FLOOD RISK ASSESSMENT

GEOSPATIAL DATASET DEVELOPMENT

January 21, 2026

Michael Baker INTERNATIONAL

SUBMITTED BY:
Michael Baker International, Inc.
2600 Citiplace Drive
Suite 450
Baton Rouge, LA 70808

LETTER OF INTEREST

Attn: Ms. Joan Rupp
Regional Planning Commission
10 Veterans Memorial Blvd.
New Orleans, Louisiana 70124

RE: Request for Proposal – Flood Risk Assessment: Geospatial Dataset Development

Dear Selection Committee,

New Orleans Regional Planning Commission (NORPC) is seeking a trusted team member to provide NORPC with the GIS framework to further its role in providing current and accurate flood risk information that can assist local policymakers, planners, and engineers by providing data-driven insights to reduce the flood risk for the hundreds of thousands of residents of the New Orleans region. NORPC will benefit greatly by hiring **Michael Baker International, Inc. (Michael Baker)**, a proven team of experts that will provide:

- A collaborative approach aligning the needs of NORPC with the technical experts provided by the MBI team;
- Efficient data research and collection;
- Skilled GIS architecture team supported by experienced watershed modelling engineers familiar with the data sets required;
- The ability to deliver user-friendly GIS layers and datasets required for flood risk reduction efforts.

To deliver this contract successfully, a strategic blend of technical skills supported by an experienced Project Manager is essential. The Michael Baker team, ready and willing to perform all services the NORPC requires, offers a technically skilled **Project Manager, L.R. "Eric" Erikson, PE, CFM**, backed by an expert team of technical specialists in the areas of GIS Architecture, hydrologic and hydraulic (H&H) modeling, flood risk assessment, and project implementation for flood risk reduction.

Michael Baker is nationally ranked as the 10th-ranked water resource engineering firm, according to the Engineering News-Record. Having provided flood risk services as the core of our business for the last 60 years, we are a national leader in flood hazard identification and management. We have served as the prime consultants for the **LWI Region 6 and 8 Modeling Contracts** and remain a trusted **Federal Emergency Management Agency (FEMA) consultant** for the past 43 years, producing more than 80,000 miles of updated flood hazard information.

Supplementing our knowledge of local conditions, capacity, and technical expertise, Michael Baker has selected one subconsultant firm for this contract. **The Water Institute,** a familiar partner of Michael Baker, will lead our Task 8 – Runoff Coefficient Model efforts. The Water Institute has recently developed state-of-the-art probabilistic soil moisture and rainfall runoff quantification models that have been deployed in Florida and parts of Louisiana with great success. Our ongoing synergistic relationship with The Water Institute has built an exceptional working relationship between our firms, for which we have engaged on several flood risk-related projects.

"The consultant worked diligently throughout the project, demonstrating strong commitment despite budget limitations and schedule changes … They also developed a practical and simplified probability analysis approach suitable for the complex coastal transition area." -Jie Gu, LADOTD Project Manager, LWI Statewide Modeling Contract

NORPC can gain these unique benefits by hiring the Michael Baker team:

- **TECHNICAL EXPERTISE AND INNOVATION**—The Michael Baker team offers **local familiarity and industry-leading GIS and H&H modeling experts.** Our successful recent delivery of the LWI Region 6 and 8 Watershed Models for LA DOTD, as well as similar projects in St. Tammany Parish, San Antonio River Authority (SARA), and Harris County Flood Control District (HCFDC), gives

our team the experience and tools to deliver this assignment on time. **In fact, many of the data sets used in the LWI Region 8 models can be instantly deployed for this project as well.** Studies completed for these clients have similar topography and challenges as they exist in the New Orleans region, preparing us to eliminate learning curves that could delay the project. We will use this experience, along with our teaming partners ' in-depth knowledge and research on rainfall runoff models and statewide coastal compound flooding modeling, supplemented with the vast amounts of FEMA experience, to employ lessons learned and recent innovations to ensure the NORPC Flood Risk Assessment: Geospatial Dataset Development is completed with the highest quality standards. Our team has the skills, depth, and availability to deliver this important project on schedule.

