Dams and Reservoirs
Services

WSP USA is a full services provider for engineering design, planning, inspection, and management of dams and reservoirs. Our team has over 50 years of experience in the design and management of all types of dam structures. WSP has the resources to tackle the largest dam and reservoir projects, but we pride ourselves in our strength of local staff and our commitment to excellence in the support of our local client projects of any size. We work closely with our clients to pioneer affordable solutions to ensure the safety and resiliency of our dams.

Question ordinary
Imagine extraordinary
Change the landscape

Our Services

WSP's dam services specialists are experienced with the full life-cycle needs of dam owners, from planning through design and construction, periodic inspections, rehabilitation, and ending with decomissioning and removal of dams that have outlived their need. We are experts in Federal Energy Regulatory Commission (FERC) regulated hydropower dams, state regulated private and municipal dams from coast to coast.

Our services include:

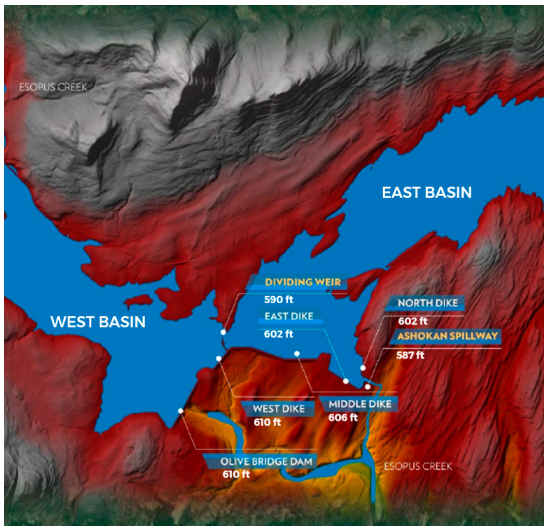
- Planning & Environmental
- Hydrologic & Hydraulic Modeling
- New Design
- Engineering Assessment
- Inspection
- Maintenance & Retrofits & Rehabilitation
- Compliance
- Decommissioning & Removal
- Design & construction support
- Divesture & procurement
- Powerhouse services

Our Team

We are a talented group of individuals with advanced degrees in science and engineering. Over our firm's history, we have become a trusted dam engineering advisor for municipalities, state, and federal agencies as well as private owners. We are problem-solvers who explore new ideas and are driven to find the ideal solution. Our team of professionals in the U.S. includes dam services focused engineers specializing in structural, geotechnical, water resources, and mechancial engineering. Our firm's commitment to quality and client service is the overridding factor in maintiang these entities as long-term repeat clients for their dam needs.

Ashokan Reservoir

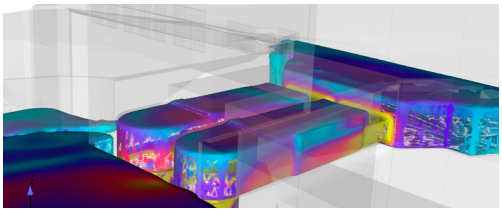
H&H modeling | Design | Computational Fluid Dynamics

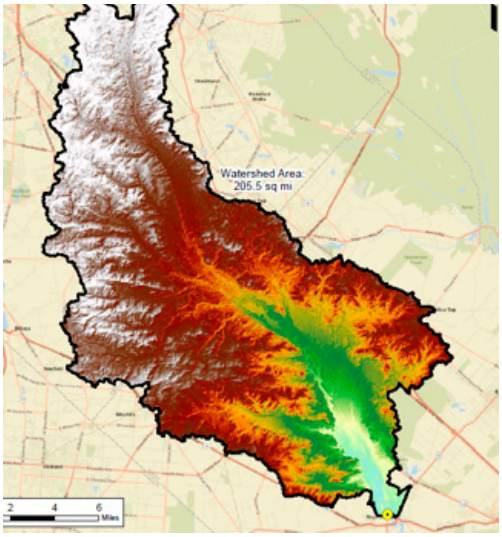


The Ashokan Reservoir is a critical part of the New York City water supply system, supplying about 40% of New York City's daily drinking water. Placed into service in 1915, the reservoir's dam and associated structures are more than 100 years old. All of the reservoir facilities are now being upgraded to pass the Probable Maximum Flood (PMF) requirements, which is the spillway design flood. WSP's services include planning, developed design concepts, design assistance during bidding, design services during construction, and other related services. One key service that supports all project phases is an intensive hydraulic modeling effort.

WSP developed a 2D HEC-RAS model of the entire reservoir system to evaluate the existing conditions and identify project issues and challenges. This model simulates reservoir routing using a suite of PMF hydrographs. In addition to the 2D reservoir model, 3D CFD models are being used for key reservoir structures that are more complex. Proposed design alternatives are being developed for different combinations of dam components and transportation elements, and alternatives' performance is being evaluated using the 2D and 3D hydraulic models. Additional consideration is being given to feasibility, costs, benefits, risks, and mitigation measures. WSP is providing design services as well as permitting and construction support services.

CLIENT: New York City Department of Environmental Protection **LOCATION:** Ulster County, NY





Lake Lenape Dam

H&H modeling | Spillway Retrofit | Powerhouse Inspection

Lake Lenape Dam is a high-hazard earthen embankment dam with a stone masonry primary spillway and a defunct powerhouse structure that was used to generate electricity located adjacent to it. The dam is currently classified as unsafe and needs remedial work to bring it into compliance with current dam safety standards. WSP worked to develop concepts to bring Lake Lenape Dam into compliance. WSP completed an alternatives analysis and Upstream Flood Reduction Study to determine viable paths to improve the dam's spillway discharge capacity, which is currently undersized. WSP also completed hydrologic modeling for the Probable Maximum Flood (PMF) using the U.S. Army Corps of Engineers' HEC-HMS software. WSP assessed reservoir routing and downstream impacts using a 2D HEC- RAS model.

Additional analysis was completed for the powerhouse, including a structural inspection and a hydraulic assessment of the powerhouse's ability to serve as a low-level outlet and construction bypass. The hydraulic assessment was completed using FLOW-3D, a state-of-the-art computational fluid dynamics software platform.

Construction is underway for both the rehabilitation of the wooden powerhouse gates with steel sliding gates and the replacement of the Lake Lenape existing masonry spillway with a new concrete labyrinth spillway. WSP completed the final design, permitting and bid support for both project in addition to providing full-time construction inspection support.

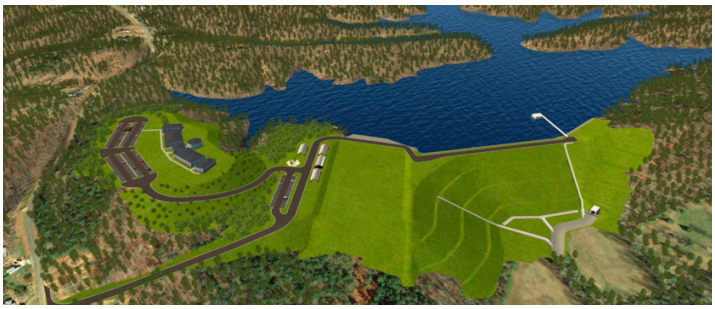
CLIENT: Atlantic County, New Jersey
LOCATION: May's Landing, NJ

Chilohowee Dam
Design | Rehabilitation

Chilohowee Dam is a concrete gravity and embankment structure that consists of an integral intake/powerhouse section, a Tainter gate spillway section, two non-overflow concrete gravity sections, and two rockfill embankment sections. Seepage at the toe of the North Embankment was first observed during dam construction and continued seepage and an increase in the number of cloudy water events observed at the toe of the embankment resulted in a renewed emphasis on determining and remediating the cause of the seepage and cloudy water events at the embankment. Based on an extensive subsurface investigation program, WSP developed a remedial design that received the **U.S. Society of Dam's Excellence in Constructed Project Award in 2018.**

CLIENT: Brookfield **LOCATION:** Monroe County, TN

Russell Creek Reservoir
Design | Water Supply | Permitting



WSP designed a 110 ft. tall earthen dam that will impound approximately 1.4 billion gallons of water. The water supply reservoir includes a pump storage structure relying on the Etowah River and the reservoir storage to prior 17 million gallons per day. The project involves removal of the existing NRCS Etowah River Dam No. 13 watershed structure and replacement with the Russell Creek Reservoir Dam. Project involves updating the Watershed Plan and an Environmental Assessment, permitting, and design of the dam embankment and outlet works in compliance with NRCS TR-60 and Georgia design criteria.

CLIENT: Etowah Water and Sewer Authority
LOCATION: Dawson County, GA

Palmetto Creek Dam
Safety Inspection | Rehabilitation | Planning

Palmetto Creek Dam No. 1 is a flood control dam constructed in 1960 as a Class A or low-hazard dam. In 1981, the structure was reclassified as a high-hazard dam due to development in the downstream floodplain and a probable loss of life in the event of a dam failure. WSP completed a dam assessment in 2015, which affirmed the hazard classification and determined that the dam lacked the hydraulic capacity to route the State of Georgia and NRCS design storms without overtopping the dam. WSP completed environmental planning and rehabilitation design compliant with Georgia and NRCS criteria in 2019. Project construction was completed in 2021.

CLIENT: Pine Mountain Soil and Water Conservation District
LOCATION: Harris County, GA

Kerite Dam Removal
Decommissioning | Design | Construction Support

The Kerite Dam is a masonry structure located across the Bladens River immediately upstream of its confluence with the Naugatuck River. Marmon Utility LLC decided to remove the dam to relieve its financial liabilities and regulatory burdens since the dam no longer serves a purpose for the company. The project consisted of removal of the dam, sediment management, channel restoration, and stabilization to a natural free-flowing condition. Services included site investigations, 30 percent through final design, permitting, bidding, and construction support.

CLIENT: Marmon Utility LLC **LOCATION:** Seymour, CT

Schuylerville Dam
Sluice Gate | Remediation

The dam consists of a right-wing wall, a sluice gate structure with two stop log gates, a low-level outlet pipe, a main spillway, an intake structure, and an auxiliary spillway. WSP developed a three-phase approach for remedial design of the spillway to safely pass the Inflow Design Flood and prevent overtopping of the non-overflow sections of the dam. The remediation consisted of demolishing and removing the existing sluice gate and low-level outlet structures, sealing the low-level outlet pipe; installing three post-tensioned tendon rock anchors, and installing a new trippable flashboard system, concrete piers, downstream training wall, and base slab.

