INDEPENDENT EXTERNAL PEER REVIEW PANEL

for the

ALLATOONA LAKE WATER SUPPLY STORAGE REALLOCATION STUDY AND UPDATES TO WEISS AND LOGAN MARTIN RESERVOIRS PROJECT CONTROL MANUALS

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:	09 Sep 2019
Type I IEPR Final Report Submittal:	16 Feb 2020
Reviewer Names and Qualifications	
Daniel Maher	**Economist**

Mr. Maher is a Project Manager with DSM Contracting and senior economist with over 30 years of experience. He received his M.S. in agricultural economics from Louisiana State University in 1988 and is a certified Project Management Professional (PMP). He has served as an economist and project manager on over 50 USACE planning studies and has been responsible for assisting in alternative development and screening and conducting economic analysis in accordance with USACE principles and guidelines (P&G). He has managed numerous economic feasibility, evaluation, and impact studies for navigation projects, ecosystem restorations, flood control and flood risk projects, water supply projects, and recreational studies. He has conducted incremental analyses, cost effectiveness studies, and forecasting studies for clients across the country. Mr. Maher's computer skills include extensive experience with IMPLAN Economic Impact Software, IWR-Planning Suite, IWR-MAIN Water Use Forecast System, and the Microsoft Office Suite. Mr. Maher is familiar with large, complex water resources planning efforts with high public and interagency interest. These efforts have frequently required his expertise in evaluating costs, benefits, and impacts related to M&I water supply, as well as forecasting future water use in both urban and rural areas. Mr. Maher was responsible for assessing the adequacy and acceptability of the economic methods, models, and analyses used to develop a water supply storage assessment of current and future water demands in the upper Apalachicola-Chattahoochee-Flint (ACF) basin as the economist for the ACF River Water Control Manual, Environmental Impact Statement (EIS) and Water Supply Storage Assessment Report IEPR. He has also conducted other aspects of water use which are often intertwined in complex planning efforts, as demonstrated by the following examples: 1) Water Supply Demand Analysis, Pine Mountain Study Area, Arkansas, which developed an M&I water use forecast as part of the estimation and analysis of water supply benefits; 2) East Baton Rouge Parish Alternative Industrial Water Supply Study Market Demand Analysis, which not only prepared a market forecast but also examined cost, availability, and quality in

assessing the ability of industrial users to convert to other water sources; 3) M&I Water Use Forecast, Southwest Florida Feasibility Study, which estimated existing water use and developing water demand projections; and 4) M&I Water Use Forecast, Comprehensive Everglades Restoration Plan (CERP) Forecast Update. During the effort for the M&I Water Use Forecast, Lake Okeechobee Regulation Schedule Study for USACE, Mr. Maher was involved in the development of water supply forecasts for use in estimating the allocation (release) of water from Lake Okeechobee. Mr. Maher has served as senior economist on several navigation and lake recreation studies for USACE. For the Calcasieu River and Pass, Louisiana, Dredge Material Management Plan Phase II, he updated and finalized the deep draft navigation incremental benefits associated with maintaining navigation on the various reaches of the Calcasieu River and estimating benefit-cost ratios for various operational scenarios. For San Diego Harbor in California, he evaluate the economic feasibility of increasing the current authorized depth of the Federal central harbor and navigation channels to the Tenth Avenue. Marine Terminal. As an economist, he was responsible for evaluating the economic feasibility and assessing the operational and environmental impacts resulting from the removal of several underwater natural obstructions (pinnacles) in San Francisco Bay. He has played similar roles on such projects as the Montgomery Point Lock and Dam, McClellan-Kerr Arkansas River Navigation System, Limited Reevaluation Report, Economic Analysis Update; and the Regional Economic Development, Southwest Arkansas Navigation Study. Mr. Maher has worked with USACE and with architect/engineering project teams on various Civil Works projects to identify and evaluate costs and benefits in accordance with USACE's Planning Guidance Notebook (Engineer Regulation [ER] 1105-2-100). He has also served as an economics expert on several USACE IEPR panels, including the Prado Basin Ecosystem Restoration and Water Conservation Integrated Feasibility Report; the Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS) Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report; and the General Reevaluation Report for the Truckee Meadows Flood Control Project, Nevada. Mr. Maher served as the phase manager tasked with conducting cost effectiveness/incremental cost analyses (CE/ICAs) of the costs and benefits of two ecosystem restoration projects: the Canonsburg Lake Ecosystem Restoration Project (USACE, Pittsburgh District) and the Licking River Watershed and Dillon Lake Ecosystem Restoration Project in Dillon, Ohio (USACE, Huntington District). For the Canonsburg project, the analyses were intended to provide decision-makers with a comparison of alternatives that produce different levels of environmental outputs in order to select the alternative that best satisfies project objectives. A total of 37 alternatives (including no action) were developed to address the restoration of Canonsburg Lake. For the Licking River/Dillon Lake project, the work consisted of analyzing alternatives for restoring various reaches of the Licking River that were eroding and impacting the water quality of the river and the downstream Dillon Lake. Sediment from Licking River was also depositing in the lake, resulting in shoals and restricted water flow. Restoration alternatives considered included armoring the bank line, revegetating river bank and near-river bank areas, and dredging portions of the lake to improve water flow and quality. In addition, Mr. Maher was the Project Manager and/or Senior Economist responsible for several other CE/ICAs: the Incremental Analysis for Four Feasibility Level Studies on the Ohio River Ecosystem Restoration Project (USACE, Louisville District); ICAs for the proposed Hovey Lake restoration project in Indiana (USACE, Louisville District); and a CE/ICA on proposed alternatives for the ecosystem and environmental restoration of the Chicopit Bay at the intersection of the St. Johns River and the Intracoastal Waterway in Florida (USACE, Jacksonville District). For the Ohio River project, major tasks included developing alternatives for meeting the objectives of the project, developing construction costs and environmental output associated with each alternative, and determining the incremental costs of producing environmental output of each cost-effective alternative. The principal elements of the Hovey Lake project were to restore an oxbow habitat and reduce erosion and control sediment for Ohio River overbank flooding. Three alternatives were developed to meet

