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**

<table>
<thead>
<tr>
<th>Outside Eligible Organization:</th>
<th>Battelle</th>
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<tbody>
<tr>
<td>505 King Avenue</td>
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<tr>
<td>Columbia, OH 43201</td>
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</tbody>
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**Dates of Review**

| Review Initiation:               | 29 November 2019 |
| Type I IEPR Final Report Submittal: | 13 February 2020 |

**Reviewer Names and Qualifications**

<table>
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<tr>
<th>Don Ator</th>
<th>Planning Formulator/Economist</th>
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Mr. Ator is an independent consultant and serves as Research Associate, Professor, and Undergraduate Advisor in the Department of Agriculture Economics and Agribusiness at Louisiana State University. He earned his M.S. in economics and agriculture economics and his M.B.A. with a concentration in finance and accounting from Louisiana State University. His current research is in financial resiliency analysis and planning for local governments in Louisiana, Texas, Alabama, Mississippi, Florida, Georgia, Kentucky, and Nebraska.

Mr. Ator has 40 years of experience working for 28 USACE districts, first as a full-time employee with the Vicksburg District, then with a not-for-profit research institute, and later at three architect-engineer firms. He has demonstrated experience in flood risk management evaluating and conducting complex multiobjective public works projects with high public and interagency interest. A few examples of the more than 500 flood risk management projects Mr. Ator has conducted include Sensitivity Analysis of Benefit and Cost Evaluation Criteria to Risk and Uncertainty Associated with Study Parameters, Flood Damage Reduction Feasibility Study, Passaic River Basin, New York and New Jersey, USACE New York District; Rancho Palos Verdes, Rolling Hills Shoreline Erosion and Storm Damage Reduction Reconnaissance Study, Los Angeles, California, USACE Los Angeles District; Reconnaissance Study and Report for Flood Damage Prevention, St. Croix, U.S. Virgin Islands, USACE Jacksonville District; Reconnaissance Study and Report for Flood Damage Prevention, Sandusky River Basin, Ohio, USACE Buffalo District; Section 905(b) Flood Damage Reduction Reconnaissance Report, Lower Sabine River, Texas and Louisiana, USACE Galveston District; Section 205 Flood Damage Reduction Study, High School Branch, Newton County, Missouri, USACE Little Rock District; and Flood Damage Reduction Feasibility Study, Sweetwater Creek, Austell and Lithia Springs, Georgia, USACE Mobile District.
Mr. Ator has worked extensively with USACE conducting flood risk management analysis, performing economic calculations using the Hydrologic Engineering Center (HEC) Flood Damage Assessment software (HEC-FDA 1.4.2). He has expertise in methodologies for estimating life loss via the use of HEC’s LifeSim software (HEC-LifeSim 1.0) and/or Flood Impact Analysis software (HEC-FIA 3.0).

Mr. Ator has extensive experience directly dealing with the USACE six-step planning process governed by Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook. He developed and field tested a template for preparing project management plans for feasibility studies for USACE Regional Planning and Environment Division South. He served as a team leader while embedded in the Plan Formulation Branch USACE New Orleans District, directing plan formulation activities of three plan formulators, providing project oversight and review to ensure compliance with USACE guidelines.

Mr. Ator is actively involved in professional engineering and scientific societies, including the Society of American Military Engineers (SAME) and the American Society of Civil Engineers (ASCE).

Joanna Morsicato  Environmental Law Compliance Specialist

Ms. Morsicato has 42 years of experience working on environmental protection programs using applicable laws, regulations, and practices associated with the National Environmental Policy Act (NEPA), Clean Air Act (CAA), Clean Water Act (CWA), Fish and Wildlife Coordination Act (FWCA), Endangered Species Act (ESA), and National Historic Preservation Act (NHPA) for public infrastructure and private projects. Most recently, she was the environmental and planning lead at Michael Baker International until she retired in mid-2017. While at that firm, she taught a webinar on NEPA compliance (and associated acts) for the water resources group company-wide, with close to 100 participants in February 2017. Ms. Morsicato earned a master’s degree in geography and urban planning from the University of Colorado in 1976. She has also completed numerous additional courses to support her NEPA and environmental compliance expertise.