CLIENT: Brookfield Renewable
LOCATION: Saratoga County, NY

Vischer Ferry Hydroelectric Project
Hydroelectric | Design

WSP is supporting NYPA to consider structural, mechanical and operational modifications to mitigate the effects of winter ice jams and their impact on flooding of the surrounding properties. WSP is providing Program Management, Concept Design, Support for Public Outreach, Owner's Engineering Oversight, and Permit Preparation Tracking, to advance through to the completion of a detailed construction design.

WSP is the technical lead on the planning for a major crest gate system that will also improve plant operation and increased power production, providing cost estimates of the four different alternatives.

CLIENT: New York Power Authority
LOCATION: Mohawk River, NY

Beacon Emergency Action Plan
Inspection | EAP

WSP supported the City of Beacon with miscellaneous dam safety issues such as updating the Emergency Action Plans and Inspection & Maintenance Plans on as-needed and directed basis for all the City Dams; completing the Promulgation and Concurrence (P&C) forms; assisting with EAP orientation for local emergency responders; and responding to NYSDEC request for information, follow-up work on outstanding permits, and staff requests for additional condition inspections or dam safety engineering support.

CLIENT: City of Beacon **LOCATION:** Beacon, NY

Blue Ridge
Hydroelectric | Embankment Stabilization

WSP was part of a team responsible for evaluating, designing, and implementing a stabilization scheme to arrest ongoing downstream movement. Issues included limited construction access, numerous underground utilities, maintaining daily dam operations, and site geology (soft alluvial sediments). We designed a micropile-supported, retention system that included cast-in-place concrete and gabion walls. The design featured an integral slab bridge, used to isolate the retaining wall from penstock. We provided Engineering During Construction services and full-time onsite QA representatives.

CLIENT: Tennessee Valley Authority
LOCATION: Blue Ridge, GA

Gate Inspections
Inspection | Engineering Assessment

WSP's dedicated climbing rope inspection team has inspected tens of thousands of steel bridge structures ranging from structures to those built well over a century ago that include some of the nation's largest and most traveled bridges, to old railroad trusses and small steel culverts. This team of dedicated engineers and Society of Professional Rope Access Technicians (SPRAT) certified inspection professionals has recently executed several climbing inspections for Tainter Gate structures, including 10-year detailed hands-on inspection for the Category 1 and 2 Tainter gates from Tennessee and North Carolina to the Pacific Northwest. WSP's engineering support has included observing and assisting during full open gate exercises, incorporating findings from visual inspections into structural models of Tainter gates, and assessing the impact of noted aging on the safety of the gates under static and dynamic loading conditions.

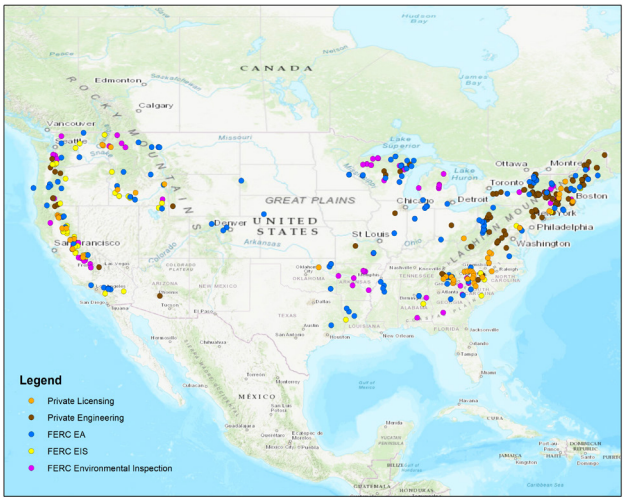
Client: Confidential **Location:** Multiple

Federal Energy Regulatory Commission Compliance
Compliance

As the lead environmental and engineering contractor supporting the Office of Energy projects since 1998, WSP assists FERC in its regulation of hydropower facilities throughout the United States. Tasks include assisting with pre-filing activities and study determinations, conducting adequacy reviews of license applications, preparing scoping documents and arranging scoping meetings, performing technical analyses of project effects, preparing environmental impact statements and environmental assessments, and preparing draft license orders.

WSP has processed more than 200 license applications under these contracts providing National Environmental Policy Act (NEPA) support for applications filed under the Traditional Licensing Process, the Integrated Licensing Process, as well as the Alternative Licensing Process. WSP also assists the Commission's Division of Hydropower Administration and Compliance with its regular post-license on-site environmental inspections of licensed projects as well as producing NEPA documents related to licensees' compliance with their FERC order.

CLIENT: Office of Energy **LOCATION:** Multiple Locations



Justin Lennon, PE
Hydraulic Structures and Flood Control
National Practice Lead
Justin.Lennon@wsp.com
+ 1 410-752-9632

About WSP USA
WSP USA is the U.S. operating company of WSP, one of the world's leading engineering, environment and professional services firms. Recognized on Fast Company's Brands that Matter List for 2022 as a top Community-Minded Business, WSP USA brings together engineers, planners, technical experts, strategic advisors and construction management professionals who are dedicated to collaborate in the best interests of serving local communities. WSP USA designs lasting solutions in the buildings, transportation, energy, water and environment markets. With more than 15,500 employees in 300 offices across the U.S., WSP partners with its clients to help communities prosper.

Name	Years Exp.	Highest Degree	Project Management	Dam Inspection	Hyraulics & Hydrology	Enginering Analysis	Instrumentation & Monitoring	Risk Analysis	Geotechnical	Civil / Structural	Consequence Analysis	Construction Services	Dam Removal & Stream Restoration	Advisory Services
Hans Hasnay, PE	40	BSCE	X	X		X				X				
Jot Splenda	22	MESM	X											
Jeremy Bielby, PE	9	MS	X	X		X	X		X			X	X	
Stefan Schadinger, PE, PMP	26	MSSE	X	X		X	X			X				
James Barbis, PE, CFM	13	MSWREE	X	X	X	X								
Gilles Bourgeois, P. Eng.	35	M.A.SC	X		X	X	X	X			X		X	X
Justin Lennon, PE	20	MSCE	X		X	X							X	
Justin Zoladz	21	BS	X											X
Casey Howard, PE, SPRAT II	11	BS					X			X		X		
Patrick Ennis, PE	27	BSCE	X	X	X	X								
Derek Olson	26	BSCE	X			X						X		
Anne Fitzpatrick, PE	15	MSCE	X	X	X	X					X	X		
Aaron Remai, PE	9	MCE	X	X		X	X		X	X				
Seth Krause, PE	6	MSCE	X			X	X					X		
Alexandra Pascale, EIT	8	BSCE	X	X	X							X		
Adriana Herrera, EIT	7	BSCE		X	X		X					X		
Bernward Hay	34	PhD	X				X	X			X		X	
Alynda Foreman	25	MS	X				X						X	
Leslie Pomaville	18	MS	X											
Tyler Rychener	23	MS	X				X						X	
Matthew Lunemann, PE	18	MS	X	X		X	X		X			X		
Shea Carr, PE	23	BSCE	X	X		X			X			X		
Rabia Sarica LeClerc,PE, PhD	20	PhD				X			X					
Dan Hurst, PG	37	BA	X	X			X	X	X			X		
Douglas E. Tate, PE	33	BSE		X	X	X	X		X			X		
Mario Glorioso, PE	21	MS	X	X		X			X					

Contacts

Jennifer Brunton, PE, CFM, CERP
Vice President, NY Water Lead
Jennifer.Brunton@wsp.com

Jeremy Bielby, PE
NY Dams and Reservoirs Lead
Jeremy.Bielby@wsp.com

About WSP USA

WSP USA is the U.S. operating company of WSP, one of the world's leading engineering and professional services firms. Dedicated to serving local communities, we are engineers, planners, technical experts, strategic advisors and construction management professionals. WSP USA designs lasting solutions in the buildings, transportation, energy, water and environment markets. With more than 13,000 employees in 200 offices across the U.S., we partner with our clients to help communities prosper.

Resumes

LEADERS YOU CAN TRUST

Our multidisciplinary team includes engineers, scientists, inspectors and managers with experience delivering a wide variety of dam-related services across the country. Our team brings nationally recognized technical expertise that are at the forefront of innovations and the latest regulations.

Hans Hasnay, PE

Dam Safety

Hans is the dams and reservoirs practice leader at WSP USA with over 40 years of experience on a wide variety of engineering projects including the design, construction, inspection, and management of major projects associated with dams and reservoirs, and hydroelectric facilities. Hans is an approved Federal Energy Regulatory Commission (FERC) Part 12D independent consultant and hasinspected dozens of dams, gates, tunnels, penstocks and associated equipment.

Jot Splenda

FERC

Jot is a principal planner with 22 years of experience in environmental planning, permitting, and natural resource analysis for federal and private utility clients and a special focus on supporting FERC and private electric and transmission clients. He manages resource specialists, and coordinates reports and documents for National Environmental Policy Act (NEPA) and other regulatory permitting and compliance projects. Jot's technical areas of expertise include recreation, aesthetics, land use, water quality, and shoreline management.

Matthew Lunemann, PE

Geotechnical

Matt has over 17 years of experience in geotechnical analysis, subsurface investigation, geotechnical dam inspection & rehabilitation, confined disposal facility (CDF) design, dredging support and dredged material re-use, embankment design, retaining wall & bulkhead design, site-specific seismic response analysis, foundation engineering, pavement design, construction services for piles and drilled shafts, construction instrumentation, and testing of soil samples. Matt has also engaged in research to develop geotechnical resilience engineering guidelines for marine transportation systems.

Stefan Schadinger, PE

Structural

Stefan is a structural engineer with extensive experience in hydropower and thermal power projects and has performed steel and concrete detailed structural designs and stability analyses of hydropower and thermal projects. Stefan is approved as a FERC Independent Consultant to perform Part 12D dam inspections and has experience directing Potential Failure Mode Analyses (PFMA) sessions.

Nicole Shute,PE, PMP

Civil

Nicole has over 20 years of engineering experience in the design, development, and presentation of vital infrastructure projects throughout the Hudson Valley Region. With a depth of experience in structural and civil design, Nicole has worked with numerous municipalities and state agencies within New York on projects such as the Lock E19.

James Barbis, PE, CFM

Hydrology & Hydraulics

James is a water resources engineer and certified floodplain manager with 13 years of experience specializing in identifying resilient solutions to protect clients' assets from the threats of climate change. His experience includes a wide range of projects flood risk assessments, 1-D and 2-D Hydraulic Modeling, extreme event hydraulic and hydrologic analyses that include Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF), levee/flood control evaluation, design and certification; dam break studies; dam assessment and rehabilitation design; dam safety, risk management; and flood hazard studies.