project objectives. Construction costs and environmental output were developed for each alternative, and the cost-effective alternatives and the incremental costs of producing environmental output of each of those alternatives were determined.

Mark Lorie	**Water Resources Planner**

Mr. Lorie is a water resources planner at Corona Environmental Consulting. He has more than 17 years of expertise in flood risk, water supply, reservoir operations, and ecological flow assessment. Mr. Lorie received his M.S. in environmental management and economics in 2002 and took doctoral coursework in environmental systems analysis in 2003 from Johns Hopkins University. He worked for the U.S. Army Corps of Engineers (USACE) as a water resources planner from 2002 to 2006. He also worked as a water resources planner for the Interstate Commission on the Potomac River Basin between 2006 and 2008, after which he worked as a consultant. Mr. Lorie's experience includes water management and drought preparedness in both eastern riparian and western prior appropriation contexts. While on staff with the Interstate Commission on the Potomac River Basin, Mr. Lorie served as a leader and technical expert for a regional program on water supply planning and management on behalf of Washington, D.C., metro area water utilities, including the development of models as forecasting tools. He is currently helping USACE develop a framework of drought risk management principles to support Clean Water Act Section 404 permitting processes for proposed water supply reservoirs. Mr. Lorie has worked on water allocation and reservoir management in the Cache la Poudre River, Colorado; the Potomac River; and the Upper Mississippi River, the Great Lakes, and other areas. He has also worked on water supply planning involving groundwater, wastewater reuse and other approaches in Virginia, California and elsewhere. Mr. Lorie facilitated and managed an interagency effort to develop a long-term ecological risk model of the river and ecosystem for the Cache la Poudre River in Northern Colorado. The probabilistic network model covered hydrology, reservoir operations and diversions, native and sport fish habitat, geomorphic processes, riparian ecosystem processes, and other elements. While on staff with USACE, Mr. Lorie assisted in the development of an integrated planning model of operations of Upper Mississippi reservoirs and the impacts on flows within the basin. The integrated model simulated operational rules and resulting lake and river levels. The model was designed to allow for modification of reservoir operational rules and to evaluate whether modifications improved performance in meeting target water levels for purposes of recreation, flood control, water supply, and other purposes. Mr. Lorie has experience in the formulation and evaluation of alternatives for water supply for municipal and industrial (M&I) uses, including both groundwater and surface water supplies. He is currently leading several technical components of a study evaluating regional water supply benefits (M&I) of a proposed water recycling project in Daly City, California. The study is evaluating the demand for and potential use of recycled water, potential reductions in groundwater pumping if recycled water is used for irrigation of private and public landscaping in the region, and long-term benefits for water availability from the region's aquifer. Mr. Lorie has experience evaluating the impacts of reservoir operations on flooding, erosion, recreation, hydropower, and water quality. Mr. Lorie developed a model of daily and hourly operations of a hydropower dam that partially controls outflows from Lakes Superior and Michigan to the lower lakes. The model evaluated impacts on electricity production, commercial shipping, and ecosystem functions below the dam and was used to investigate how new water management policies could impact short-term dam operations. Mr. Lorie has authored and/or co-authored more than 10 manuscripts and made numerous presentations at professional conferences on a variety of topics related to water resource management.