- **THE RIGHT LEADERSHIP**—Our proposed **Project Manager, L.R. "Eric" Erikson, PE, CFM**, has 25 years of experience in flood control, storm water management and modeling, civil and drainage design, and project management. He is currently the project manager for the LWI Region 6 and 8 Modeling contracts, as well as the St. Tammany Parish Comprehensive Drainage Plan, which is currently underway. Mr. Erikson has also served as Deputy Project Manager for Michael Baker's efforts as a subconsultant in LWI Regions 1 and 4. Mr. Erikson is a licensed engineer in the states of LA, MS, AL, and TX, and is a certified Floodplain manager (CFM). He has received several Louisiana Engineering Society Awards of Merit as well as the ACEC Emerging Leadership Institute class of 2021. Mr. Erikson has successfully managed large teams to deliver complex water resource projects on time and under budget.
- **DEPTH, CAPACITY, AND SCHEDULE ACCELERATION**—With 5 local, 22 regionally-based floodplain mitigation and H&H modeling experts available and backed by over 130 skilled water resources engineers nationwide, the Michael Baker team offers one of the largest flood mitigation planning and H&H modeling teams in the region. This gives us the ability to effectively staff multiple simultaneous projects throughout the Region. **Michael Baker has extensive experience with accelerating modeling projects, as evidenced by our recent Louisiana Watershed Initiative project – developing complex GIS datasets, HEC-RAS 2D models, and impact analysis of flood risks for over 20 parishes in southeast Louisiana. Our ability to expedite modeling with large, dedicated teams, cloud-based modeling, and leveraging innovative scripting tools** will enable us to complete the modeling tasks on this project, so we can focus on the real task- developing effective mitigation solutions to reduce flood risk across these developing watersheds.

"The Project Manager demonstrated strong schedule management, successfully accommodating several small additional data requires before the contract's completion without impacting overall delivery." -Jie Gu, LADOTD Project Manager, LWI Statewide Modeling Contract

The Michael Baker team understands that the goal of this RFP is to select a technical consultant to develop various geospatial datasets that can assist in policymaking, planning, and engineering or flood risk reduction projects that will enhance flood resiliency and provide a basis for informed infrastructure investments.

Our objective is to form a true partnership between our team and the NORPC project team, as well as other stakeholders, to ensure a successful project for all that exceeds all expectations and goals.

The Michael Baker team has reviewed the Project Background, Requirements, and proposed Project Scope of Services, and was found to be an exact fit for our team due to our successful previous work on the LWI Region 6 & 8 statewide modeling contract, knowledge of flood risk parameters in the Region, as well as our Teams recently derived state of the art research innovation on flood modelling ongoing projects with similar goals in mind.

Michael Baker has developed many data sets for the New Orleans Region during its engagement as prime consultant for the LWI Region 6 & 8 Statewide Modeling Contract. These datasets will be available to employ for this contract immediately upon Notice to Proceed, thus reducing the overall budget and schedule.

We appreciate the opportunity to submit our qualifications for this contract. We look forward to delivering quality work on schedule and continuing to earn your trust. If you have any questions, I can be reached by phone at 225-218-2846 or by email at daniel.thornhill@mbakerintl.com.

Sincerely,

MICHAEL BAKER INTERNATIONAL, INC.

Daniel Thornhill, PE

Associate Vice President, Principal-in-Charge

Cover Letter Technical Requirements:

Submitting Respondent:

Michael Baker International, Inc. | **Federal Tax ID:** 25- 1228638

Authorized to Execute Contracts and Contact for Technical and Contractual Clarifications: Daniel Thornhill, PE | Vice President | (Phone) 225-218-2846 | (Fax) 225-706-0749 | (Email) daniel.thornhill@mbakerintl.com | (Address) 2600 Citiplace Drive, Suite 450
Baton Rouge, LA 70808

Michael Baker acknowledges that a revision to the modified form 24-102 was released by NORPC on November 12, 2025.