Jeremy Bielby, PE

Construction & Dam Safety

Jeremy is a lead dam consultant responsible for project management, design, analysis, field inspections and reports, bid support, permitting and documentation for dam and water-related projects. Prior to joining WSP, Jeremy served as a senior geotechnical engineer developing a comprehensive understanding of design, analysis and report writing and field experience within geotechnical engineering and foundation construction. Key projects include LOCK E19, NYSCC Dam inspections and Lake Lenape Dam.

Justin Lennon, PE

Dam Removal

Justin is WSP USA's National Practice Area Leader in the areas of hydraulic structures and flood control and a national practice lead in the areas of river / bridge hydraulics & scour, ecological & stream restoration, and climate resiliency. Justin specializes in riverine restoration, embankment stabilization, riverine hydraulics and working climate change uncertainty into engineering analyses.

Resumes for these individuals included in the appendix to this document.

FIRM

WSP USA

YEARS OF EXPERIENCE

46

EDUCATION

BS, Civil Engineering, Clarkson University 1976

PROFESSIONAL REGISTRATIONS

Professional Engineer: New York, 1983 (PE #60329); New Jersey, Pennsylvania

AREAS OF PRACTICE

Dam, hydro, and power plant inspections; penstocks and outlets works; electrical substations; water and wastewater treatment; hydroelectric facilities; transmission structures; structural engineering; fossil fuel plants; gas turbine generators

Atilla (Hans) Hasnay, PE

Dam Safety

QUALIFICATION SUMMARY

Hans Hasnay is the dams and reservoirs practice leader at WSP USA. He has over 40 years of experience on a wide variety of engineering projects including the design, construction, inspection, and management of major projects associated with dams and reservoirs, fossil fuel plants, hydroelectric facilities, gas turbine generators, transmission structures, electrical substations, water and wastewater treatment facilities, and industrial buildings.

Hans is an approved Federal Energy Regulatory Commission (FERC) Part 12D independent consultant. He has over 30 years of experience in the inspection of dams, gates, tunnels, penstocks and associated equipment. As a dam safety expert he led the effort to perform condition and risk assessments for more than 600 water impounding structures including dams, reservoirs, spillways and embankments for the New York State Canal Corporation (NYSCC). He has been instrumental in developing dam safety programs for public utilities, private owners and state agencies.

REPRESENTATIVE PROJECT EXPERIENCE

NYPA Vischer Ferry Dam Ice Jam Mitigation Modifications, Sullivan County, NY: Senior Engineer in supporting NYPA to consider structural, mechanical and operational modifications to the Vischer Ferry Hydroelectric Project, to mitigate the effects of winter ice jams and their impact on flooding of the surrounding properties. WSP is providing Program Management, Concept Design, Support for Public Outreach, Owner's Engineering Oversight, and Permit Preparation Tracking, to advance the project from its current stage of development through to the completion of a detailed construction design for planned project implementation.

WSP is the technical lead on the planning stage for installation of a major crest gate system that will provide mitigation of ice jam flooding issues on the Mohawk River upstream of the project, and improved plant operation and increased power production. WSP is providing cost estimates to allow comparison of the benefits and costs of each of the four different alternatives. WSP will develop a business case for NYPA to demonstrate the benefits that will result from construction of the project. WSP is also assisting in developing conceptual designs and cost estimating for post-tensioned anchors that may be required to meet FERC stability requirements, and additional repairs to address undercutting issues that could future impact gate installation and operation.

NYCDEP Engineering Services for the Reconstruction of the Dividing Weir Bridge, Dividing Weir and Ashokan Spillway, Ulster County, NY: Senior Engineer assisting with the remedial design and associated dam safety issues. WSP, as a major and integrated subcontractor, was selected to provide engineering services for the reconstruction of multiple structures associated with the Ashokan Reservoir. These services include planning, design, assistance during bidding, design services during construction and other related services. The Ashokan Reservoir is a critical part of the New York City Water Supply System, supplying about 40% of New York City's daily drinking water. It features nine impounding structures, and dam breach modeling and inundation mapping are being performed for each structure. To ensure that the water quality conditions remain in compliance with water quality criteria throughout the project duration, we will develop and execute sampling programs as well as performing water quality and sediment modeling.

City of Beacon Dam Inspection and Rehabilitation, Beacon, NY: Design Engineer for the rehabilitation design of a 100-year old masonry and concrete dam. The dam is being remediated to increase spillway capacity and to meet current dam stability criteria. The project consists of performing the annual dam inspection, performing

hydrologic and hydraulic analyses, performing stability analyses, and developing a conceptual and final design including the preparation drawings and specifications.

Rehabilitation of Lake Lenape Dam and Spillway, Hamilton Township, NJ: Design Engineer for the study of the dam and spillway. WSP is providing dam engineering consulting services for the evolution and rehabilitation of Lake Lenape Dam and Spillway, the study of the dam and spillway will develop appropriate and feasible rehabilitation alternatives.

Chiselhurst Dam Rehabilitation, Chappaqua, NY: Senior Engineer for the rehabilitation design of the existing concrete dam. Chiselhurst Dam, regulated by the NYSDEC, is a concrete gravity dam approximately 20 feet high. The dam's service spillway is an uncontrolled broad crested spillway with a concrete chute spillway with sidewalls. WSP was retained by the dam owner to perform the EA for the structure and develop an emergency action plan (EAP) and an inspection and maintenance plan.

Kerite Dam Removal, Seymour, CT: Project Manager for the design and permitting effort required for the removal of the dam. Kerite Dam is a masonry structure located across the Bladens River immediately upstream of its confluence with the Naugatuck River in Seymour, Connecticut. Marmon Utility LLC decided to remove the dam to relieve their financial liabilities and regulatory burdens since the dam no longer serves a purpose for the company. The project removal of the dam, sediment management, channel restoration, and stabilization to a natural free-flowing condition. Services include site investigations, 30% through final design, permitting, bidding, and construction support.

Batesville Generating Facility Unit 1 Gas Turbine Foundation Evaluation, Batesville, MS: Lead Structural Engineer responsible for performing physical evaluation of the foundation of the Unit 1 Gas Turbine at the Batesville Generating facility to determine the extent of any potential damage after a catastrophic failure. Non-Destructive Evaluation (NDE) methods including Impact Echo and Spectral Analysis of Surface Waves were used to assist in the evaluation. In addition, Hans was a member of the team of specialists that developed the repair scheme for the project.

Blue Ridge Dam and Appurtenances, Blue Ridge, Georgia: Project Manager on this multi-faceted upgrade at TVA's Blue Ridge Generating facility. Work included a comprehensive inspection of the facility including a geotechnical program, complete inspection of the 900-foot-long, 14-foot diameter penstock, and 170-foot-tall intake tower. Remediation work will include relining the penstock, structural stabilization of the intake tower, a weighted berm on the upstream and downstream dam embankments, and powerhouse access modifications.

FERC Low Hazard Inspection Program, Statewide, New York, New Jersey, Vermont, New Hampshire, Alaska, Washington: Lead Inspector that participated in FERC's 2006 low hazard facility inspection program, in which 25 hydropower facilities across the country were inspected by senior firm personnel in accordance with FERC operational inspection guidelines. Participants in the program had to meet the requirements for a FERC Part 12 inspector. Hans completed seven facility inspections in New York, Vermont, New Jersey, Washington and Alaska, which included review of existing data and analysis, a field inspection, interviews with owners, and a detailed report in FERC standard format.

Gilboa Dam Emergency Upgrade, Gilboa, NY: Independent Quality Control Consultant on this $17 million emergency stabilization of the New York City owned dam. The project included the installation of 79 high capacity post tensioned multi-strand anchors. Hans participated in the development of the quality control procedures to be followed, the forms to be used, the submission protocol and construction activities to be monitored. He supervised the activities of three full time field inspectors and at the completion of the project prepared the final independent quality control report for the project.

Mongaup Falls Dam Part 12D Inspection, Lumberland, NY: Independent Consultant. Part 12D dam safety inspections are conducted every five years in accordance with the dam safety program required for projects regulated by the FERC. He performed detailed site inspections, reviewed the available hydraulic and structural data, verified the stability analysis for the structures, and prepared detailed reports for submission to FERC.

NYSCC Dam Safety Engineering, Statewide, NY: Consulting Dam Safety Engineer for NYSCC during the transition from NYS Thruway Authority control to the New York Power Authority (NYPA). While embedded with them at their Albanyoffices Hans was responsible for developing their dam safety program and culture in line with current best practices and NYPA standards. In addition, he assessed the system facilities for hazard and risk and worked with management to prioritize rehabilitation projects during their budgeting process. Hans managed rehabilitation design projects that addressed high risk structures

Ogdensburg and Kayuta Dams 2008 Part 12 Inspections, ualitative Screening-Level Risk Analysis Evaluation for Water-Impounding Structures, Statewide, NY: Project Manager for qualitative screening-level risk analysis (QSLRA) evaluation for water-impounding structures. Assignments included developing a QSLRA for more than 600 structures on the New York State canal system. Additional work consisted of performing NYSDEC based hazard classifications for 34 structures, evaluating public benefit and use reports for the large off channel reservoirs and performing potential failure mode analysis for the higher risk structures.

FIRM

WSP USA

YEARS OF EXPERIENCE

22

EDUCATION

MESM, Water Resources, U.C. Santa Barbara, California, 2002

BS, Ecology and Evolution, U.C. Santa Barbara, California, 1997

AREAS OF PRACTICE

- FERC Licensing & Compliance
- NEPA
- Energy Projects Permitting
- Project Management
- Transmission Routing

JOT SPLENDA

FERC

QUALIFICATION SUMMARY

Mr. Splenda is an Assistant Vice President and Principal Planner with broad experience in environmental planning, permitting, and natural resource analysis for federal and private utility clients. Mr. Splenda's has 22 years of experience with a focus on supporting Federal Energy Regulatory Commission, Army Corps of Engineers, Rural Utility Service, National Park Service, United States Forest Service, Bureau of Land Management and private electric and transmission clients. His role as project manager has included supervising teams of resource specialists, schedule and budget planning and management, and coordinating reports and documents for National Environmental Policy Act (NEPA) and other regulatory permitting and compliance projects. Mr. Splenda's technical areas of expertise include recreation, aesthetics, land use, water quality, and shoreline management. His experience includes managing projects associated with the licensing and permitting of infrastructure projects throughout the United States.