Ms. Morsicato is familiar with the habitat, fish and wildlife species, and tribal cultures and archeology that may be affected by the project alternatives in the study area and has a solid understanding of the principles of flood protection. She has a general background in fish and wildlife habitat and species, tribal cultures, and archaeology found in the Gulf Coast states. Most of her large project work has been in urban areas (Honolulu and Denver); however, in the course of her career, Ms. Morsicato has worked on, provided quality assurance (QA) reviews, and/or supervised staff for various projects across the United States. An example of a recent detailed QA review involved an environmental assessment (EA) for a Federal Aviation Administration project at the Tallahassee International Airport (Florida) for a solar farm.

In her capacity as an environmental compliance manager for various large engineering firms, Ms. Morsicato has often reviewed projects for conformity with NEPA, CWA, ESA, NHPA, and other applicable regulations.

Ms. Morsicato is familiar with large complex Civil Works projects with high public and interagency interests. A recent example is her role as the Deputy Manager of Planning and Environment for the Honolulu, Hawai‘i, Authority for Rapid Transportation (HART). In that capacity, she worked on the final design and construction phase of the Honolulu Rail Transit Project (HRTP), a $5.2-billion plus, 20-mile, elevated steel wheel-on-steel rail transit system with 21 transit stations, from 2011 through 2014. She also participated in various Section 404 permitting activities for HRTP waterway crossings with the USACE Honolulu District and
performed U.S. Fish and Wildlife (USFWS) ESA Section 7 coordination for the project. In addition, she wrote the project’s Hawai‘i Coastal Zone Management Program Consistency Assessment for the agency. She provided management and oversight of the NHPA Section 106 Programmatic Agreement (PA) implementation and served as Archaeological Inventory Survey Manager for HART.

Ms. Morsicato has extensive expertise in consistency reviews and environmental compliance for large and small projects, including the preparation of corridor studies, baseline surveys, categorical exclusions (CEs), EAs, environmental impact statements (EISs), cultural resource assessments, and Section 106 PAs. She was involved with NEPA activities associated with the Beech Ridge Wind Energy EIS for the USFWS in Greenbrier and Nicholas counties, West Virginia, and she worked on an EA and a Finding of No Significant Impact for the Denver Regional Transportation District environmental evaluations for extension of the Southeast and Southwest Light Rail Corridors and Colorado Department of Transportation (CDOT) projects. Examples of smaller projects in the state of Colorado include overseeing biological assessments for various roadway improvements between Cañon City and Colorado Springs for CDOT; overseeing wetlands impacts for bridge replacement for a county road in Rio Blanco County; obtaining approvals from the Bureau of Land Management for groundwater wells in Garfield County; and performing CE work for a bypass for the Town of Delta.

Over her 42-year career, Ms. Morsicato's projects have typically included elements of compliance and coordination with the CWA (including USACE) and ESA as well as consultation (informal and formal) with USFWS. She is familiar with the USFWS Habitat Evaluation Procedures. Ms. Morsicato has recent experience with QA and IEPR reviews for USACE projects, including the Portland District (2014, Mount St. Helens Sediment Retention Structure project) as well as the Honolulu District (2016, Ala Wai Canal IEPR) and the Albuquerque District (2018, Middle Rio Grande Flood Protection Project).

Peter Baril  
H&H Engineer

Mr. Baril is a Senior Hydrologic Engineer specializing in hydrology and in flood control analysis and design. Since 1998, he served at a Principal-in-Charge capacity and led the Water Resources Team for GZA’s Norwood, Massachusetts, office. Much of his work has included dam safety and flood control investigatory studies and remedial design repair projects, as well as other water resource engineering related assignments. After 30 years with GZA, Mr. Baril retired in June 2019. Mr. Baril is currently an active, part-time consultant for GZA.

