues and state contracting processes. Mr. Wang is proficient in various computer languages and software such as ArcMap, ArcIMS, ArcSDE, ArcObject, MS Office, FORTRAN, JAVA, C, VB, MATLAB, PHP, .NET, HEC, DSS, MODFLOW, and SQL.

## Relevant Experience

### Database Management System Development

**Integrated Flood Information System, California Department of Water Resources.** Mr. Wang is leading the GEI team that is designing and developing California's statewide integrated flood information system. The goal of the integrated flood information system is to upgrade and modernize California Data Exchange Center (CDEC) by applying advanced GIS technology and integrating all flood related data into the real time hydrology data. The information system includes CDEC data, California Levee Database, flood warning and alerts, forecasting processes, flood system documentation, forecasting models and notification processes, and reservoir operations tools and information. A fully integrated decision management system and a user-friendly web-based GIS-enabled application are being developed to ensure all participating agencies have access to this flood information, and that the information can be easily exchanged and understood by all parties. The Integrated Flood Information System developed on latest ESRI ArcGIS Server technology will eventually be used as the decision support system for the California Flood Operations Center.

**Integrated Water Resources Information System (IWRIS), Department of Water Resources, California.** The goal of the IWRIS was to provide a simple, cost-effective spatial data management tool. The IWRIS is a web-based, statewide water resources information management system and serves as a platform for advanced GIS analysis. It integrates multi-disciplinary spatial data sources and provides access, visualization, retrieval, summarization, and query of Water Data Library, USGS stream flow and California Data Exchange Center information. It leverages existing databases and web sites and simplifies exchange of data within DWR. As the Technical Director, Mr. Wang was responsible for the following: system architecture and interface design; relational geo-database design and development; spatial data collection and analysis; mapping and graphical animation of hydrologic data; conversion and integration of preexisting MS Access and Excel databases into a new geo-database; tools and technology research coordination; design and programming of the system.

**Hydrologic Database Management System (HDMS) Development, City of San Bruno, CA.** As the developer for the web-based GIS HDMS for the City of San Bruno and the Westside Groundwater Basin, Mr. Wang developed GIS tools for assessing groundwater data. In coordination with other staff members, he deployed the system and provided user support and training.

**Grants Application Review System (GARS), DWR, California.** GARS is a web-based data management system used by DWR for review of grant applications and management of contracts during the project life cycle. As the lead developer, Mr. Wang was responsible for the following: design and development of the GARS using PHP programming language and MySQL database; migration from an existing MS Access database to a web-based system; deployment of the system using an Apache server and MySQL; technical support services; server and hosting support; and coordination among the development staff and users.

## Hydrologic and Hydraulic Modeling

**Stony Creek Fan IGSM Development and Model Development, Stony Creek Fan ISI Project Partners.** Mr. Wang was the Lead Engineer for the enhancement of IGSM code from Version 5.0 to Version 6.0, including modifying the IGSM code to simulate ground\water and surface water on a daily time step. Work also included performing GIS analysis of land use data, creating and managing groundwater GIS data, performing spatial analysis, collecting and analyzing stream flow and precipitation data, and developing model grid and model input data.

**Salinas Valley Reservoir Operations Modes, Monterey County Water Resources Agency, CA.** Mr. Wang served as Project Engineer for enhancement and application of a reservoir operations model that operates the two multipurpose reservoirs on the Salinas River system in order to meet the downstream water needs, including groundwater recharge requirements.

**IGSM2 Reservoir Operation Module, DWR, California.** As the lead technical specialist, Mr. Wang transferred the reservoir operations and water rights module from IGSM version 5.0 to IGSM2 (precedent of IWFM).

**Salinas Valley IGSM, Monterey County Water Resources Agency, CA.** As the Project Engineer, he was responsible for development and calibration of the groundwater simulation model for the Salinas Valley. The model was developed using the IGSM flow model, including code development and calibration of the reservoir operation module.

**Niles Cone – South East Bay Plain IGSM, Alameda County Water District and East Bay Municipal Utility District, CA.** Mr. Wang served as the Project Engineer responsible for developing code to incorporate the daily pumping data and evaluate the pumping test, enhanced the IGSM model to add lake vertical leakance model output and Lake Budget model output, performed calibration and sensitive analysis of its corresponding MODFLOW Model.

**Sacramento Area Water Forum, City-County Office of Metropolitan Water Planning, CA.** Mr. Wang was responsible for modifying the existing Sacramento County IGSM database for changes in the stream configuration, surface water diversions, and groundwater pumping. Based on this modification, he recalibrated the Sacramento County IGSM to match simulated groundwater levels with observed data.

## Technical Skills

GIS: ArcGIS, ArcIMS, ArcIMS Java API, ArcObjects, ArcSDE, ArcInfo, ArcEditor, ArcView and AutoCAD; Computer Language: FORTRAN, MATLAB, C/C++, Java, C#, Python, Visual Basic, SQL, PHP, ASP, ASP.NET and JavaScript; Software/Tool: HEC-HMS, DSS, HEC-DSSVue, HYDRUS-2D, Flowpath, MODFLOW, GMS, SURFER, GEOEAS, GSLIB, MODFLOW, MT3D, GW Vistas and TECPLOT; Database: SQL Server, MySQL, Access, FoxPro; Web Application: Ajax, Servlet, Java Server Pages (JSP), HTML, XML, CSS and SOAP Web service.

# John Zoraster, PE, Principal Engineer

GEI Consultants

**Education**
B.S., Civil Engineering, California State University, Los Angeles, 1985
B.A., Economics, Occidental College, 1971

**Registration**
California, Registered Civil Engineer, No. 44284

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## Background

Mr. Zoraster has 30 years of professional experience in water resources planning and public works projects. His experience includes planning and implementation of capital improvement programs, conjunctive use projects, municipal water supply, recycled water, water system valuation, and rate studies.

