INDEPENDENT EXTERNAL PEER REVIEW PANEL
for the
Little Colorado River (LCR) at Winslow, Navajo County, Arizona, Flood Risk Management Feasibility Study

The U.S. Army Corps of Engineers submits the following information per requirements in the Water Resources Reform and Development Act of 2014, Section 1044(c)(4)(B).

Entity Conducting the Review	
Outside Eligible Organization:	Battelle 505 King Avenue Columbus, OH 43201
Dates of Review	
Review Initiation:	8 February 2017
Type I IEPR Final Report Submittal:	25 April 2017
Reviewer Names and Qualifications	
David Luckie	**Civil Works Planner/Economist**

Mr. Luckie is an independent consultant with nearly 30 years of professional experience in water resource economics, planning, plan formulation, benefit-cost analysis, and risk-based analysis. His public works experience encompasses decades of work with Federal and non-Federal agencies, as well as local and state organizations. He earned his B.S. in economics and finance from the University of South Alabama in 1986. His professional experience includes working with multidisciplinary teams to provide or review complex planning studies for coastal storm risk management, dam safety, flood risk management, ecosystem restoration, and water supply and water quality studies. He is intimately familiar with Engineer Regulation (ER) 1105-2-100 and the 6-Step Planning Process and has prepared, supervised, or reviewed numerous planning studies in his career.

Mr. Luckie is familiar with the evaluation of alternative plans for both CSRM and flood risk management (FRM) studies, and has conducted, supervised, or reviewed several water resource studies featuring numerous alternative plans constructed from an array of different management measures. Over the last three decades, Mr. Luckie has been involved in numerous CSRM studies. Two examples are the Panama City Beach, Florida, study, a multipurpose project that included structural, non-structural, and recreation outputs, and the Mississippi Coastal Improvements Program following Hurricanes Katrina and Rita. He has also served as a panel member on the IEPRs of the Hereford Inlet CSRM Study in New Jersey and the Encinitas – Solana Beach CSRM Study in California. He applied his knowledge of ER-1105-2-100 and the 6-Step Planning Process in each of these high-profile efforts. Least cost analysis, also known as cost-effectiveness analysis, has been a very important aspect of Mr. Luckie's decades of work. He is familiar with the evaluation of alternative plans. As a Regional Economist with the USACE Mobile District (1988-2006), Mr. Luckie conducted, supervised, or reviewed benefit-cost analyses for a variety of water resource projects, both single-purpose and multi-purpose projects covering the full range of USACE missions. Relevant studies include the Apalachicola-

Chattahoochee-Flint River and the Alabama-Coosa-Tallapoosa Comprehensive Studies and the draft Programmatic Environmental Impact Statements covering the states of Alabama, Florida, and Georgia; and the Hunting Bayou General Reevaluation Report (GRR) in Houston, Texas. Mr. Luckie is very familiar with USACE standards and procedures. He has extensive experience in performing National Economic Development (NED) analyses, specifically as they relate to flood and coastal risk management. For more than 25 years, he has performed, supervised, or reviewed NED procedures for technical accuracy and compliance with policy and guidance and accepted planning principles. Such studies as Panama City Beaches and Mississippi Coastal Improvements reflect this expertise. Mr. Luckie has been using the Hydrologic Engineering Center's Flood Damage Reduction Analysis (HECFDA) software since its inception in the 1990s. He has also performed, reviewed, or trouble-shot scores of HEC-FDA analyses for federal, non-Federal, and private sector clients. In addition, he has mentored interns and junior economists in USACE methodologies for coastal flood risk management, requiring them to calculate without- and with-project condition damages, either by hand or with a Microsoft Excel spreadsheet, before allowing them to use HEC-FDA. He is also very familiar with the USACE Regional Economic System (RECONS) model and the estimation of Regional Economic Development benefits, and has used the model for both Federal and non-Federal project proponents since its inception.