Mr. Baril is a registered professional engineer in Massachusetts, Maine, Connecticut, and New Hampshire. He has 39 years of experience in the fields of dam and water resources engineering and specializes in urban hydrology, flood control analysis and design, and surface water hydrology and open channel hydraulics. Over the course of his career, Mr. Baril has employed both deterministic and probabilistic statistical hydrologic methods to develop annual exceedance probability characteristics and apply them to the design of hydraulic structures. He has applied these statistical methods in risk-based decision-making protocols for water resource projects. Mr. Baril has developed a detailed working knowledge of USACE's tolerable risk guidelines and risk management protocols as outlined in USACE's ER 1110-2-1156, Safety of Dams – Policy and Procedures. A number of his dam safety projects include applying USACE and Bureau of Reclamation concepts dealing with identification of failure modes during initial phases of dam assessment and development of design concepts for repairs, with the primary focus being on spillway capacity, overtopping potential, and outlet control facilities.
Over the past several years, Mr. Baril has applied his experience in dam safety/flood control engineering as a subject matter expert/peer reviewer on a number of major dam rehabilitation projects for the New York City (NYC) Department of Environmental Protection (DEP). He has also served on two IEPR Panels, commissioned by Battelle, for USACE flood control projects in California.

In his nearly 40 years of consulting engineering experience, Mr. Baril has utilized water surface profile modeling software, primarily 1D and 2D versions of HEC-RAS and predecessor program HEC-2. He has used this software package for dam breach propagation and sediment transport studies and is well versed in the Federal Highway Administration’s HEC-18 bridge scour methods. More recently, Mr. Baril has provided peer review of “rain-on-grid,” a 2-dimensional HEC-RAS hydraulic modeling method employed by USACE to estimate runoff from various extreme events up to the Probable Maximum Flood (PMF).

Much of his project experience has been focused in the areas of dam safety inspections, emergency action planning, and design/improvement of spillways and related hydraulic structures. Mr. Baril has made presentations to various regulators associated with project permitting at the local, state, and Federal levels and has provided expert witness testimony and value engineering consulting on water resource related projects. He is familiar with, and has participated, as a subject matter expert, in technical review sessions for dam repair-related projects for the NYC Office of Management and Budget/DEP site visits (Gilboa and New Croton Dams) and workshops, with primary focus on augmenting spillway capacity to safely pass design floods. Mr. Baril is well-versed in his area of expertise and can coordinate, interpret, and explain testing results with other engineering disciplines about H&H analyses.

In 2012, Mr. Baril was a member of the IEPR Panel for Lake Isabella Dam, California, which reviewed the geotechnical, hydrological, hydraulic, structural, and economic aspects of the Dam Safety Modification Report. Mr. Baril worked as a subcontractor to Battelle for this assignment. The IEPR team evaluated the proposed $500 million design repairs at this critical flood control dam near Bakersfield, California.

Mr. Baril’s role was to review and comment on the USACE’s Final Hydrology Report, Spillway Adequacy Study, and associated baseline risk assessment report. Much of Mr. Baril’s efforts focused on the risk informed decision-making methods employed for evaluating hydrologic loading probability characteristics, probabilities of overtopping potential failure mode, population at risk, and loss of life consequences.