Bijay Panigrahi	**Water Resources Engineer/Hydrologist**

Dr. Panigrahi is a Principal Engineer and President of AMCON, Inc. (formerly, BPC Group) and KBC Construction, LLC, in Orlando, Florida. Dr. Panigrahi is a licensed Professional Geologist (P.G.) in Florida and North Carolina, Certified Underground Utility and Excavation Contractor (CUC), BCEE (Board Certified Environmental Engineer), D.WRE (Diplomate, Water Resources Engineering), and a registered Professional Engineer (P.E.) in Florida, Virginia, and Michigan. He received his Ph.D. in civil engineering from Drexel University in 1985, M.S. in civil engineering and geology from Oklahoma State University in 1980, and an M.E. in hydraulic engineering from the Asian Institute of Technology in Thailand in 1978. Dr. Panigrahi has 36 years of experience in environmental, geotechnical, and water resources engineering, including ground water and surface water modeling. He has directed and managed multi- disciplinary projects involving hydraulics and hydrologic modeling, flood protection studies, feasibility studies, stormwater management system design, watershed and water quality assessment and modeling, statistical analyses and stochastic modeling, geotechnical and environmental design and studies, seepage and slope stability analyses, foundation analyses, scour and erosion control, water resources facility design, and permitting. Some of the projects involving water supply, reservoir analyses, and inter- basin water transfer include: 1) Modeling Assessment for the C-51 Reservoir Feasibility Analyses; 2) Modeling Water Management Practices in Central Broward County; 3) Frein Reich Preserve Design, and C-51 Basin Rule Development. Dr. Panigrahi has assessed and designed several canal conveyance systems and water resources control structures such as levees/dikes, culverts, reservoirs, canals, pump stations, and treatment systems using HEC-HMS/RAS/FDA/FIA, MIKESHE/11, RSM, LOWCAP, QUAL2, SEEP2D, FLONET, SLOPEW, SLIDE, MODFLOW among others. He is familiar with model building and alternative analyses using reservoir simulation models HEC-ResSim and RiverWare. He has assessed and developed a number of water quality improvement plans, completed optimal network design and implementation plan development, thematic accuracy assessment, and spatial pattern analyses using advanced statistical and geostatistical techniques including discrete multivariate analyses. Some of these projects include: 1) Optimal Design and Implementation Plan Development for ET Network, 2) Thematic Accuracy Assessment for Seagrass Mapping for 22 Bay Segments and 5 Estuaries, and 3) Water Quality Improvement Analyses for Everglades Agricultural Areas. Dr. Panigrahi has provided technical expert testimony and litigation support services, including formulation of standard care of opinion, risk assessment, and administrative hearings on several cases in Florida, Michigan, and New Jersey. Dr. Panigrahi has served on peer review panels as the subject expert in hydraulic, hydrology, geotechnical, and environmental engineering. He has reviewed more than 30 hydraulic-hydrodynamic models, which included surface water, groundwater, integrated surface water- ground water, seepage, and numerous watershed water quality models for the Interagency Modeling Center of the South Florida Water Management District. Some of these projects include: the C 11 and C- 9 impoundments (reservoirs), the C-44 canal design, and the stormwater treatment Area 5&6 expansion. He served as an IEPR Panel member performing hydraulic design review for a number of Hurricane and Storm Damage Risk Reduction System (HSDRRS) projects for USACE New Orleans District. Dr. Panigrahi has worked on numerous planning, design, permitting, and construction projects. Most Notably, they include gravity bypass, earthen cofferdam, dewatering, traffic control, erosion control, environmental protection for the C-44 Reservoir/STA System Discharge Project, the S-46 Feasibility Study, the Yuca Pen Hydrologic Restoration, and the Site 1 Impoundment (Frein Reich Preserve). Other relevant efforts include designs, plans, and permits for earthen cofferdams, sheet pile and shoring systems, dewatering, traffic control, erosion control, environmental protection for South Florida Water Management District, U.S. Navy, USACE, Orlando International Airport, Tampa International Airport, Orange County among others. Dr. Panigrahi served on the Florida