REPRESENTATIVE PROJECT EXPERIENCE

FERC, Lake Elsinore Advance Pumped Storage Project (LEAPS), CA: Recreation Lead. The LEAPS Project is revisited in a new FERC licensing proceeding consisting of a proposed pumped storage project with a 34-mile-long transmission line in southern California. Responsible for evaluating the proposed projects effects on land use, recreation, and aesthetic resources and recommending protection, mitigation, and enhancement measures. Key issues include analyzing potential affects relative to the U.S. Forest Service's Cleveland National Forest Plan (recreation areas, visual resources, road-less inventory) and the BLM's Visual Resource Management System. 2020 – ongoing

FERC County Line Hydroelectric Project, Idaho Falls, ID: Senior Planner. Mr. Splenda is evaluating the proposed project to increase irrigation flows to two canals off of the Snake River and divert the excess flows through two new powerhouses about 4 miles downstream from the diversion. Issues include reduced instream flows, recreation resources, aesthetics, and visual resources. 2022-Ongoing.

FERC Moretown #8 Hydroelectric Project, Moretown, Vermont: Senior Recreation Planner. Mr. Splenda is evaluating the proposed license application to operate and maintain the Moretown Project on the Mad River. Recreation issues to be evaluated in the EA include public access at informal and formal sites, canoe portage, access to the downstream of the dam, and boating resources downstream of the dam. 2021-Ongoing.

FERC Connecticut River EIS: Senior Recreation Planner. Mr. Splenda is evaluating the proposed license application to operate and maintain FirstLight's Turners Falls and Northfield Mountain Pumped Storage Projects along the Connecticut River in Massachusetts. Recreation issues to be evaluated include new operations, changes in lands within the project boundary, recreational boating releases and overall demand for facilities. 2021 – Ongoing.

FERC, Allegheny, Monongahela, and Ohio River Projects, West Virginia and Pennsylvania: Senior Recreation Planner. overseeing the preparation of the recreation, land use, and aesthetics resource sections for the various EA's that analyzed the effects of issuing new licenses to hydropower development proposals on existing USACE locks and dams. 2015-2016.

FERC, Logan 2 EA, UT: Senior Recreation Planner overseeing the preparation of the recreation, land use, and aesthetics resource sections for draft EA that analyzed the effects of removing existing sediments in the project impoundment, rehabilitating the

intake works, and temporary effects to recreation resources in the vicinity of the project. 2015-2016.

FERC, Norway-Oakdale Final EA, IN: Senior Recreation Planner overseeing the preparation of the recreation, land use, and aesthetics resource sections for EA that analyzed the effects implementing the proposed modified definition of abnormal flow condition that would revise Article 403, which defines the operation of the project. 2015-2016.

FERC, Susquehanna River Projects, Pennsylvania and Maryland: Recreation Planner responsible for preparing recreation, land use, and aesthetic resource sections of the EIS that analyzed the effects of relicensing the York Haven, Muddy Run Pumped Storage and Conowingo hydroelectric projects. 2013-2014.

FERC, Lake Powell Pipeline Project, UT: Recreation Lead. The Lake Powell Pipeline Project is a proposed 184-mile-long water pipeline with several in-line hydropower stations and a pumped-storage hydropower station. The applicant, Utah Department of Water Resources, has applied for a FERC hydropower license following ILP. As the lead federal agency under NEPA, FERC has requested other federal agencies to act as cooperators in the process. The other agencies include the U.S. Bureau of Land Management (BLM), which would have right-of-way authority over much of the pipeline's length; the National Park Service, which would have right-of-way authority over a small portion of the pipeline's length; and the Bureau of Reclamation, which has authority over the proposed water withdrawal from Lake Powell. Participated in scoping and study plan development related to water quality issues. 2009

Wisconsin Public Service, Tomahawk and Grandfather Falls Projects, Wisconsin: Project Manager. Directly responsible for the oversight of field data collection, analysis and reporting for the FERC-approved study plan, as well as for the preparation of the recreation resources study report which will inform the license application. Issues included winter and summer public access, overall site use and needs, and administering surveys at Grandfather Falls project to inform potential needs at that project. 2014

PG&E, McCloud-Pit Hydroelectric Project, California: Recreation, Land Use, and Aesthetics Technical Lead for six recreation, land use, and aesthetic related studies in northern California for PG&E as part of its relicensing effort using the Integrated Licensing Process (ILP). Directly responsible for the oversight of field data collection, analysis and reporting for the six FERC-approved study plans, as well as for the preparation of the recreation, land use, and aesthetic resources sections of the license application. Recreational opportunities in the area include premier flat water and white-water boating and angling. Data collection included interviews, spot count, traffic counters, aerial observations, user group, agency, and outfitter interviews, regional context and demand for recreation at the project. 2006-2012

FERC, Eagle Mountain Pumped Storage Hydroelectric Project, CA: This proposed 1,300-MW project in the desert of Riverside County involves the possible use of two inactive mining pits as reservoirs and the construction of a transmission line. Lead author responsible for preparing the recreation, land use, and aesthetic sections of the EA that analyzes the potential effects associated with granting an original license for this project. The proposed project would be constructed adjacent to Joshua Tree National Park and Wilderness Area. Key issues associated with this project include the effects of groundwater withdrawal to fill and maintain the reservoirs, seepage, and the effects on endangered species, land use, and aesthetics resources. 2009-2012

FERC, Tulloch Reservoir Shoreline Management Plan EA, CA: Project Manager responsible for preparing the EA for the proposed Shoreline Management Plan for Tulloch reservoir. The project is located in the foothills of the Sierra Nevada Mountains in El Dorado County, California. Key issues included loosely controlled residential development, shoreline classifications, restoration, and monitoring. 2009

FERC, Taum-Sauk Project, MO: Recreation Planner. Prepared resource sections for the EIS for the relicensing of AmerenUE's Taum Sauk Pumped Storage Project on the East Fork Black River, in Reynolds County, Missouri. Reviewed the license application for adequacy and drafted responses to additional study requests made in response to the Commission's tendering notice. The relicensing proceeding is complicated by the fact several base line studies were completed prior to the breach of the upper reservoir in December 2005 and could not be completed until the upper reservoir was built and resumed operations. AmerenUE was authorized by FERC to rebuild the upper reservoir in August 2007 and completed the reconstruction in 2010. 2008 -2009

FERC, Lake Elsinore Advance Pumped Storage Project (LEAPS), CA: Water Quality Lead. The LEAPS Project was a proposed pumped storage project with a 34-mile-long transmission line in southern California. Responsible for evaluating the proposed projects effects on land use, recreation, and aesthetic resources and recommending protection, mitigation, and enhancement measures. Key issues were analyzing potential affects relative to the U.S. Forest Service's Cleveland National Forest Plan (recreation areas, visual resources, road-less inventory) and the BLM's Visual Resource Management System. 2004-2007

FIRM

Text

YEARS OF EXPERIENCE

18

EDUCATION

- MS, Civil Engineering, Rutgers University, 2009
- BS, Civil Engineering, Rutgers University, 2006

PROFESSIONAL REGISTRATIONS

Professional Engineer:

- New Jersey, 2009
- Pennsylvania, 2016
- Delaware, 2018

CERTIFICATIONS

- 40-hr OSHA HAZWOPER
- Envision Sustainability Professional
- Project Management Professional
- Nationally Certified Tunnel Inspector

PROFESSIONAL ASSOCIATIONS

- PIANC-USA
- Western Dredging Association
- North American Society of Trenchless Technology
- American Society of Civil Engineers
- Geo-Institute
- Coasts, Oceans, Ports, & Rivers Institute (COPRI)
- Project Management Institute

Matthew M. Lunemann, PE, PMP, ENV SP

Geotechnical

QUALIFICATION SUMMARY

Matt has over 17 years of experience in geotechnical analysis, subsurface investigation, geotechnical dam inspection & rehabilitation, confined disposal facility (CDF) design, dredging support and dredged material re-use, embankment design, retaining wall & bulkhead design, site-specific seismic response analysis, foundation engineering, pavement design, construction services for piles and drilled shafts, construction instrumentation, and testing of soil samples. Mr. Lunemann has also engaged in research to develop geotechnical resilience engineering guidelines for marine transportation systems, and served as a United States young professional representative on PIANC Task Group 193.

REPRESENTATIVE PROJECT EXPERIENCE

Lake Lenape Dam Rehabilitation and Spillway Reconstruction - Phase 2, Hamilton Township, Atlantic County, NJ: Project Manager responsible for final design and permitting of a new labyrinth spillway to replace the existing 150-year-old masonry wall spillway and to rehabilitate the existing dam embankments for this high hazard dam. Matt coordinated a team of hydraulic, geotechnical, structural, surveying, public involvement, environmental, and fish passage subject matter experts. The project included a supplemental subsurface investigation with borings and GPR; wetlands delineation; threatened & endangered species determination; structural and geotechnical spillway design; 2-D and Computational Fluid Dynamics (CFD) modeling; and environmental permitting and coordination with NJDEP, Pinelands Commission, Cape Atlantic Soil Conservation District, NJDEP Dam Safety Bureau, and USACE. Matt also served as WSP's point of contact for the Lake Lenape Dam Committee and presented the project to the general public at a public information center.

2007-2021 Grover's Mill Dam Regular Inspections; West Windsor, NJ: Project Manager (2014, 2021) & Geotechnical Engineering Task Leader (2009-2012) for biennial regular inspections and repairs to this earthen dam and concrete spillway. Responsible for inspecting condition of dam slopes, upstream reservoir, downstream stilling basin, and concrete spillway. Also responsible for preparing water lowering permits to facilitate inspection and for coordinating with the NJDEP Dam Safety Bureau. Drafted Regular Inspection Reports for each inspection and the 2009 Damage Assessment Report. Developed short-term and long-term repair recommendations, and typical sections in coordination with the client. Reviewed and updated the Operations & Maintenance (O&M) Manual each inspection and revised the Emergency Action Plan in 2011 & 2021.

Pocket Dam Evaluation; Beacon, NY: Geotechnical Task Leader. Responsible for performing a geotechnical inspection of the dam spillway, embankments, upstream reservoir, and exit channels. Prepared geotechnical inspection memorandum and reviewed dam stability calculations under static and seismic loading conditions in accordance with NYSDEC requirements.

