INDEPENDENT EXTERNAL PEER REVIEW PANEL

for the

LOWER GUADALUPE FEASIBILITY STUDY (GUADALUPE AND BLANCO RIVERS), TEXAS INTEGRATED DRAFT REPORT AND ENVIRONMENTAL IMPACT STATEMENT FT. WORTH DISTRICT

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 Columbia, OH 43201
Dates of Review	
Review Initiation:	16 July 2019
Type I IEPR Final Report Submittal:	18 September 2019
Reviewer Names and Qualifications	
Gretchen Greene	**Plan Formulation/Economics**

For more than 25 years, Dr. Gretchen Greene, a principal economist with Greene Economics, LLC, has specialized in water resource economics, environmental valuation, regional economic impact assessment, benefit-cost analysis, regulatory analysis, population projections, urban water demand forecasting, and public infrastructure investment. She also has Civil Works planning experience on numerous projects related to water resources, including dam feasibility, levee alterations, flood protection, port development, conservation, and ecosystem service payments. She earned her Ph.D. in food and resource economics from the University of Florida in 1998.

Dr. Greene has extensive experience in economic analysis of water resource development, having worked on numerous Indian Water Rights litigation cases that hinge on benefit-cost analyses following the Principles and Guidelines for Water Resource Development, using the National Economic Development approach. She also led the Dredged Material Management Study, "Risk-Based Analysis of the Lewiston Levee," part of a dredged material management Environmental Impact Statement (EIS) for the Snake River system in which she estimated flood damage reduction benefits of the Lewiston Levee system. Dr. Greene also prepared a benefit-cost economic analysis of various dredge plans, levee alterations, and dredged material disposal options for USACE Walla Walla District. For this effort, she estimated flood damage reduction benefits using the HEC-FDA model; environmental benefits and costs were evaluated separately. The model and results were operated and presented in a manner consistent with USACE Engineering Manual 1110-2-1619, Risk Based Analysis for Flood Damage Reduction Studies (USACE, 1996).

Dr. Greene has more than 20 years of experience working with USACE. For Savannah USACE, she worked on a Water Supply Reallocation Report for the City of Thomson, Georgia (Chasman &

Associates). Dr. Greene has reviewed and completed several navigation benefit analyses for the Columbia River system, including an analysis of the socioeconomic implications of developing an additional marine terminal at the Port of Portland. She has also studied marine transportation as part of the economic analysis of rules that currently govern the transfer of oil within Washington State waters. This effort focused on the costs and benefits associated with changes in oil transfer safety procedures affecting vessels and four different types of marine facilities that transfer oil on or over state waters. She has used the USACE plan formulation process as a contractor to USACE. The process forms the basis for benefit-cost analysis that she uses every day as an economist. She is familiar with the IWR Planning Suite and has more than 20 years of experience using the USACE six-step planning process (following ER 1105-2-100) for a number of projects, including the Lewiston Levee project, a Water Supply Reallocation Report for the Savannah District, in the analysis of recreational benefits of a Proposed Water Storage Facility on the Fort Apache Indian Reservation in Arizona, as well as in her context as a reviewer for Fargo Moorhead, the Alton to Gale Organized Levee Districts, and the Savannah Harbor General Reevaluation Report and EIS. Most of the projects described above also included an element of National Economic Development benefits calculation and review. Dr. Greene is an active member of the Population Association of America, Western International Economic Association, the American Agricultural Economic Association, and the Society for Benefit Cost Analysis.

David Young **Environmental Law Compliance**

Mr. Young is an independent environmental/NEPA Impact Assessment consultant who earned his B.S. in marine biology from Texas A&M University at Galveston in 1993. He has 25 years of experience in wetland delineation, environmental assessments (EAs), water quality, and NEPA, and has been directly involved with water resource evaluation and NEPA assessments for more than 15 years. Throughout his career, he has been tasked with performing cumulative effects analyses for multi-objective public works projects, which include dam safety, flood control and management, navigation channel improvement projects, transportation, linear (utility), seismic exploration (geophysical exploration) on Federal lands, nuclear waste, and oil and gas prospect development on Federal lands.

Mr. Young has served as a NEPA, biology/ecology, and environmental expert for six IEPR reviews: the Mohawk Dam Major Rehabilitation Report (MRR), Chatfield Storage Reallocation Study and Environmental Impact Statement, Isabella Lake Dam Safety Modification Project, Leon Creek Watershed Feasibility Study, Hunting Bayou Flood Risk Management Study (for the Harris County Flood Control District), and Whittier Narrows Dam Safety Modification IEPR. Several of these studies included HEP evaluation, for which he was responsible for reviewing and identifying any potential technical issues. Mr. Young has also managed and provided technical support for the Houston Ship Channel-Placement Areas 14 and 15 navigational dredging project (USACE Galveston District). This project involved maintenance dredging of the Houston Ship Channel and the placement of dredged material for beneficial uses at Placement Areas 14 and 15. The project had potential impacts on environmental, estuarine, and coastal processes, and affected sensitive habitats such as oyster reef, seagrass beds, wetlands, and shallow-water estuarine ecosystems. HEP evaluations were performed for the project. It required the development of scope and appropriate methodologies for assessing impacts and involved a multitude of public and private (non-governmental) interests.