Linda Leeman **Biological and Environmental Law Compliance Specialist**

Ms. Leeman, a senior biologist with Ascent Environmental, has 19 years of experience conducting environmental review and compliance under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) for water resource, flood control, and flood management projects. She earned her M.S. in natural resources from Humboldt State University in 2000 and is a certified wildlife biologist. Ms. Leeman has worked extensively within the western United States and Central America. She has extensive experience with CEQA, NEPA, and the Federal and California Endangered Species Acts (ESA) compliance for projects throughout northern and central California. Although her primary experience is in California, she has worked in Arizona as an independent contractor for the Arizona Game and Fish Department and is familiar with the natural resources in Arizona. Since 2000, she has prepared numerous impact analyses for biological resources and prepared documents in accordance with CEQA and NEPA requirements. These impact analyses include cumulative effects analyses, compliance with other environmental regulations, and public outreach and comment periods. Several water resource projects that she worked on triggered the Fish and Wildlife Coordination Act and relied on Habitat Evaluation Procedures (HEP) for the analysis. An example project is the Orestimba Creek Flood Control Project in Stanislaus County, California. She has extensive experience with ESA, developing compliance strategies through Section 7 of the ESA, not-likely-to-affect analyses, Biological Assessments, and conservation strategies. For example, she has been involved in the San Joaquin River Restoration Program Environmental Impact Report (EIR)/EIS and ESA compliance for the U.S. Bureau of Reclamation, the Calaveras Dam Project EIR and ESA compliance for the San Francisco Public Utilities Commission, and the Putah Creek Watershed Management Action Plan for the Creek Coordinating Committee. Through permitting of projects under the Clean Water Act, she has worked with cultural resource specialists and assisted USACE with Section

106 compliance, consulting with the State Historic Preservation Officer and tribal representatives. Ms. Leeman has also worked on several projects as the lead biologist for environmental compliance in coordination with archeologists for protection of cultural resources. Examples include construction monitoring (and discovery of American Indian burials and sensitive cultural artifacts) of the Level II Infill Correctional Facility Project and the Natomas Levee Improvement Program, as well as surveys for cultural resources at Beale Air Force Base. Ms. Leeman has experience serving on IEPRs for flood risk management projects, including the Berryessa Creek, California, General Reevaluation Study (GRS) Draft General Reevaluation Report and EIS/EIR and the Sutter Basin Pilot Feasibility Study, California: Draft Feasibility Report and EIS/EIR.

Jordan Furnans **Hydrology and Hydraulic Engineer**

Dr. Furnans, a senior engineer and hydrologist with LRE Water, LLC, has 17 years of experience studying and working in hydrologic and hydraulic engineering. He is a licensed professional engineer in Texas, New Mexico, Oklahoma, Colorado, Washington, Indiana, Illinois, Michigan, and Florida. He is also a licensed professional geologist in Texas, as well as a certified floodplain manager (CFM). Dr. Furnans holds a BSE in civil engineering from Princeton University, and both an MSE in environmental and water resources engineering and a Ph.D. in civil engineering from the University of Texas at Austin. As a certified floodplain manager, Dr. Furnans has the necessary training and experience to assess FEMA floodplain requirements and help clients evaluate and manage their flood-preparedness. He has used Hydrologic Engineering Center's River Analysis System (HEC-RAS) to define floodplains, and filed Letter of Map Revisions (LOMRs) with the Federal Emergency Management Agency (FEMA) upon reviewing changes to floodplains made by clients. He is well-versed in ArcGIS applications, and uses GIS daily in all his projects. The majority of his professional work in Texas has involved hydrologic statistical analyses of streamgauge records. This has involved time-series analyses to determine heterogeneity in annual, monthly, and daily flow data. He has performed statistical analyses for all U.S. Geological Survey gauges in Texas, quantifying and spatially mapping streamflow trends. He has also used baseflow analysis techniques to assess trends in inflows to the Highland Lakes (upstream of Austin, Texas), and served as an expert witness in legal cases before the Texas State office of Administrative Hearings, where he testified regarding his statistical analyses of streamflows, trends in precipitation, and reservoir inflows. Dr. Furnans has studied the physical bases for sediment transport models, and performed field data collection efforts to determine both bed load transport and suspended sediment transport (in Texas and Oklahoma). He also modeled sediment transport using EFDC, SED2D, and custom-designed streamflowpower relationships. The majority of his channel stability analyses have involved scour calculations around bridge piers, where he has used empirical equations and hydrodynamic models to calculate hydraulic forces on each pier. He has performed geomorphic assessments of stream alteration patterns in the Sabine and San Antonio Rivers (Texas), and assessed how high flow pulses are likely to damage and shape riverine landforms. Dr. Furnans has used Monte-Carlo type analyses, coupled with statistical analyses on inflow parameters, to assess uncertainty in water availability and hydrodynamic models in Florida and Texas. He has also helped Texas clients assess water supply risks associated with the vagaries of streamflow patterns in the Brazos River Basin, Texas. He used statistical techniques and Monte-Carlo analyses to assess uncertainty in water reliability calculations using State of Texas Watershed Assessment Models. Dr.