2016 Formal Inspection of Smithville Dam, Eastampton, Burlington County, NJ: WSP's project manager and Geotechnical EngineeringTask Leader on this inspection, as sub to another consultant. Provided geotechnical and structural inspection of this concrete-arch, Class I (high hazard)dam and appurtenant structures. Responsible for managing the structural and geotechnical inspections, including underwater inspection, and for preparing the Visual Inspection Checklist (VIC) for the Formal Inspection Report.

Trout Run Dam, Boyertown, PA: Geotechnical Engineer. Provided assistance on this project to monitor instrumentation at this 104-foot high earth embankment dam with 32-foot wide concrete spillway. Updated piezometer data and created new plots of reservoir levels, head-loss, piezometer water levels, and monthly precipitation over different time periods.

Lake Lenape Dam and Spillway Evaluation and Rehabilitation - Phase 1, Hamilton Township, Atlantic County, New Jersey (: Geotechnical Task Leader for preliminary design of rehabilitation or reconstruction of this 100-year old, Class I (high hazard) dam with masonry spillway. He was responsible for developing the supplemental subsurface investigation and laboratory testing programs, drafting the Geotechnical Data Report, and performing alternatives analyses for geotechnical rehabilitation and replacement of the dam embankments and spillway.

Lake Lenape Dam 2018, 2020, & 2022 Inspections, Hamilton Township, Atlantic County, NJ: Geotechnical Engineering Task Leader responsible for performing the 2018 & 2020 geotechnical regular inspection of this 100-year old, Class I (high hazard) dam with masonry spillway and served as Project Manager for the 2020 & 2022 inspections and subsequent spillway surveys in 2020 & 2022. Coordinated structural and geotechnical inspection efforts and oversaw development of the Regular Inspection Report, updates to the Emergency Action Plan, and updates to inundation mapping. Coordinated efforts with local and county governments and NJDEP and conveyed findings to the stakeholders on the Dam Committee.

2016 Formal Inspection of Grover's Mill Dam; West Windsor, NJ: Project Manager & Geotechnical Engineering Task Leader responsible for managing inspection & evaluation for this once-every-10-year formal inspection of this Class II (significant hazard) dam in accordance with NJDEP Dam Safety regulations. Led geotechnical inspection and analyses of the armored embankment dam and coordinated underwater & surface structural inspection, structural analyses, and hydraulic evaluation. Obtained water lowering permit from NJ Fish & Wildlife to facilitate inspection. Provided findings and recommendations in Formal Inspection Report and updated the O&M Manual and Emergency Action Plan.

2012 & 2018 Repairs to the Grover's Mill Dam, West Windsor, Mercer County, NJ: Geotechnical Engineering Task Leader (2012) and Project Manager (2018). Following the 2011 & 2016 inspections, developed plans and specifications for short-term and long-term repair recommendations, in coordination with the client. Responsible for preparing NJ Fish & Wildlife water lowering permits to facilitate inspection & construction and for coordinating with the NJDEP Dam Safety Bureau and obtaining the Dam Safety Permit for 2012 & 2018 repairs. Repairs in 2012 consisted of grout-filled geotextile bags used as scour protection and formwork for flowable fill / cement grouting of undermining void at downstream concrete apron. Repairs in 2018 included installation of downstream spillway revetment, structural spillway repairs, keying in section of downstream ACBMs, and tree removal along the northwest slope (after property ownership change allowed access) to bring the dam into conformance with USACE and NJDEP requirements. During construction, responded to Contractor RFIs, and reviewed shop drawings.

Gull Island CDF Reconstruction, Point Pleasant & Manasquan, NJ: geotechnical engineering task leader for this conceptual design & investigation which involved incorporating existing site conditions evaluated from the previous dredging program and slope stabilization efforts and newly-collected survey information to develop alternatives for reconstructing the Gull Island CDF in a manner that will maximize its storage capacity and account for beneficial use of on-site dredged materials adjacent to County parkland. Matt managed the subsurface investigation program including CPTs, test pits, and soil borings with concurrent geotechnical sampling and geo-environmental sampling for analytical testing of proposed fill. Alternatives developed included new bulkhead and revetment options to resist island erosion, on-site processing of dredged sediments, use of on-site fine-grained dredged material for adjacent marsh enhancement, and use of remaining on-site dredged material to reconstruct confining dikes on a restored footprint while accounting for future dike raisings and historic wetlands lines. Matt is currently responsible for managing the geotechnical design for the reconstructed CDF, including slope stability and seepage analyses, soil rebound and settlement calculations, geotextile reinforcement design, and earthwork staging.

Spring Creek South Coastal Storm Risk Management Project; New York, NY; US Army Corps of Engineers: served as deputy project manager and geotechnical task leader for the preliminary design of this marsh restoration, park development, and coastal protection project on undeveloped National Park Service property adjacent to the Howard Beach community in New York City. Responsible for establishing the geotechnical work plan and the subsurface investigation program and for all geotechnical analyses and reporting for the marsh restoration and protective berms, including slope stability analyses, soil rebound calculations, and consolidation analysis, while accounting for storm surge and sea level rise considerations. The site included historically-placed dredged materials which were incorporated into the protective berm design.

FIRM

WSP USA

YEARS OF EXPERIENCE

27

EDUCATION

MS, Structural Engineering, Northeastern University, 2005

BS, Civil Engineering, University of Vermont, 1995

PROFESSIONAL REGISTRATIONS

- Professional Engineer: AL; DE; IN; MA; MD ME; MI; NC; NH; NJ; NY; PA; TN; TX; VA; VT; WI; WV
- Project Management Professional (PMP)

AREAS OF PRACTICE

- Dam Safety
- Independent Consultant
- Dam Rehabilitation and Remediation
- Analysis and Design – Civil/Structural
- Structural Inspection
- Instrumentation and Monitoring

Stefan Schadinger, PE, PMP

Structural

QUALIFICATION SUMMARY

Stefan Schadinger is the national business line structural lead within the Energy Group. A principal engineer with extensive experience in hydropower and thermal power projects, Stefan has performed steel and concrete detailed structural designs and stability analyses of hydropower and thermal projects. Stefan is approved as a Federal Energy Regulatory Commission (FERC) Independent Consultant to perform Part 12D dam inspections and has experience directing Potential Failure Mode Analyses (PFMA) sessions. He has over 25 years' experience, with a majority of this time, working on FERC and State Dam Safety and related concerns.

Stefan has been a FERC Independent Consultant on 9 projects, and has participated/ assisted on several other Part 12D dam safety inspections and been a core member of the PFMA review sessions.

Stefan has experience inspecting, performing site condition assessments and working on various structural and stability aspects of arch dams, concrete gravity dams, earthen embankments, spillways, Tainter and Stoney gates, penstocks and tunnels, high capacity post-tensioned anchor designs and installation. As part of the analyses and evaluations performed, he also has extensive experience interpreting dam instrumentation.

REPRESENTATIVE PROJECT EXPERIENCE

Dam Safety Independent Consultant

Amoskeag Dam Project (Central Rivers Power, NH). FERC Part 12 Inspection Report (2022): As Project Manager and Independent Consultant, specific duties included the following:

- Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report.
- Preparation of the FERC Twelfth Periodic Safety Inspection Report for the development.
- Performed the field inspections of the project structures.
- Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.
- Responsible for the review and evaluation of the instrumentation records.

Lake Lynn Hydroelectric Project (Eagle Creek, WV). FERC Part 12 Inspection Report (2022): As Project Manager and Independent Consultant, specific duties included the following:

- Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report.
- Preparation of the FERC Eleventh Periodic Safety Inspection Report for the development.
- Performed the field inspections of the project structures.
- Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.

- Responsible for the review and evaluation of the instrumentation records.

Croton Dam Project (Consumers Energy, MI) FERC Part 12 Inspection Report (2022): As Independent Consultant, specific duties included the following:

- Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report for the project.
- Preparation of the FERC Ninth Periodic Safety Inspection Report for the Croton Dam Project.
- Performed the field inspections of the project structures.
- Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.
- Responsible for the review and evaluation of the instrumentation records.

Webber Dam Project (Consumers Energy, MI) FERC Part 12 Inspection Report (2022): As Independent Consultant, specific duties included the following:

- Directed the supplemental PFMA session and responsible for the preparation of the supplemental PFMA report for the project.
- Preparation of the FERC Ninth Periodic Safety Inspection Report for the Webber Dam Project.
- Performed the field inspections of the project structures.
- Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses.
- Responsible for the review and evaluation of the instrumentation records.

Dam Safety/Water Resource/Hydropower

Vischer Ferry Dam (New York Power Authority (NYPA)) (2021-Present): WSP is supporting structural, mechanical and operational modifications considerations to mitigate effects of winter ice jams and flooding impacts on surrounding properties.

- As a lead structural engineer his responsibilities included evaluating dam stability, assessing various gate alternative impacts and identifying modifications to meet the project's stability requirements.

Hawks Nest Project (Brookfield Hawks Net Hydro) (2022): Project repair drawings and specifications for the repair of scoured concrete and bedrock at the spillway toe of Hawks Nest Dam.

- Dam Safety Inspection (August - December 2018), Eagle, Elmer, Taylorville, and Belfort Developments. As Project Manager and as a Consultant for the project, his specific duties included the following:
- Performed a 4-site field inspections of the project structures.
- Prepared a Safety Inspection Report for each site.
- Directed the PFMA review session for each site.
- Prepared an updated PFMA report for each site.
- Reviewed/evaluated existing stability, seismic and hydraulic analyses.
- Reviewed/evaluated project instrumentation records.

Helen Gould Dike Flood Wall (July – October 2018): As Project Manager and Owner's Engineer his specific duties included:

- Responsible for the design of a timber flood wall to prevent overtopping of the dike under the project's Spillway Design Flood. Issued an Engineering Report along with drawings for construction and a work plan/specification.

STID Preparation (June – December 2018) for six dam projects in New York State (Brookfield): As Project Manager and Responsible Engineer his specific duties included:

- Responsible for the original development of the STID for six dam projects.

Emergency Spillway Potential Failure Mode (August/ September 2017), Bear Swamp Pump Storage:

- Assisted Brookfield Renewable and the active Independent Consultant with the review and development of the potential failure mode that considered over pumping at the Bear Swamp pump storage project causing flow through the emergency spillway.

Penstock/Pipeline External and Concrete Foundation 5-Year Inspection (May 2017), Santeetlah Development: As principal engineer his specific duties included:

- Performed the inspection of the steel pipeline and saddles including bents, where applicable.
- Performed the inspection of the concrete foundations supporting the steel pipeline.
- Responsible for developing the inspection report documenting the observations.