More recently (2018-2019), Mr. Baril was a member of a five-person, subject matter IEPR Panel hired by Battelle to conduct a detailed engineering peer review for a major USACE Civil Works project located in the San Gabriel Valley, east of Los Angeles. Whittier Narrows is a major flood control reservoir originally completed in 1957. The dam embankment is of earthen construction, 90 feet high and about 4.5 miles long. Several safety issues had been identified at the dam as part of USACE’s Dam Safety Modification Study (DSMS). Mr. Baril’s responsibility was to evaluate the H&H aspects of the DSMS, including design basis computations such as “rain-on-grid,” HEC-RAS-modeled PMF analysis, and proposed mitigation measures to bring the annual probability of failure and associated consequences to below tolerable risk guidelines. The project tasks included a meeting with USACE design engineers, a site reconnaissance of the dam and appurtenant structures, and preparation of Final Panel Comments and a Final IEPR Report.
Recently, Mr. Baril was part of a three-member subject matter expert team reviewing the design work performed by the Joint Venture Design Team dealing with development of spillway design criteria for the spillway structures associated with Ashokan Reservoir/Olive Bridge Dam, located in the Catskill Region of New York State. Ashokan is a key water supply reservoir owned and operated by the NYC DEP. Mr. Baril reviewed and commented on design documents and attended periodic workshops hosted by NYC DEP and the Joint Venture Design Team associated with meteorological methods and results dealing with the development of the site-specific Probable Maximum Precipitation as well as H&H methods associated with the estimation of the PMF and overtopping potential of the main dam embankment and dikes.

Scott Arends

Civil Engineer

Mr. Arends is a Civil Works project manager for dam safety and flood risk management projects and a senior H&H engineer with Hanson Professional Services, Inc. He has 23 years of experience in civil engineering, 12 of which are with his current company. Mr. Arends received a B.S. in civil engineering (emphasis geotechnical) from the University of Illinois at Urbana-Champaign in 1996 and a B.S. in physics from Western Illinois University in 1997. He is a P.E. in Arkansas, Illinois, Indiana, Louisiana, New Jersey, North Dakota, Iowa, Ohio, and New York. He is also a Certified Floodplain Manager in Illinois.

Mr. Arends has led the H&H analysis, peer review, forensic failure analysis, and design, plans, and specifications for numerous dams and complex water resource projects throughout the country. For the USACE Memphis District, Mr. Arends was the Civil Works, geotechnical, and H&H reviewer for an IEPR/Safety Assurance Review (SAR) of the St. Francis Levee Renovation in Clay County, Alaska. The project included renovation of approximately 6,300 feet of levee embankment with seven through-levee culverts on the West Bank. The St. Francis Floodway Levee System included four tasks: re-establishing the levee centerline; restoring the net levee section with 1V:3H slopes and 15-foot vegetation-free zones; eliminating four redundant culverts; and replacing seven gated culverts. Mr. Arends completed IEPR reviews on both the design and construction phases of the flood risk management system. He has also conducted peer reviews of the following projects for USACE: 1) Canton Dam Auxiliary Spillway Channel, Canton, Oklahoma (Tulsa District), 2) Pine Creek Dam, McCurtain County, Oklahoma (Tulsa District), and 3) Center Hill Dam, near Nashville, Tennessee (Nashville District).

Mr. Arends has extensive experience with USACE’s Adaptive Hydraulics (AdH) (2D), HEC-RAS, and HEC-HMS models and their integration with geographic information systems (GIS) to develop H&H models and inundation/flood hazard mapping. For the USACE St. Paul District, Mr. Arends was a senior hydraulic engineer leading a team of 2D modelers in the evaluation of performance metrics, optimization of the geometric configuration, and development of design criteria, for an aqueduct structure carrying the Maple River over the diversion channel for the Red River around Fargo, North Dakota. Prior to joining Hanson, Mr. Arends served 10 years as a dam safety and floodplain construction regulatory engineer with the Illinois Department of Natural Resources, administering the department's dam safety, public waters, and floodplain development regulations. He conducted dam inspections, issued permits, and peer reviewed hundreds of H&H analyses.