Mr. Young also managed and provided technical support for two flood control projects for Harris County Flood Control District: Hunting Bayou Detention Basin and White Oak Bayou Detention Basin. In both projects, an EA/Finding of No Significant Impact (FONSI) was prepared to evaluate the potential effects from the construction of a proposed regional stormwater retention/detention area to provide flood protection and enhance water quality to the citizens within the watershed.

Federal Emergency Management Agency (FEMA) was the Federal sponsor, and the EA/FONSI was prepared in accordance with FEMA guidelines. The preparation of the EA/FONSI also included various environmental technical documents and public involvement activities.

He has also prepared several EA/FONSIs for proposed 3D seismic survey projects, which involved extensive coordination with the National Park Service, U.S. Forest Service, and U.S. Fish and Wildlife Service. These 3D seismic surveys included cumulative effects analysis for seismic exploration and oil and gas field development over extensive project areas (one project exceeded 80 square miles). Pre-plot surveys were conducted to provide avoidance measures to seismic drilling activities. An assessment for vegetation communities within the project area was documented using spatial and statistical analyses that were coordinated with the Federal agency. Impacts on sensitive habitats (freshwater marsh, freshwater cypress/tupelo swamp, and brackish marshes) were also assessed. All activities, including scoping, were coordinated with various Federal, state, local, and non-governmental stakeholders.

Mr. Young's project experience also includes the management and preparation of several EA/FONSIs for transportation projects for the Texas Department of Transportation. These projects required the preparation and technical review of various technical reports, including but not limited to hazardous materials, regulatory permitting, management of archeological and historic resources studies in Central Texas, including tribal interests, biological assessments and other sensitive habitats (including habitat for Central Texas indigenous fish and wildlife species), socio-economical/community resources reviews, indirect and cumulative impact assessments, and public involvement. These projects involved various project trade-offs, such as avoidance/minimization of impacts for one constraint versus others, balancing the purpose and need and public-perceived controversy. His project experience routinely involved Clean Water Act (CWA) and Endangered Species Act (ESA) compliance and coordination.

He has been directly involved with water resource environmental evaluation or review and NEPA for more than 10 years, having prepared numerous NEPA documents for public and private clients, including USACE. His experience is highlighted by managing, preparing, and/or providing support on numerous Programmatic Categorical Exclusions, Categorical Exclusions, EAs/FONSIs, and Environmental Impact Statements (EISs). He has attended numerous training efforts on various aspects of NEPA, including Section 106 coordination, and state (Florida, Arizona, Texas) Department of Transportation processes related to NEPA compliance.

Peter Fischer **Hydrology and Hydraulic Engineer**

Mr. Fischer is a senior water resource engineer with 63 years of experience practicing in the fields of civil and water resources engineering, with river engineering experience on navigable waterways. He received his B.S. and M.S. degrees from the University of Minnesota-Minneapolis and, prior to retirement, was a registered professional engineer (P.E.) in Minnesota, North Dakota, Wisconsin, and Iowa. For more than 31 years, Mr. Fischer was with USACE St. Paul District, and for about seven years served as Chief of the Hydraulics and Hydrology Branch. His work included engineering management, project management, technical supervision, hydraulic design, and hydrologic engineering of a wide variety of projects in ecosystem restoration, storm water management, flood damage reduction, navigation, and water resources development, as well as field inspections and reporting of dams, embankments, levees, rivers, and channels. During his 25 years as a part-time member of the Water Resources Division of Short Elliott Hendrickson, Inc. (SEH Inc.), Mr. Fischer was involved in the hands-on design of water resources projects. His work included preparing concept and preliminary designs, providing hydraulic and hydrologic engineering advice to project designers, providing peer and quality review of hydrology and hydraulic modeling, and design reports, and preparing and coordinating the preparation of design

and environmental reports. For several flood damage reduction projects, he provided expert technical advice, troubleshooting overview, quality review, and hands-on-design, for example:

- Roseau, Minnesota – design water surface profiles for 1% flood using HEC-RAS, permissible bypass channel cross-section dimensions and slope to limit velocity to a non-damaging rate, hydraulics of inlet and outlet structures
- Black River Falls, Wisconsin – discharge frequency of the Black River 1% flood using the HEC-Flood Frequency Model, water surface profiles for pre-project and with project modifications using HECRAS, top of levee profile, levee set-back, interior drainage hydrology using HEC-1 and HEC-HMS, ponding and pumping capacities
- Dyer, Indiana – discharge frequency for the Hart Ditch and Plum Creek 1% flood using the HECFlood Frequency Model, water surface profiles for pre-project and with project modifications using HEC-RAS, top of levee profile, levee set-back, interior drainage hydrology using HEC-1 and HECHMS, ponding and pumping capacities.
- East Grand Forks, Minnesota – water surface profiles for the large flood plain overflow channel for pre-project and with project modifications using HEC-RAS, design water surface profiles and hydraulic design of a new diversion channel, hydraulic design of inlet and outlet structures, top of levee profile, levee set-back, interior drainage hydrology using HEC-1 and HEC-HMS, ponding and pumping capacities
- An IEPR for the Papio, Nebraska NRD on the Lower Platte River, Papio Creek, and a reach of the Missouri River – review and comment on discharge frequency of the Papio Creek 1% flood that used the HEC-Flood Frequency Model, water surface profiles for pre-project and with project modifications that used HEC-RAS, top of levee and floodwall profile, levee and floodwall set-back, commented on interior drainage hydrology that used HEC-1, HEC-HMS Puls routing, ponding (detention/retention basin) capacities and 1% ponding elevations, evaluated possible use of hydraulic and hydrologic sediment transport models
- Flood Plain Encroachment Study on the Lower Minnesota River – reviewed water surface profiles for the 1% flood that used HEC-RAS without and with overbank encroachment for about a 10-mile reach upstream.

Mr. Fischer has experience in design and construction of ecosystem restoration projects and navigation features on rivers. As an example, he worked on studies and design for providing chutes to backwater areas for habitat restoration. For more than 10 years he worked on and managed hydraulic navigation channel design on projects along the Mississippi River and tributaries, and projects that required the design of riprap bank protection where the navigation channel was eroding its banks, diversion dikes, channel closure structures, dredging and low overflow spillways. He worked on several studies and rehabilitation projects on the Mississippi River and its tributaries, including the Mississippi River Locks and Dams 1 to 10 Rehabilitation projects, and projects to repair erosion downstream from Mississippi River Locks and Dams. He prepared hydraulic studies for the extension of the Mississippi River Navigation channel upstream from Lock and Dam 1, concentrating on the location of dredged material disposal areas to limit channel velocities to navigable rates. Mr. Fischer has also worked on small harbors of refuge projects on Lake Superior where design and layout must consider protection of existing wildlife
Habitat.

Mr. Fischer has a thorough understanding of the physical effect of river training structures on river bathymetry, velocities, and water surfaces; river data collection; and river geomorphology. This is demonstrated by his work on navigation channels on the Mississippi, Minnesota, and St. Croix rivers. He has a thorough understanding of design culverts and channel improvements in urban settings. While working for SEH Inc., he provided guidance and technical review for the storm water master plan for Grand Forks, North Dakota, which included large interceptor pipe, channels,

culverts, and structures. He also worked on the interior drainage system for East Grand Forks, Minnesota, which included pipe outlets, storm water pipes, channels, culverts, and structures.

Mr. FIscher has recently participated in independent reviews of design and feasibility reports for levees, canals, and other water control facilities for USACE. He served as a member of an IEPR team for two projects within the New Orleans Hurricane and Storm Damage Risk Reduction System and a project that included the upgrade of three urban flood damage reduction systems.

Mr. Fischer is an active member of the American Society of Civil Engineers, the U.S. Committee on Large Dams, and the U.S. Committee on Irrigation, Drainage and Flood Control.

Josh Repp **Civil/Structural Engineer**

Mr. Repp has 15 years of structural engineering experience on various multidisciplinary waterfront, navigation, hydraulic, transportation, and building projects. He earned an M.S. in civil-structural engineering from the State University of New York, Buffalo in 2003 and is a licensed professional engineer in New York and Kentucky. Mr. Repp has expertise in condition assessment of existing structures, planning, alternative analysis investigation, structural design, and project management. He has completed numerous inland waterway projects for USACE, the New York State Canal Corp. and other state and canal authorities. Rehabilitation and restoration of navigation, water retention, and waterfront facilities has been a highlight of his experience in recent years.

Mr. Repp has assisted USACE St. Paul District on the Devil's Lake City Embankments – East Ditch Pump Station, Devils Lake, North Dakota as a cost and structural engineer. He was responsible for the evaluation, retrofit, and replacement alternatives to upgrade an existing pump station. The project included raising existing embankments to accommodate future elevated lake levels. He evaluated structural retrofit capabilities for modifying the existing pump station and provided station replacement concepts for increased static head conditions and improved overall capacity. Mr. Repp coordinated the structural detailing and station layout with hydraulic staff to meet Hydraulic Institute requirements.