FERC Eighth Part 12 Follow-up Recommendations (August-September 2016), Bear Swamp Pump Storage and Fife Brook Dam: As Project Manager and principal engineer, his duties included:

James Barbis, PE, CFM

Hydrology & Hydraulics

FIRM

WSP USA

YEARS OF EXPERIENCE

13

EDUCATION

MS, Water Resources and Environmental Engineering, Villanova University, Villanova, PA, 2010

BS, Sports Biology (Chemistry minor), Springfield College, Springfield MA, 2002

PROFESSIONAL REGISTRATIONS

- Professional Engineer (P.E.): Pennsylvania (PE087655), New Hampshire (15090); Texas (133709); New York (101909-01)
- ASFPM Certified Floodplain Manager, PA, 2010. Certificate Number: US-10-05374

PROFESSIONAL ASSOCIATIONS

- Association of State Floodplain Managers, Inc. (ASFPM)
- American Society of Dam Safety Officials (ASDSO)
- American Society for Civil Engineers (ASCE)

QUALIFICATION SUMMARY

James is a WSP Vice President and a Mid-Atlantic Water Resources Engineering Manager. He is a registered Professional Engineer and certified floodplain manager (CFM) who leads an experienced team of local professionals who successfully support municipal and private clients throughout the United States in identifying resilient solutions to protect their key assets from the threats of climate change.

Mr. Barbis's experience includes a wide range of water resources-related projects, including leading flooding walkdowns for flood risk assessments, drainage design, permitting, 1-Dimensional and 2-Dimensional Hydraulic Modeling, extreme event hydraulic and hydrologic analyses that include Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF), storm sewer modeling (separate and combined); levee/flood control evaluation, design and certification; dam break studies; dam assessment and rehabilitation design; dam safety – risk management; and flood hazard studies.

REPRESENTATIVE PROJECT EXPERIENCE

Lester G. Ross Dam (MA-311) Dam Rehabilitation Design, USDA-NRCS, Berlin, MA: Project Manager (2015-Present). The Lester G. Ross Floodwater Retarding Dam is one of nine floodwater retarding dams built between 1962 and 1987 in the watershed of the Sudbury, Assabet, and Concord Rivers (known as the SuAsCo watershed). In 2015, the NRCS contracted WSP to development of the final design in 2017 for the Lester G. Ross Floodwater Retarding Dam, WSP developed detailed HEC-HMS and 2D HEC-RAS hydraulic models, which led to design deviations from the 2013 Supplemental Watershed Plan. Based on the refined hydrologic and hydraulic modeling, the widening of the auxiliary spillway was no longer required. However, the models did indicate flow velocities equal to or greater than 20 feet per second (fps) may be expected along the auxiliary spillway and in the tributary, which runs along the right embankment of the dam. Due to the high velocities, WSP developed a design using articulated concrete block (ACB) to protect the auxiliary spillway and right dam embankment. The cost estimate to implement this design is approximately $11M.

Following the 90% review of the design, the NRCS requested WSP evaluate a Roller Compacted Concrete (RCC) altnerantive due to the high cost of armoring the spillway.

Confidential Client, Dam #1 Reconstituted Design Evaluation and Rehabilitation Alternatives per NC State Dam Safety Requirements, NC: Project Engineer (2015-2020). Supported the engineering analyses performed, starting in 2015 in support of the evaluation of the dam and compliance with applicable NC State Dam Safety Rules and the client's Programmatic Document criteria for high-hazard dams. Analyses consisted of a hydrologic analysis using HEC-HMS, and hydraulic analyses using SITES, HEC-RAS (1D and 2D), and WinDamB models to understand erosion potential on the spillway with tailwater effects as well as the overtopping potential of the downstream structure. Field inspections, survey, and geotechnical investigations were incorporated into these analyses. Deliverables include H&H Results for the reconstituted design, rehabilitation alternatives, cost analysis and final Design Drawings Specifications and Design Report submitted for Permitting and for construction of an armored roller compacted concrete (RCC) auxiliary spillway with stilling basin, leading into the downstream lake.

Hamilton Lake Dam (PA-602) Supplemental Watershed Project Plan – Environmental Assessment, USDA-NRCS, Tioga County, PA: Project Manager (2015- 2018).Responsible for leading the rehabilitation analysis and evaluation of

modification alternatives necessary to bring the Hamilton Dam into compliance with USDA-NRCS and PA State Dam Safety criteria for high-hazard dams. The project consisted of a dam inspection, subsurface investigation soil borings to evaluate auxiliary spillway erodibility, internal drainage evaluation, sediment survey and reservoir storage evaluation, resource inventory of watershed, hydrologic/hydraulic analysis, rehabilitation alternatives and cost analysis, and development of an assessment report. A SITES model was developed for existing, and full build-out conditions.

Core Creek Dam (PA-620) Supplemental Watershed Project Plan – Environmental Evaluation, USDA-NRCS, Bucks County, Pennsylvania: Project Manager (2015-2017). Responsible for leading the rehabilitation analysis and evaluation of modification alternatives necessary to bring the Core Creek Dam into compliance with USDA-NRCS and PA State Dam Safety criteria for high-hazard dams. Primary responsibilities included the concurrent bidding, procurement, scheduling and execution of field work activities in preparation for desktop analysis. Field work managed included the wetlands study, sediment and site survey, video pipe inspection, dam inspection, and geotechnical investigations. The project consisted of a dam inspection, subsurface investigation soil borings to evaluate auxiliary spillway erodibility, internal drainage evaluation, sediment survey and reservoir storage evaluation, resource inventory of watershed, hydrologic/hydraulic analysis, rehabilitation alternatives and cost analysis, and development of an assessment report. A SITES model was developed for existing, full build-out, and alternative rehabilitation conditions. The alternative analysis also considered Future Without Project (current) conditions and decommissioning of the dam.

Hibernia Dam (PA-436F) Supplemental Watershed Project Plan No.7 - Environmental Evaluation, USDA-NRCS, Chester County, Pennsylvania: Project Engineer (2011- 2012). Responsible for the rehabilitation analysis and evaluation of modification alternatives necessary to bring the Hibernia Dam into compliance with USDA-NRCS and PA State Dam Safety criteria for high-hazard dams. The project consisted of a dam inspection, subsurface investigation soil borings to evaluate auxiliary spillway erodibility, internal drainage evaluation, sediment survey and reservoir storage evaluation, resource inventory of watershed, hydrologic/hydraulic analysis, rehabilitation alternatives and cost analysis, and development of an assessment report. A SITES model was developed for existing, full build-out, and alternative rehabilitation conditions. The alternative analysis also considered Future Without Project current conditions and decommissioning of the dam.

Beaver Creek Dam (PA-433) Supplemental Watershed Project Plan No.8 - Environmental Evaluation, USDA-NRCS, Chester County, Pennsylvania: Project Engineer (2011-2012). Responsible for the rehabilitation analysis and evaluation of modification alternatives necessary to bring the Beaver Creek Dam into compliance with USDA-NRCS and PA State Dam Safety criteria for high-hazard dams. The project consisted of a dam inspection, subsurface investigations including soil borings to evaluate auxiliary spillway erodibility and test pits to evaluate seepage conditions, internal drainage evaluation, sediment survey and reservoir storage evaluation, flood pool storage evaluation, principal spillway riser structural evaluation, resource inventory of watershed, hydrologic/hydraulic analysis, rehabilitation alternatives and cost analysis, and development of an assessment report. A SITES model was developed for existing, full build-out, and alternative rehabilitation conditions. The alternative analysis also considered Future Without Project current conditions and decommissioning of the dam.

NRCS Dams in the SuAsCo Watershed (Hop Brook, Cold Harbor Brook, Rawson Hill Brook, Delaney, and Tyler dams), Incremental Analysis of Inflow Design Flood (IDF) and Rehabilitation Alternatives Study, USDA-NRCS, Massachusetts : Project Engineer (2010-2012). Responsible for the engineering analyses conducted to support the Watershed Plan and Environmental Assessment for the evaluation of rehabilitation alternatives for the NRCS dams in the SuAsCo Watershed in Massachusetts. The projects involved engineering analyses to determine if the dams qualified for a reduction in the Freeboard Hydrograph (FBH) storm, which, per NRCS criteria in TR-60, is generated by the Probable Maximum Precipitation (PMP) storm following the Federal Emergency Management Agency (FEMA) Publication 94, Federal Guidelines for Dam Safety – Selecting and Accommodating Inflow Design Floods (FEMA 94); as interpreted by Hoeft and Locke(1) for application to NRCS dams. The project included hydrologic and hydraulic modeling, dam breach modeling; engineering evaluation of alternatives; and the development of conceptual design plans and construction cost estimates.

George H. Nichols Multi-Purpose High-Hazard Dam Rehabilitation Design, Town of Westborough, Massachusetts : Project Engineer (2010-2012). Responsible for assessing the available hydrologic and hydraulic models and updating with pertinent information for the rehabilitation of the George H. Nichols Multi-Purpose High-Hazard Dam. The dam was found to have capacity and stability deficiencies that required the auxiliary spillway to be widened from 100 to 350 feet and protected. The project included relocating and widening of the auxiliary spillway, spillway protection using Articulated Concrete Block (ACB), extension of the existing dam, temporary erosion and sediment control, earthwork/grading, surveying and hydrologic/hydraulic modelling (using SITES and HEC-RAS). The design was completed in 3

phases; 25% (conceptual), 85% (preliminary), and 100% (final). In addition, a FESWMS/Aquaveo 2D hydraulic model was developed to support the design of the ACB along the spillway exit channel given the converging and multi-directional flow conditions of the original spillway. Mr Barbis provided support through the construction of the dam, specifically during high flow events in order to mitigate breach risks.

James Barbis, PE, CFM
Hydrology & Hydraulics

FIRM

WSP USA

YEARS OF EXPERIENCE

27

EDUCATION

BS, Civil Engineering, SUNY Buffalo, 1996

BA, Mathematics, Smith College 1994

PROFESSIONAL REGISTRATIONS

- PE, New York, 2001
- Project Management Professional (PMP), 2021

AREAS OF PRACTICE

Civil Engineering

Nicole Shute, PE, PMP

Civil

QUALIFICATION SUMMARY

Ms. Shute leads the Municipal Services Practice in WSP's Valhalla office. She has over 20 years of engineering experience in the design, development, and presentation of vital transportation projects throughout the Hudson Valley Region. With a depth of experience in structural and civil design, Ms. Shute has worked with numerous municipalities within New York State, as well as agencies in New York City. She is thoroughly familiar with the NYSDOT locally-administered project process, from environmental permitting and right-of-way approval, to detailed design and the production of construction documents.