Board of Professional Engineers (Gubernatorial Appointment) from 2008 to 2012, and has authored more than 50 technical manuals, monographs, and peer-reviewed papers.

Sandra Scheda **Environmental and NEPA**

Ms. Scheda is vice president and Southeast Transportation Services Director at Environmental Science Associates. She earned her M.S. in zoology from the University of South Florida in 1984 and has 35 years of experience conducting environmental planning efforts, biological assessments and related studies throughout the southeast United States, including Florida, Georgia, and South Carolina. These efforts have included surface and groundwater quality studies, planning/NEPA, the construction oversight of environmental elements, and design/permitting. She has also authored journal articles, conducted peer reviews for technical documents, presented at conferences, and taught at the University of South Florida. Ms. Scheda is familiar with large, complex water resources projects with high public and interagency interest. She has worked on several large water resources projects with multi-agency funding and project development teams. Some examples of these projects include the Tamiami Trail Culverts/Hydrologic Restoration Feasibility Study; the Water Preserve Areas Feasibility Study (Project Implementation Report/Environmental Impact Statement [PIR/EIS]); the C-43 West Basin Reservoir PIR/EIS; and the Site 1 Impoundment PIR/EIS and Strazzullla Wetlands PIR/EIS as a technical reviewer. She was responsible for assessing the adequacy and acceptability of the environmental and NEPA methods, models, and analyses used to develop a water supply storage assessment of current and future water demands in the upper ACF Basin as the environmental and NEPA panel member for the ACF River Water Control Manual, EIS and Water Supply Storage Assessment Report IEPR. Ms. Scheda is experienced in the USACE water supply storage reallocation process for Federal water projects with studies that have involved water storage for reallocation based upon modeling. One such project was the C-43 West Basin Reservoir. This reservoir was designed to intercept above-normal flows upstream and redeliver water downstream to match at least the required cubic-foot-per-second (CFS) rate in the Caloosahatchee River over the Franklin Lock. She is also familiar with and experienced in studies related to operational changes in multi-purpose reservoir systems. Her work on the Water Preserve Areas Feasibility Study for the South Florida Water Management District (SFWMD) included both operational changes as well as new project components and were prepared in conformance with the NEPA process, CERP regulations, and USACE/District requirements. Ms. Scheda is experienced in the preparation of EISs in accordance with NEPA. She is thoroughly knowledgeable of the Project Development and Environment (PD&E) guidelines used for development of transportation projects by the Florida Department of Transportation and the NEPA process and related requirements. In addition, she has completed NEPA studies in her areas of expertise for port/marine, water resources, and habitat restoration/CERP projects. She has compiled the required NEPA documents in her areas of expertise under the direction of different lead Federal agencies, including the Federal Highway Administration, Federal Transit Authority, Federal Railroad Administration; Maritime Administration, U.S. Army Corps of Engineers, and U.S. Coast Guard. Example studies include the Kissimmee River Pools D and E Hydrologic Restoration Feasibility Studies; the MacDill Air Force Base Wave Barriers Environmental Assessment/Finding of No Significant Impact; and the SR 7 Extension PD&E Study Wetland Evaluation Report, Endangered Species Biological Assessment/Biological Opinion and Mitigation/Habitat Restoration Plan (for over 300 acres). Ms. Scheda has extensive experience preparing EISs in accordance with Endangered Species Act (ESA) requirements and has prepared numerous NEPA documents and related Biological Assessments in accordance with ESA requirements. She has worked on various levels of NEPA documentation for a wide variety of project types and species. Relevant studies include the C-43 West Basin Reservoir PIREIS Design and Permitting, Hendry County, Florida; the L-8 Reservoir Design/Permitting and Construction; and numerous construction/design build projects in the Southeast United States.