For the New York State Office of General Services (NYS OGS), Mr. Repp was the project manager for the rehabilitation design of Clear Lake Dam in North Collins, New York, an existing earth dam and concrete spillway, to comply with NYS Department of Environmental Conservation (NYSDEC) dam safety criteria (Part 673). The project included a full-scale rehabilitation of the dam, including anchoring of the concrete spillway, stabilization of an existing displaced chute wall (concrete gravity), restoration of an existing intake structure and low-level-outlet system, flatting of earthen dam embankment slopes, and several site improvements. Mr. Repp was a structural project engineer on the Red House Lake Dam & Bridge Assessment and Design in Allegany State Park, NY, where he prepared a comprehensive dam safety engineering assessment report to summarize the existing dam's performance in terms of NYSDEC compliance requirements, including structural stability analysis on an existing 160-foot-long concrete gravity dam. He prepared plans, specifications, and a cost estimate for rehabilitating the dam to comply with NYSDEC requirements, including anchoring of the concrete spillway, replacement of an energy dissipation system at the base of the spillway, and replacement of outlet gates to restore the low-level outlet system for the dam. The project also included temporary lowering of the impoundment, flattening of slopes for the earthen portion of the dam, and several other site improvements. He also worked on the Utica Tainter Gate and Dam Rehabilitation project as a structural project engineer for rehabilitation and modification of a combination fixed crest and tainter gated dam on the Mohawk River. The number of tainter gates was reduced from three to two and a new concrete fixed crest section added. Deteriorated concrete piers and abutments were also rebuilt, cofferdam impact studies, in-depth inspections, esign of new steel gates, assessment of dam stability, and foundations were also provided.

As design engineer on the New York State Canals Lock E-10/Dam 6 Emergency Spillway Repair, Mr. Repp designed a new spillway that included features such as additional sheet pile cutoff walls and more robust structural slab design to reduce risk of heavy scour damage during heavy flooding events. For USACE's LaGrange Lock Alignment Study, he assisted USACE in determining the preferred methodology to choose the final alignment of the replacement lock. This project developed a new 110-foot wide by 1200-foot long lock located landward of the existing lock requiring excavation behind the existing landward lock wall for the manmade channel.

Rune Storesund **Geotechnical Engineer**

Dr. Storesund is the Principal Engineer at Storesund Consulting and the Executive Director of the University of California (UC), Berkeley Center for Catastrophic Risk Management. He also serves as an on-call expert geotechnical engineer (G.E.) to the State of California's Department of Consumer Affairs for its annual examination. He earned his doctorate (D. Eng) in civil engineering from UC Berkeley; is a registered civil engineer in California, Louisiana, Hawaii, and Washington, and is a registered G.E. in California. He has 18 years of experience in planning, design, operation and maintenance (O&M), construction, and decommissioning of Civil Works structures and has worked on a variety of projects throughout the United States and internationally.

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, Design Review and Checking System (DrChecks) collaboration, and Micro-Computer Aided Cost Estimating System (MCACES/MII) cost evaluations. He has demonstrated experience performing geotechnical evaluations and geo-civil design for USACE flood risk management projects with dredged material disposal sites and using dredged material for ecosystem restoration. Most recently, he served as a G.E. of record for the final shaping of the Hamilton Wetland Restoration project in Novato, California (the entire project spanned 2004 through 2014). The project involved deepening the Port of Oakland, transporting the material via barge to an off-coast pumping station, then pumping the dredged materials into a former Army airbase to create constructed beneficial wetland and upland habitats. He performed site characterization, engineering analyses (e.g., settlement, static/dynamic slope stability, seepage, wave runup), construction oversight, and post-project monitoring (terrestrial light detection and ranging [LiDAR]). 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 experience related to the design of flood risk management projects associated with the design and construction of levee and flood risk management structures, including static and dynamic slope stability, seepage through earthen embankments, and underseepage. He has been an active participant in ASCE committees on the local and national level since 1998. Dr. Storesund is familiar with large, complex Civil Works projects with high public and interagency interests. Following Hurricane Katrina, which hit the greater New Orleans area in 2005, he participated in a review of the performance of the Hurricane Defense System for the greater New Orleans area, the largest and most complex flood protection project in the United States. He completed a study evaluating the improved Hurricane Protection System from a holistic systems-based perspective, using the modeling tool Systems Modeling Language (SysML) to synthesize and integrate disparate system elements. He has also worked on the Louisiana Coastal Restoration initiative (with the Environmental Defense Fund) and the National Science Foundation-sponsored Resilient and Sustainable Infrastructures project, evaluating interconnected, interrelated, interactive critical infrastructures in the California Delta.

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, he participated in an ASCE 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.	