Furnans has focused most of his professional work in assessing Texas hydrology, performing analyses on every major river system across the state. He has also managed gain/loss studies on the Rio Grande River upstream of Albuquerque, New Mexico, and assessed the likely impacts of delayed or earlier onset annual snowmelt on river water availability for Albuquerque. Dr. Furnans is proficient with the HEC-RAS model, having used it to determine floodplains and minimum flows and levels for Florida streams, and in designing canal improvements for water providers in Texas. All of the modeling has been under steady-flow conditions. He is currently developing a model of about 20 miles of water canals in Fort Bend County, Texas, including over 20 bridge crossings and inline gate structures. He has studied the physical basis for flood wave routing simulated in Flo-2D, and used similar flood routing models, including the Interconnected Channel and Pond Routing (ICPR) model (for the City of Bonita Springs, Florida) and HEC-RAS 2D (non-project specific training efforts). In addition, he has addressed USACE's Safety Assurance Review (SAR) on previous IEPRs, including the Integrated Draft General Reevaluation Report (GRR) and draft Supplemental Environmental Impact Statement (SEIS) for the Hunting Bayou Flood Risk Management Study in 2013. Dr. Furnans is a member of the American Society of Civil Engineers, the Texas Floodplain Management Association, and the Texas Water Conservation Association. He recently presented a paper at the Environmental and Water Resources Institute (EWRI) World Environmental Congress in Austin, Texas.

Rune Storesund **Geotechnical Engineer**

Dr. Storesund is the Executive Director of the University of California—Berkeley (UC Berkeley) Center for Catastrophic Risk Management (CCRM), a group of academic researchers and practitioners who pursue transdisciplinary solutions to avoid and mitigate the aftereffects of catastrophic events. He also has a private civil engineering consultant. He has more than 16 years of planning, design, engineering, and construction experience working on a variety of projects throughout California, the United States, and ternationally. He earned a D.Eng. (2009) in Civil Engineering (Civil Systems focus) and an M.S. (2002) in Civil Engineering (Geotechnical Engineering), both from UC Berkeley. His D.Eng. Degree focused heavily on geotechnical engineering, geomorphology, and risk identification, analysis, and evaluation. He provides consulting services in all aspects of civil, geotechnical, water resources, ecological, restoration, and sustainability engineering projects. His expertise focuses on the application of reliability and riskbased approaches to engineering projects (with a specialization in environmental restoration and flood control projects) in order to effectively manage project uncertainties. He has participated in all aspects of engineering projects, from preliminary reviews, to detailed analyses, to construction observations and post-project monitoring. He is also the President of Storesund Engineering LLC, a Class A General Contractor Dr. Storesund’s work on four USACE projects—the N1 Levee, N2 Levee, Pacheco Levee, and Panhandle Berm Levee—demonstrates his extensive experience evaluating static and dynamic slope stability, seepage through earthen embankments, and settlement of earthen embankments. He also evaluated seepage through and settlement of earthen embankments for the USACE MRGO Levee project and gained additional expertise on settlement through his work on the USACE Bulge Levee project. Furthermore, Dr. Storesund gained experience evaluating underseepage through foundations of levee embankments through his work on the N1 Levee, N2 Levee, Bulge Levee, Pacheco Levee, Panhandle Berm, MRGO Levee, Amber