## Experience

**Mid-Valley In-Lieu Program, Coachella Valley Water District, Coachella, CA** (1999 to present). This conjunctive use program was initially conceived during a broad conjunctive use/stored water investigation for the District and Metropolitan Water District in 1999. Mr. Zoraster was responsible for the initial layout and sizing of production, transmission, distribution, and recharge facilities to improve CVWD's operational flexibility for that study. The program will establish a 50,000 acre-foot conjunctive use program combining surface water, groundwater, and recycled water. Mr. Zoraster was responsible for the 2005 Concept Report that became the basis for initiating design studies and development of an implementation plan to phase conversion of golf courses from their current water sources to the conjunctive use program. Mr. Zoraster was the assistant project manager for the Phase 1 design of six-mile, 54-inch transmission pipeline. The design was completed in 2006 and construction was completed in 2008. In 2010, Mr. Zoraster completed an evaluation of the conveyance capacity of an existing non-potable water system that is part of the program.

**Project Development Plan for the State Water Project Extension, Coachella Valley Water District, Coachella, CA** (2007 to present). The proposed State Water Project Extension would extend the State Water Project to the Coachella Valley. Several state water contractors, led by Coachella Valley Water District, are participating in the study: Mojave Valley Water District, Desert Water Agency, Coachella, and San Bernardino Valley Municipal Water District. Mr. Zoraster is the project manager on this study. Phase 1, completed in 2007, identified four possible alignments and a cost range from $ 0.7 billion to $1.5 billion for the project. Phase 2 studies, initiated in August 2008, completed in 2011, further evaluates two proposed alignments. One alternative, developed by Mr. Zoraster proposed collaborative use of existing conveyance systems of the project parties. If this alternative proves to be institutionally feasible, it could reduce the costs to the public by $200 million.

**Regional Urban Water Management Plan, Tehachapi-Cummings County Water District, CA** (2010). Developed a water balance for the Tehachapi region encompassing four groundwater basins and State Water Project supplies. Projection of the water balance through 2040.

**Integrated Water Resources Plan, Imperial Irrigation District, Imperial Valley, CA** (2009)**.** Imperial Irrigation District is considering options to better regulate their existing supplies and to provide water supplies for future economic development. Mr. Zoraster prepared reconnaissance level investigations of recycled water opportunities throughout the District's service area. He participated in the development of reconnaissance level investigations of brackish water desalting opportunities.

**Imported Water Spreading at San Antonio Spreading Grounds, Three Valleys Municipal Water District, Claremont, CA** (2005). Prepared a feasibility study for management of imported water spreading in

the Six Basins (vicinity of Claremont). Key elements of the study were evaluation of the recharge capacity of the basin, environmental documentation, modeling of the possible groundwater management options, and initial layouts of the required facilities.

**Water Fund Rate Study and Drought Planning, City of Rialto, Rialto, CA** (2004). The City of Rialto is dependent on local water supplies and has been adversely impacted by drought and perchlorates. Mr. Zoraster provided engineering support for Rialto's Perchlorate Recovery Activities. He prepared an engineering report in accordance with California Water Code Sections 350-359 to provide authority for declaration of a Water Supply Emergency. He prepared a water fund rate study that included development of revenue requirements and rate design.

**Financing of Capital Improvement Program, City of South Pasadena, Pasadena, CA** (2004). Developed implementation plan for $20 million CIP. The proposed implementation plan included program management requirements, schedule, bond issues, and rate increases. Prepared rate study.

**Water Marketing—Transfers and Exchanges, Stored Water Recovery Unit of the Water Banking Project, Semitropic Water Storage District, Kern County, CA** (2002). Planning of a $120 million addition to its existing Groundwater Banking Project that will increase the project's storage and recovery capacity. Prepared portions of the Engineering Report and environmental documentation. Compiled well completion and groundwater quality data.

**San Bernardino Valley Municipal Water District Master Plan Implementation, San Bernardino Valley Municipal Water District, San Bernardino, CA** (1999 to 2006). Mr. Zoraster has assisted the District with the implementation of their $250 million Regional Facilities Master Plan. Specific projects have included:

- Project Manager for the 8-mile long, 50-cfs Baseline Feeder West Extension Feasibility Study.
- Preparation of an Integrated Regional Groundwater Management Plan.
- Permitting, cost estimating, right-of-way acquisition support, and CEQA documentation for the Baseline Feeder South Pipeline Design.
- Development of water resources criteria including sizing of reservoir, groundwater production facilities, and proposed surface water treatment plant.
- Water System Vulnerability Analysis.

<u>Grant Applications</u>

Prepared grant applications or provided support for preparation of applications for the following agencies:

**Stored Water Recovery Unit of the Water Banking Project, Semitropic Water Storage District, Kern County, CA** (2005). Prepared portions of the engineering report and environmental documentation. Prepared economic justification of the project for a grant application to the California Department of Water Resources for this $120 million project. Prepared a proposal to the San Francisco Public Utilities Commission for a dry-year water supply purchase exchange program.

**Three Valleys Municipal Water District, Claremont, CA,** (2005). Prepared Groundwater Storage Program Construction Grant (Proposition 13) for the San Dimas Basin Conjunctive Use Project.

**San Bernardino Valley Municipal Water District, San Bernardino County, CA** (2002). Obtained $115,000 federal grant for a vulnerability analysis.

**Calleguas Municipal Water District, Ventura County, CA** (2000). Assisted in preparing a grant application for the development of a recycled water system and a groundwater treatment system.