Mr. Arends is currently leading the development of a 3.5-mile-long, $220 million flood risk management system to meet the Federal Emergency Management Agency’s National Flood Insurance Program accreditation for a 500-year design flood and support public waterfront access for the Cedar Rapids West Side Flood Control System, Cedar Rapids, Iowa. He facilitated a project kick-off charrette with both east and west teams to establish communication protocols, design criteria, survey and computer-aided design and drafting (EM) standards, and peer review
procedures that meet USACE Engineer Manual and Engineer Technical Letter criteria. As project manager, Mr. Arends is leading a multi-discipline team of engineers in geotechnical analysis and foundation design criteria for the entire West alignment, structural design of all floodwalls and closure structures, as well as comprehensive design, plans, specifications, design documentation reports (DDRs), potential failure modes analysis, permitting, and construction phase services for all floodwall and flood-closure gate segments. He also led updates to the 25-mile Cedar River HEC-RAS model and the development of the Hydraulic DDR Appendix for use by both the east and west teams. Completed design segments include: 1) 850 feet of pile-supported T-type floodwall, trails, pump station footprint, and a 45-foot roller gate monolith; 2) 350 feet of drilled shaft-supported T-type floodwall with an integral restroom/wet flood proofed storage building; 3) conceptual (30%) design of 1,460 feet of floodwall through an interstate highway ramp and under the bridge; 4) 90% design of a roller gate monolith, appurtenant T-wall, and I-wall transition to levee; 5) conceptual (30%) design of 1,050 feet of partially demountable floodwall; and 6) subsurface investigations and geotechnical design for 6 pump stations, 14 gatewells, and 2,200 feet of levee, including slope stability, settlement, and seepage analyses to inform design recommendations at a site challenged by up to 10 feet of highly variable fill over sand. Mr. Arends regularly collaborates with the USACE Rock Island District Design Team working on the East Side Flood Control System to facilitate design continuity, overtopping resiliency, and constructability considerations.

For the Illinois Department of Natural Resources Stratton Lock and Dam Lock Capacity and Water Level Control Improvements, McHenry County, Illinois, project, Mr. Arends was the lead dam safety and hydraulic engineer working to expand the lock structure and relocate the spillway, replacing the capacity of five existing sluice gates with three 28-foot-long hinged crest gates, at Stratton Lock and Dam. He led the hydraulic optimization of the approach apron, pier configuration, gate operations, stilling basin geometry, cofferdams, and construction sequencing to address resiliency objectives and meet zero-rise permit criteria.

Mr. Arends is a member of SAME and the Association of State Dam Safety Officials (ASDSO) Advisory Committee, as well as a technical advisor to the ASDSO Dam Failures Investigation Committee. Mr. Arends participated in the Maple River Aqueduct Value Based Design Charrette, recognized by both SAVE International's 2013 award for Outstanding Value Management in Government to the St. Paul District, and the Department of Defense's 2012 Value Engineering Achievement Award to USACE.

Charles Aubeny  
Geotechnical Engineer

Dr. Aubeny is a professor at Texas A&M University teaching soil mechanics, geotechnical design, geotechnical testing, and numerical methods in geotechnical engineering. He earned his Ph.D. in civil engineering from the Massachusetts Institute of Technology in 1992 and is a registered P.E. in Colorado, Texas, and California. His experience includes over 19 years of academic research and external consulting involving slope stability, in situ testing, numerical analysis, foundations and pipelines, and unsaturated soils; 8 years with the Embankment Dams Branch of the U.S. Bureau of Reclamation (USBR); and 7 years in private consulting. His geotechnical engineering experience relevant to levee and earth dam design and construction includes supervising geotechnical field investigations and laboratory testing programs; supervising and/or performing analyses for seepage, static and dynamic slope stability, static settlement, liquefaction, seismically induced settlements, and wave run-up; developing and evaluating various foundation remediation alternatives; designing earthen embankments, including the internal filter and drainage systems; designing slope protection measures; designing instrumentation systems for monitoring; supervising cost comparisons for various design alternatives; preparing specifications; preparing construction considerations and monitoring construction; developing guidelines for reservoir first
filling and dam operation, and evaluating the safety of existing dams and levees and preparing upgrade alternatives to address deficiencies. His expertise includes performing cost engineering and construction management for all phases of flood risk management, including levee engineering experience (1992-1999) that included comparative cost evaluations and quantity/cost estimates on dam design and remediation alternatives in embankment dam design at USBR (1978-1986).