REPRESENTATIVE PROJECT EXPERIENCE

Lock E19 Site Improvements for NYS Canals Corporation, Frankfort, NY (Ongoing): On-call Project Manager. Lock E-19 is located in the Town of Schuyler within the Mohawk Region of the New York State Canal System. The site is relatively unimproved, but was temporarily housing the Utica Maintenance Facility staff operations until the permanent facility was rebuilt after suffering significant damage in recent flooding. The work at this site is being enacted in three stages, to allow multiple user groups to co-exist and better accommodate each user group's needs as the design progresses. Immediate improvements (Stage 1) are geared almost exclusively toward the maintenance facility workers. Interim improvements (Stage 2) will include site safety measures and mitigation of effects from elevated usage by maintenance staff, but with an eye toward permanent construction. Permanent improvements (Stage 3) to the site will be long-term, low-maintenance, and comply with state environmental regulations, but also accommodate the objectives of the Erie Canalway/Empire State Trail running adjacent to the project area. Environmental permitting, stakeholder engagement, compliance with regulatory agencies, collecting site data, and completing designs as per applicable engineering standards are all within WSP's scope of work for this project. Ms. Shute is the Project Manager for this on-call task, coordinating with the various disciplines among several WSP offices and two separate subconsultants. She acts as the main point of contact for the client.

Design of Large Culverts – Regions 8 & 10, NYSDOT, Various sites (Ongoing): Project Manager. WSP is performing scoping, preliminary engineering, and detailed design tasks associated with the replacement or rehabilitation of 40 large culverts within NYSDOT's Region 8. Design is being progressed in various phases depending on project type, complexity, and environmental factors, beginning with data collection and the preparation of the Design Approval Document, which is currently in progress. Ms. Shute is the Project Manager for this multi-site and multi-phased project. She is managing the overall effort, tracking budgets and the schedule, coordinating with three subconsultants, and is the main point of client with the State. Additionally, she provides technical and procedural guidance to efficiently complete the engineering, data analysis and presentation, environmental review, and administrative tasks.

Replacement of the Otisville Viaduct, Otisville, Orange County, NY (Ongoing) (Locally Administered Federal-Aid project): Project Manager. WSP is finalizing design for this federally aided bridge replacement project over Wallace Street in the Village of Otisville, NY. Constructed in 1970, the Highland Avenue Bridge carries two travel lanes and one sidewalk, providing access to downtown Otisville and adjacent residential properties. The seven span steel multi-girder viaduct has been red-flagged by NYSDOT in recent years, increasingly becoming a safety concern and maintenance issue for the County. Orange County progressed a conceptual design and WSP recognized the advantages that can be realized by replacing the current seven-span steel viaduct with a single span precast concrete frame over Wallace Street and back-to-back prefabricated segmental block walls along the remaining roadway

length of Highland Avenue. Ms. Shute's responsibilities within this project include project management, coordination with staff, client, and outside reviewing agencies, and performing final quality checks on submissions. Ms. Shute also participated in the alternative concept refinements, structural layout of the modular block wall and precast frame, as well as checking calculations for soldier pile and lagging wall design.

On-call Engineering Services for the Hydraulic Analysis of Various Bridges for Orange County DPW, Orange County, NY (Ongoing): Project Manager. WSP was selected to provide, on an as-needed basis, hydraulic engineering services relating to various bridge design projects. Tasks completed thus far have included collecting and analyzing hydrologic and stream data for use in determining an appropriate bridge low chord elevation and bridge hydraulic opening for three separate Orange County-owned crossings. Ms. Shute's responsibilities within this project include management of the overall agreement, including assignment of tasks to appropriate staff, tracking schedule and budget, and communicating to the client issues surrounding data collection or analysis. Ms. Shute also reviews each hydraulic report with respect to structural / bridge engineering concepts, offering suggestions to both the hydraulic staff and the client how to best address hydraulic criteria established by NYSDOT, or giving reasons why certain criteria cannot be met without significant changes to the intended scope of construction.

Replacement of CR 25 over Fitting Creek for Columbia County DPW, Town of Stockport, NY (2018) (Locally Administered Federal-Aid project): Project Manager. WSP completed the preliminary and final design for this bridge replacement project, BIN 3342350 over Fitting Creek, originally constructed in 1935. As part of the preliminary design phase, WSP evaluated various replacement structure alternatives. The alternatives included precast concrete arches and 3-sided frames, as well as adjacent box beams on conventional abutments with all structures designed to meet current NYSDOT design standards and provide necessary scour protection. The proposed begin abutment was located in line with an adjacent dry-laid stone wall to result in fewer disturbances to private property and ensure proper stream alignment through the structure. Subsurface investigation, environmental screening, and hazardous material assessment were all conducted as part of the requirements for this Federal-Aid project. Ms. Shute also supervised the construction support of this project, which was completed in the fall of 2018. She was the main point of contact for the client and the engineering field staff.

Greenkill Avenue Bridge Replacement, City of Kingston, NY (2016): Design Engineer. An interim in-depth bridge inspection revealed significant deterioration of the Greenkill Avenue Bridge steel superstructure, prompting the City of Kingston to post the bridge for an 8-ton load limit and initiate the project. WSP was retained to provide engineering services for preliminary and final design for this locally administered Federal Aid project. Ms. Shute's responsibilities included collecting information and producing the preliminary and final design reports (which served as the approval documents at the State and Federal levels), obtaining sign-off letters or permits from affected agencies, coordinating with CSX (as the railroad company occupies an adjacent structure), and coordinating with the various affected utility companies. She was the primary author of the design report and the main point of contact with the client. Ms. Shute was involved in nearly all aspects of the design and construction support phases. She assisted with the final design of the bridge steel superstructure and the concrete substructure rehabilitation, where the design adhered to NYSDOT LRFD standards. She was also responsible for overseeing the preparation of the engineer's estimate, creating the contract plans, and collecting specifications appropriate to the contract work.

FIRM

WSP USA

YEARS OF EXPERIENCE

9

EDUCATION

BS, Civil Engineering, State University of New York- Buffalo, 2012

MS, Geotechnical Engineering, State University of New York- Buffalo, 2014

PROFESSIONAL REGISTRATIONS

Professional Engineer: CT (PEN.0034700); NJ (24GE05608000); NY (098785)

PROFESSIONAL ASSOCIATIONS

- Association of State Dam Safety Officials
- U.S. Society on Dams
- American Society of Civil Engineers

Jeremy Bielby, PE

Dam Safety & Construction

QUALIFICATION SUMMARY

Jeremy Bielby is a lead dam consultant with- WSP USA responsible for project management, design, analysis, field inspections and reports, bid support, permitting and documentation for dam and water-related projects. Prior to joining WSP, Jeremy served as a senior geotechnical engineer for six years. He developed a comprehensive understanding of design, analysis and report writing and gained field experience within the areas of geotechnical engineering and foundation construction. His projects included transportation bridges and retaining walls, new building and development construction, waterfront and marine developments and storm water infrastructure.

Jeremy's computer expertise includes Settle3D, GeoStudio software, SLIDE, STABL, Surfer 8.0, MathCAD, CPeT-IT2, Plaxis, L-PILE, GRLWEAP, Levelogger, AutoCAD, ArcGIS, FAARFIELD, Microstation, InRoads, and Bluebeam.

REPRESENTATIVE PROJECT EXPERIENCE

2022 Dam Safety Inspections – Eastern Region, various Counties, New York: Lead Dam Consultant responsible for dam safety inspections for six (6) dams across the eastern portion of New York State. Jeremy performed confined space training, quality assurance and quality control (QA/QC) reviews of the inspection approach, visual inspection program, and the inspection report with recommendations.

Canalway Trail Slope Repair Amherst to Lockport, New York: Geotechnical Engineer responsible for sub-surface investigation program management. Jeremy is working on the geotechnical data report and to help define parameters for our remedial design. The goal of the project is to provide engineering services to support the stabilization of the embankment along the Erie Canal Trail in locations where settlement and failure have occurred.

Lock E19 Site Improvements, New York: Geotechnical Engineer responsible for sub-surface investigation program and soil sampling. Jeremy wrote the geotechnical data report and calculated cost estimate for foundation work. The goal of the project is to provide engineering services to support three stages of site improvements: emergency, interim, and permanent. Our responsibilities include conducting engineering studies and preparing site plans for all three stages and to lead permitting submissions and stakeholder engagement discussions. Site improvements consist of erosion and sediment control, temporary and permanent lighting, temporary office trailers, security features, parking features, and roadways.

Lake Lenape Dam Powerhouse Improvements, Atlantic County, New Jersey: Senior Dam Engineer (design phase) and Project Manager (construction phase) on this project to complete structural repairs on the existing dam powerhouse and replacement of the powerhouse sluice gates to provide a reliable low-level outlet for the Lake Lenape Dam in advance of the planned replacement of the dam spillway. He was responsible for the design of structural repairs to the powerhouse and for the new gates as well as development of the project specifications, Engineer's cost estimate, and final construction drawings. He coordinated with Atlantic County and Hamilton Township during monthly progress meetings and provided updates on the powerhouse improvements project at meetings of the Lake Lenape Dam Committee as requested.

Lake Lenape Dam Rehabilitation and Spillway Reconstruction - Phase 2, Atlantic County, New Jersey: Deputy Project Manager and Senior Dam Engineer on this project to perform final design and permitting for the replacement of the existing masonry spillway with a concrete labyrinth weir and the rehabilitation of the dam embankments. Jeremy was responsible for performing QA/QC reviews of the technical reports, Engineer's cost estimate, construction drawings, technical specifications, and construction inspection program. He also coordinated with Atlantic County and Hamilton Township during monthly progress meetings and provided updates to the Dam Committee on an as-requested basis.

BSMount Beacon and Pocket Dam Remediation, Beacon, New York: Senior Dam Engineer responsible for annual inspections per Department of Environmental Conservation requirements. Jeremy worked on the remediation design and implementation work for the dam including low level outlet valve replacement. Jeremy also provided engineering support services during the permitting, bidding in addition to providing construction oversight and managed field staff during construction of the Mt. Beacon and Pocket Dams.