SECTIONS 1-10

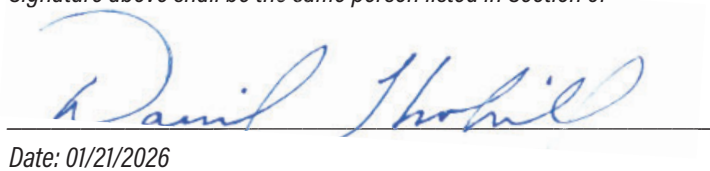
MODIFIED DOTD FORM: 24-102
RPC REQUEST FOR PROPOSALS (RFP)

PROPOSAL TO PROVIDE CONSULTANT SERVICES

Please read carefully, as this form differs from Standard Form DOTD 24-102. Subconsultants should respond only to questions 1-9 and 16-19, and these responses should be labeled by firm and included as attachments to of the Prime's submittal.

ANY CONSULTANT FAILING TO SUBMIT ANY OF THE INFORMATION REQUIRED ON THE LADOTD FORM 24-102, OR PROVIDING INACCURATE INFORMATION ON THE DOTD FORM 24-102, MAY BE CONSIDERED NON-RESPONSIVE.

Prime consultant should enter the firm name in the footer at the bottom of this page. (It will carry over to subsequent pages.)

1. Contract Name as shown in the advertisement	FLOOD RISK ASSESSMENT: GEOSPATIAL DATASET DEVELOPMENT
2. Contract Number(s) as shown in the advertisement	N/A
3. Prime consultant name (as registered with the Louisiana Secretary of State where such registration is required by law)	MICHAEL BAKER INTERNATIONAL, INC.
4. Prime consultant? (Y/N)	Yes
5. Consultant mailing address	2600 CitiPlace Drive, Suite 450 Baton Rouge, Louisiana 70808
6. Consultant physical address (existing or to be established, if location is used as an evaluation criteria)	2600 CitiPlace Drive, Suite 450 Baton Rouge, Louisiana 70808
7. Name, title, phone number, and email address of consultant's contract point of contact	L. R. "Eric" Erikson, PE, CFM Department Manager – Water Resources 225-218-2829 | Eric.Erikson@mbakerintl.com
8. Name, title, phone number, and email address of the official with signing authority for this proposal	Daniel Thornhill, PE | Office Manager - Associate Vice President 205-908-8026 |Daniel.Thornhill@mbakerintl.com
9. This is to certify that all information contained herein is accurate and true, and that the team presently has sufficient staff to perform these services within the designated time frame. By submitting this proposal, the proposer certifies that it is not engaged in a boycott of Israel and it will, for the duration of its contract obligations, refrain from a boycott of Israel. Proposer also certifies and agrees that the following information is correct: In preparing its response, the proposer has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not, in the solicitation, selection, or commercial treatment of any subcontractor or supplier, refused to transact or terminated business activities, or taken other actions intended to limit commercial relations, with a person or entity that is engaging in commercial transactions in Israel or Israeli-controlled territories, with the specific intent to accomplish a boycott or divestment of Israel. The proposer also has not retaliated against any person or other entity for reporting such refusal, termination, or commercially limiting actions. RPC reserves the right to reject the response of the bidder or proposer if this certification is subsequently determined to be false, and to terminate any contract awarded based on such a false response.	*Signature above shall be the same person listed in Section 9:*  *Date: 01/21/2026*
10. If a Disadvantaged Business Enterprise (DBE) is participating in the project team, indicate which firm(s) are DBEs and their percentage of the contract. If a firm is not certified as a DBE in Louisiana, please indicate the state where they are certified.	*Firm (s):* N/A *Firm(s)' %: Goal 0%:* N/A

By Teaming with Michael Baker NORPC will realize the benfits of reduced cost and shortened turnaround by utilizing the data sets already compiled for the LWI Region 6 Modeling Contract. As well as our proven proprietary scripts and Machine Learning (ML) tools, dedicated to speed up the processing and visualization of large data sets.

SECTION 11
FIRM SIZE

11. FIRM SIZE

RESOURCE AVAILABILITY.