Dr. Aubeny’s experience includes the following projects: director of geotechnical investigations for the Elk Grove Bufferlands Mitigation for the California Department of Water Resources; director of site investigations, geotechnical analyses, geotechnical quality control and instrument monitoring for the Mokelumne Aqueduct Upgrade for the East Bay Municipal Utility District; resident engineer for the Butt Valley Dam seismic upgrade and stream channel restoration for Pacific Gas & Electric; director of site investigations and geotechnical analyses for upgrades to the North Beach Lake and the regional wastewater treatment plant flood control system for the Sacramento Area Flood Control Agency involving both earthen embankments and concrete floodwalls; the Twitchell Island, Sherman Island, and Hotchkiss Tract levees for individual reclamation districts in coordination with the California Department of Water Resources; and wastewater retention dikes for Sonoma County. At the USBR, he served as design engineer involved in all phases of the McGee Creek Dam project in southeast Oklahoma, including geotechnical site characterization; evaluation of earthen and rockfill embankment alternatives; final design addressing issues of slope stability, through- and under-seepage, dispersive erosion, settlement, riprap slope protection, freeboard, and appurtenant structures such as outlet conduits; and monitoring of construction to provide design approval for adequacy of the foundation excavation and surface treatment, the grout curtain, and the earthfill placement. His USBR experience also includes safety evaluations of existing dams throughout 17 Western states. He drafted the USBR Design Standards for Foundation Surface Treatment for Embankment Dams, which were in effect from 1986 until they were incorporated into an updated version in 2012.

Dr. Aubeny has performed IEPRs for the Freeport Harbor Navigation Improvement Project (2008), the Mississippi Coastal Improvement Study (2008-2009), the Santa Maria and Bradley Canyon, California, levees (2010-2012), the Kansas Citys, Missouri and Kansas, Flood Risk Management Project (2012-2014), the Dallas Floodway Feasibility Study and Environmental Impact Statement (2013), the Lower San Joaquin River, California, Flood Risk Management Feasibility Study (2015-2017), and the City of Norfolk, Virginia, Coastal Storm Risk Management Feasibility Study (2017-2018). Collectively, these reviews addressed topics of risk assessment; adequacy of geotechnical site investigations; slope stability analysis; seepage analysis; riprap and soil cement slope protection; seepage barriers such as slurry trenches and sheetpile walls; drainage measures, including relief wells; regional impacts of seepage control measures; floodwall stability; pile supports for floodwalls; closure structures; encroachments to embankments; internal erosion; wave runup; overtopping; soil improvement; constructability; and construction quality control. He is capable of addressing the USACE SAR aspect of projects and has served on the USACE SAR panel for the Santa Maria Levee slope protection upgrade. Dr. Aubeny’s design experience with problems involving ground fissures due to subsidence includes his work in the Sacramento-San Joaquin Delta, where significant subsidence is occurring due to oxidation and erosion of organic soils, accompanied by progressive lowering of water levels by pumping to keep pace with subsiding ground levels. Mitigation measures depended on project-specific features, but included direct excavation and refilling/recompacting of fissure zones, grouting of fissures, and use of seepage barriers (slurry trenches, geomembranes, and sheetpiles) to intercept seepage paths created by fissures, berms to stabilize ground movements, and pile supports for structures and pipelines affected by the fissures.
Dr. Aubeny has practical experience with commercial software supporting geotechnical analysis and design for slope stability, seepage, deformation and settlement, pile installation, axial and lateral pile response, and seismic response. He also teaches two graduate courses in numerical methods covering both theoretical development and practical applications for these types of programs. He actively participates in related professional engineering activities and has published more than 80 professional papers. He is a Fellow in the ASCE and serves as Associate Editor for two prominent journals: the ASCE Journal of Geotechnical and Geoenvironmental Engineering and the American Society for Testing and Materials (ASTM) Journal of Geotechnical Testing.