BSKerite Dam Removal, Seymour, Connecticut: Project Manager who assisted with design of dam removal and stream restoration, permitting, specifications, bid package process and contractor coordination, in addition to construction inspection and support. WSP was hired to remove the Kerite Dam. The Kerite Dam is a masonry structure located across the Bladens River immediately upstream of its confluence with the Naugatuck River in Seymour, Connecticut. Marmon Utility LLC has decided to remove the dam to relieve their financial liabilities and regulatory burdens since the dam no longer serves a purpose for the company. The removal of the dam, sediment management, channel restoration, and stabilization, will return the river to a natural free-flowing condition. Services include site investigations, 30 percent through final design, permitting, bidding, and construction support. Additional services included a re-design during construction due to Hurricane Ida damages.

BSLake Jeff Conservation Association Dam and Engineering Assessment, Jeffersonville, New York: Senior Dam Engineer responsible for slope stability analysis, structural stability analysis, and compiling the engineering analysis report. WSP is providing dam engineering consulting services for the Lake Jeff Conservation Association. The study of the dam and engineering assessment report were developed to determine if the owners want to move forward with purchasing the dam and what remedial measures will be needed to bring the dam into Department of Environmental Conservation compliance. Our services consisted of a dam safety inspection, hydrologic and hydraulic analysis, structural stability analysis, slope stability analysis, and an engineering report.

BSCargill Dam Engineering Support, City of Beacon, New York: Senior Dam Engineer responsible for structural slope stability and subsurface investigation. The Cargill Dam project involves performing engineering services to address several recommendations associated with maintaining the dam and its appurtenant structures in a safe condition. Our services consist of conducting a subsurface investigation including installing piezometers, performing slope stability analyses, assessing remedial alternatives, performing stability analyses, revising the Instrumentation and Monitoring Plan, and preparing a geotechnical report to present the results of the subsurface investigation and stability analyses.

BSMongaup Dam Stabilization, Forestburgh, New York: Senior Dam Engineer responsible for slope stability analysis for a cracked base dam. WSP evaluated the piezometers and foundation drain efficiency and performed a stability analysis for the spillway at Mongaup for the Federal Energy Regulatory Commission compliance.

FIRM

WSP USA

YEARS OF EXPERIENCE

20

EDUCATION

MS, Civil Engineering (Water Resources), The Pennsylvania State University, University Park, PA, 2004

BS, Civil Engineering, The Pennsylvania State University, University Park, PA 2002

PROFESSIONAL REGISTRATIONS

Professional Engineer:

- Maryland, 2007 (34681)
- Virginia, 2011 (49257)
- Delaware, 2012 (17677);
- Florida, 2015 (PE79940);
- District of Columbia, 2019 (PE921693);
- Louisiana, 2019 (43784)
- Texas, 2021 (140516)

CERTIFICATIONS

Envision Certified Sustainability Professional, 2014

PROFESSIONAL AFFILIATIONS

- Transportation Research Board (TRB) AKD50(2) Hydraulics Subcommittee Member
- American Society of Civil Engineers (ASCE) Member
- US Society on Dams (USSD) Member – Dam Decommissioning Committee Member

AREAS OF PRACTICE

Water resources; bridge hydraulics; scour; river engineering; ecosystem restoration; aquatic organism passage; climate resiliency

Justin Lennon, PE

Dam Removal

QUALIFICATION SUMMARY

Justin Lennon PE is a Senior Director Water Resources Engineering and Technical Fellow with WSP's Water National Business Line. Justin is a Vice President and the National Practice Area Leader in the areas of hydraulic structures and flood control and a national practice lead in the areas of river / bridge hydraulics & scour, ecological & stream restoration, and climate resiliency. Justin has prepared numerous publications and presentations for local and national level conferences focusing on riverine hydraulics, stream restoration, bridge scour, water quality management, climate change adaptation, and watershed restoration. He is part of WSP's strategic team that is working on the development of tools and methods for incorporation of climate change uncertainty into engineering analyses.

REPRESENTATIVE PROJECT EXPERIENCE

Consumer's Energy ROadmap

Pensacola Bay Bridge, Pensacola, Florida: Coastal Project Lead for the design/ build replacement of the Pensacola Bay Bridge. The project included dynamic ADCIRC+SWAN modeling of coastal design storm conditions Bridge foundation scour calculations were performed following FDOT scour methods for complex and multiple piers. Wave impact calculations were performed following AASHTO guidance for loadings on piers. Additionally, the design included the development of riprap and ACBM revetment designs for the protection of approach roadway embankments. The embankments required protection from both storm surge and wave impact erosive forces. Justin led the technical team in the development of the studies.

Painters Mill Levee Certification, Owings Mills, Maryland: Project Manager responsible for the design of levee repairs and acquiring certification of the levee from FEMA for the Painters Mill levee. The levee is a 2,200 foot long earthen levee protecting a commercial development. The levee was constructed by the State Highway Administration in 1980 to mitigate flood increases from the construction of I-795. The levee was decertified in 2008 and require upgrades to meet performance criteria for recertification. Justin lead the team of hydraulic and geotechnical engineers in the development of construction plans to increase the levee freeboard, repair scour protections, and upgrade the levee drainage system to meet FEMA and MDE Dam Safety requirements. Construction is to be completed in the Spring of 2017 at which time the FEMA certification application will be submitted.

New York Levee System Inspection, USACE New York District: Lead Water Resources Engineer responsible for the inspection and analysis of four levee systems in up-state New York. Project responsibilities involved site inspection of the current levee conditions, detailed analysis of the original levee design compared to current design standards, development of pre-inspection packets and protocols, grading deficiencies noted along the levee systems, input into the overall levee grade (score), and reporting inspection findings in the Periodic Inspection Report generated at the end of the inspection process. Inspected levees included the Kingston, South Amsterdam, and Hoosick Falls levee systems.

White River Streambank Stabilization, Indianapolis, IN: Technical Lead in charge of developing the streambank stabilization concept, project limits, and technical direction of the design development. The stabilization project is being performed as part of the I-69 construction between Indianapolis and Bloomington, IN. The White River at the project site is a large river, with a 2,400 sq. mi. watershed, the river is currently migrating towards the I-69 corridor and poses long-term threats to the new

interstate. The project consists of quantifying fluvial erosion hazards, performing HEC-RAS 2D modeling and developing riverbank stabilization designs covering 3,500 linear feet of river bank. The design under development by WSP utilizes riprap bendway weirs, designed following USACE standards, to provide flow training and direct erosive stresses away from the riverbank and riprap protection along the river banks.

Watergate Wetland Restoration Project, Delaware Water Gap National Recreation Area, NJ: Stream Restoration Lead for the design of Van Campens Brook as part of the Watergate Wetland Restoration project. The restoration design will include the removal of several low head dams on the property, reconnection of floodplains, and creation of a sustainable channel geometry. The WSP Team is supporting NPS in the development of the Schematic Design phase following the Denver Service Center guidelines.

Powells Creek Stream Restoration, Prince William County, Virginia: Project Manager and Lead Designer for the Powells Creek stream restoration design being developed for the Prince William County DPW as part of their TMDL program. The design encompasses three miles of fifth order perennial stream running from Lake Montclair dam to US Route 1, including crossing of I-95. The total restoration project's construction value is projected as a $15 Million. Design services for the project are broken into multiple design phases and task orders under a task order contract. Services have included project grant applications, geomorphic survey of the three mile reach of channel, development of the restoration design, and full H&H studies. The project is utilizing a two-dimensional HEC-RAS hydraulic model to perform design analysis and FEMA floodplain studies. (Ongoing; construction scheduled for 2019)

Big Pipe Creek, Carroll County, MD: Technical Director for the Big Pipe Creek stream restoration project near Manchester, MD. The project ties into the upstream end of the MD 496 at Big Pipe stream stabilization project. The project is under development of MDSHA's Water Programs Division and include the restoration of 8,000 linear feet of perennial stream channel through farm fields. Big Pipe Creek upstream of the project vicinity is habitat for native brook trout with high population counts and spawning grounds. The site also contains habitat opportunity to critical endangered bog turtles, which are native to the area. The design vision for Big Pipe Creek developed by Justin includes the creation of a new channel alignment that minimizes impacts to bog turtle habitat wetlands and the few mature trees living on site, while creating new wetland areas within the channel floodplain benches, oxbow formations at abandoned channel locations, and a new channel geometry with a sustainable riffle-pool channel morphology. Design treatments under development in the design include the use of toe wood and root wads to provide trout habitat and cover / stabilization of channel banks, bioengineering to produce a sustainable stream design, and enhanced utilization of native salvaged materials for construction of channel glides for trout spawning.

Bronx River Stabilization, White Plains, NY: The Bronx River Stabilization Project is a USACE Section 14 stream project intended for the protection of the historic Bronx River Parkway from active erosion of the Bronx River stream banks. Justin was the Lead Water Resources Technical Designer for the stream stabilization component of the Bronx River Stabilization Project. Project involved stabilization of 1,150 linear feet of streambank using boulder structures, vegetated riprap, and bioengineering techniques. The project is bounded by several historical cultural resources including the Bronx River Parkway (the first limited access highway, construction began in 1907) and the stone arch Central Park Drive bridge (current structure dates to the 1910's). Protection of each of these historic properties was the key goal of the stabilization project. (US Army Corps of Engineers, 183612D/13, 2011)

Long Draught Branch, Montgomery County, MD: Technical Director and Engineer Of Record for the Long Draught Branch stream restoration project located in Gaithersburg, MD. As the project technical director Justin was responsible for the development of project goals, development of the conceptual vision for the restoration, and direction of the design team in implementation of the design. The Long Draught Branch project includes the restoration of 3,050 linear feet of perennial stream that is systemically impaired due to limited riparian buffer, channel incision, and numerous utility crossings. The project also include the removal of a failed inline SWM facility / dam at the downstream project limits. The project design involves the creation of a new sustainable channel geometry along with the grading of large inset floodplain benches. The project team efforts on the project included the full phase of services from the development of project alternatives, procurement of permits, preparation of erosion and sediment control plans, and preparation of full construction documents. Construction of the project

MD 355 over Little Bennett Creek, Hyattstown, Maryland: Justin performed geomorphic survey and analysis to assess the long term channel potential for lateral migration and vertical degradation. The analyses are based on research into historical channel migration tendencies, channel sediment transport behavior, current bed evolution tendencies and analysis of historic milldam activities along the channel and the effect of legacy sediments on the geomorphic stability of the channel. The geomorphic analysis is to be used for the design of a new MD 355 bridge crossing over Little Bennett Creek.