Knolls Reservoir, Platt Reservoir, Grape Creek Reservoir, and Red Hills Reservoir projects. He has evaluated underseepage under floodwalls on three other USACE projects (the IHNC floodwalls, 17th Street Floodwall, and London Avenue Floodwall); evaluated underseepage under closure structures on the USACE Bayou Bievenue Closure Structure, Bayou Dupre Closure Structure, and Hamilton Panhandle Control Structure projects; and evaluated underseepage of other pertinent features of flood protection systems such as outlet structures, overflow structures, and spillway structures. Dr. Storesund has worked on a number of projects in Arizona, including Chino Bandito, Chandler, Arizona. Dr. Storesund has participated in numerous projects related to USACE geotechnical practices. For more than 10 years, he directly participated in engineering design, specification development (SPECSINTACT), DrChecks, and MII/MCACES cost evaluations. Most recently, he served as the geotechnical engineer of record for the Hamilton Wetland Restoration project in Novato, California (2004 through 2014). Other USACE flood protection projects he has worked on include the West Sacramento Flood Control Project; the Las Gallinas Coastal Inundation Study; the Upper Penitencia Creek Flood Improvement Project; the San Lorenzo Flood Control Project; and the USACE Upper Napa River Flood Protection Project. Dr. Storesund has extensive experience with safety assurance reviews (SARs), having recently participated in the SAR for the USACE Princeville IEPR. In addition, in the aftermath of Hurricane Katrina, which hit the greater New Orleans area in 2005, he participated in an American Society of Civil Engineers assessment that served as the basis for the Guiding Principles for conducting USACE SARs. He has been active in advancing risk-informed decision making for critical infrastructure identification and management of uncertainties. His 'systems' synthesis perspective is unique among his peers, and he has routinely evaluated the application of redundancy, resiliency, and robustness. Dr. Storesund is a registered P.E. in California, Louisiana, Hawaii, and Washington State and a registered Geotechnical Engineer (G.E.) in California. He also is a Qualified Stormwater Pollution Prevention Plan (SWPPP) Practitioner (QSP) and Qualified SWPPP Developer (QSD).

Chris Brown **Civil/Cost Engineer**

Dr. Brown is an associate professor at the University of North Florida teaching civil engineering, fluid mechanics, hydraulics, senior design, foundation engineering, and engineering geology. He earned his Ph.D. in civil engineering in 2005 from the University of Florida and is a licensed, practicing professional engineer in Florida and Pennsylvania focusing on water resources and geotechnical engineering. Dr. Brown has 25 years of civil engineering experience including design, construction, inspection, and teaching, working with and for USACE (Philadelphia District, 1991 to 1999, Jacksonville District, 1999 to 2006), as well as municipal governments and private engineering firms. Dr. Brown has worked on levee project design in Florida, Puerto Rico, Delaware, New Jersey, and Pennsylvania. He has also developed grading plans for earth works and landfills. He has evaluated levee stability (slope stability, seepage, erosion, and settlement), and served on the original USACE ad hoc national levee assessment team. In addition, he has designed levee and bank protection schemes in multiple states involving riprap, gabions, articulated mats, and various geosynthetic materials. Dr. Brown also helped devise the scope of work for levee overtopping studies in the Southeastern United States after Hurricane Katrina. Dr. Brown is very competent in cost estimating for construction using the Micro-Computer Aided Cost Estimating System (MCACES) and has acted as cost-estimating IEPR reviewer on some of the largest USACE Civil Works projects, including the most expensive lock and

dam replacement in USACE history. He is very familiar with construction costing, material costs, labor costs, and overhead. Dr. Brown teaches construction cost estimating and contracting as part of the senior civil engineering capstone course series at the University of North Florida. He is also fully capable of addressing relevant SAR issues and has fulfilled this requirement for at least four other IEPR projects, including the Olmsted Locks and Dam 52 and 53 Replacement Project Post Authorization Change Report and the Dallas Floodway Feasibility Report and Environmental Impact Statement (EIS), Dallas, Texas. Dr. Brown is active in the Society of American Military Engineers (SAME) and the American Water Resources Association, and is the faculty advisor to the University of North Florida SAME student chapter.