Our management team will identify the number of required resources based on the task order scope. Our team has redundancy to handle multiple task orders. Our mission is to have the most qualified personnel to expedite the schedule while minimizing impacts to the overall project budget.

Firm name		*DOTD Job Classification*	*Number of personnel committed to this contract*	*Total number of personnel available in this DOTD Job Classification (if needed)*
Michael Baker International, Inc. Michael Baker INTERNATIONAL Michael Baker is a leading provider of engineering and consulting services, including design, planning, architectural, environmental, construction and program management, and has been solving some of the world's most complex infrastructure challenges for over 80 years with a legacy of expertise, experience, innovation and integrity.	**Prime**	Principal	**1**	**1**
		Supervisor-Eng	**2**	**4**
		Engineer	**2**	**6**
		Engineer Intern	**2**	**5**
		GIS Analyst	**1**	**4**
		Clerical	**1**	**4**
The Water Institute THE WATER INSTITUTE — THE SCIENCE OF QUANTIFYING COMPOUND FLOOD RISK IS ADVANCING COMMUNITY RESILIENCE. LEARN ABOUT OUR WORK The Water Institute's technical team strives to improve our collective understanding of natural and human aspects of coastal, riverine, and urban water management systems; to develop methods, models, and tools to aid in the restoration of communities and ecosystems; and to reduce risk for habitats, people, and infrastructure.	**Subconsultant**	Supervisor-Eng	**1**	**1**
		Supervisor-Eng (Other)	**1**	**1**
		Planner	**1**	**1**

SECTION 12
ORGANIZATIONAL CHART

12. ORGANIZATIONAL CHART

PRINCIPAL-IN-CHARGE
Daniel Thornhill, PE [1]

QA/QC MANAGER
Manoj KC, PhD, PE, CFM [1]

PROJECT MANAGER
L.R. "Eric" Erikson, PE, CFM [1]

LANDSCAPE DEVELOPMENT INTENSITY INDEX (LDI)
Afaq Durrani, EI, CFM [1]
Kushall Regmi, PE [1]

ROAD & BRIDGE DIGITAL ELEVATION MODEL (R-DEM)
Justin West, PE, CFM [1]

PLUVIAL FLOOD RISK INDEX (PFRI)
Achutam Baral, PE, CFM [1]
Tanveer Ahmed, EI [1]

RUNOFF COEFFICIENT MODEL
Muthu Narayanaswamy, PE [2]
Mark Bartlett, PE [2]
Colleen McHugh [2]

GIS ANALYST
Megan Meeks [1]

Team:

1 - Michael Baker International, Inc.

2 - The Water Institute

SECTION 13
PROPOSAL NARRATIVE

13. PROPOSAL NARRATIVE

Michael Baker International (Michael Baker) proposes a technically rigorous and regionally specific methodology designed to meet all Louisiana Watershed Initiative (LWI) requirements and provide the Regional Planning Commission (RPC) with a planning-level geospatial model and data.

Our approach is characterized by hydro-specific conditioning to account for the unique, low-relief topography and infrastructure barriers (roads, levees) of the RPC region, ensuring the final outputs are highly reliable for local decision-makers.

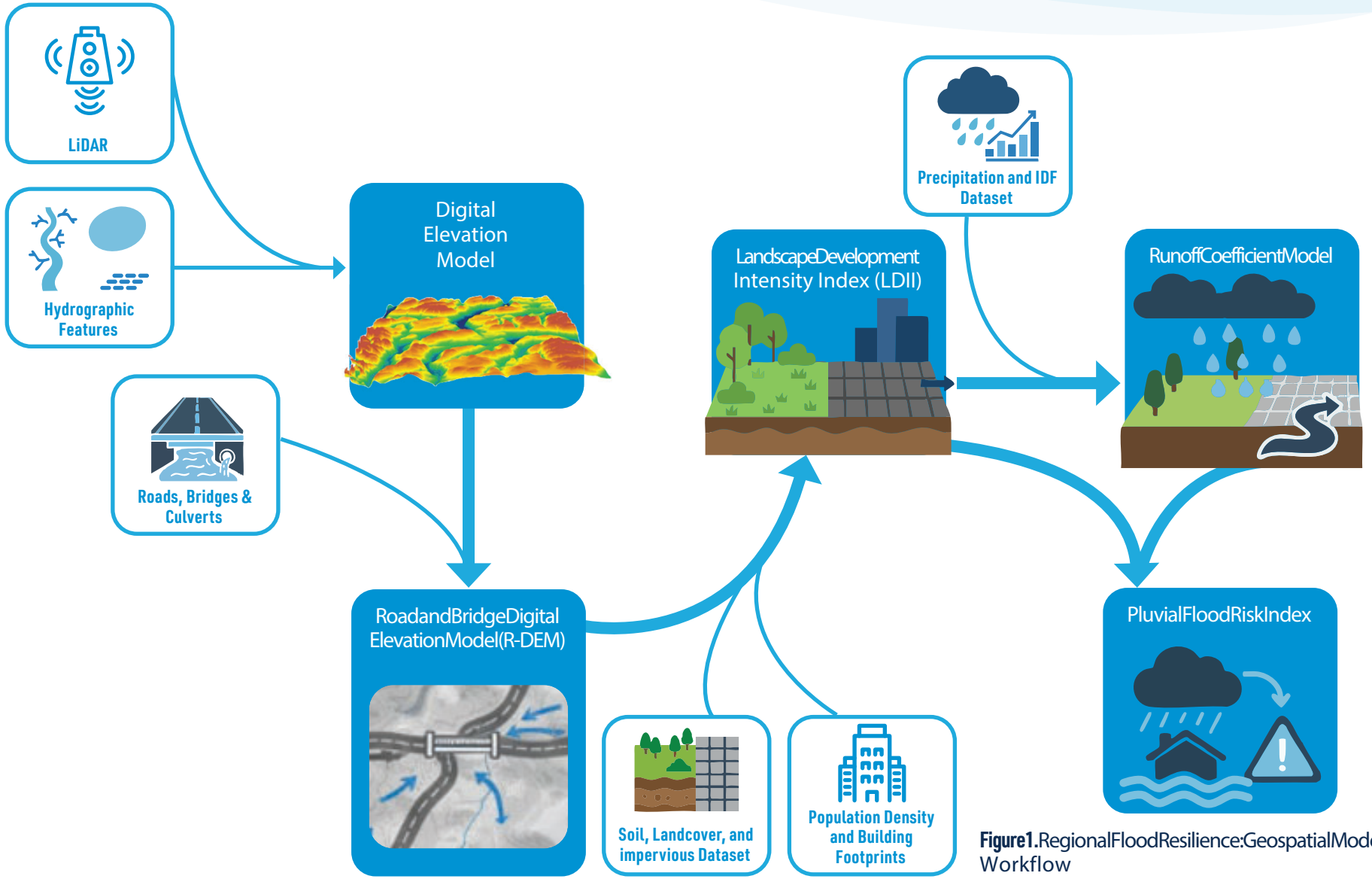


Figure1. RegionalFloodResilience:GeospatialModeling Workflow

Prime Consultant Name: **Michael Baker International, Inc.**

In the following sections, the proposed methodology and approach are described in detail, outlining how the project team will execute the tasks required for successful project completion, ensuring quality deliverables.

Task 1: Project Management

The Michael Baker International (MBI) project team will utilize an agile, open Project Management Plan (PMP) to ensure the project is completed on time and within budget.

Kickoff Meeting: An immediate kickoff meeting will be held to review the Statement of Work (SOW), ensure everyone understands their responsibilities, and finalize the PMP, communication rules, and reporting formats.

Communication & Reporting: Our dedicated Project Manager (PM) will serve as the single point of contact, facilitating weekly internal check-ins and monthly progress meetings with RPC staff. Monthly reports will detail completed activities, upcoming tasks, potential risks, and resource utilization.

QC/QA Integration: After each major task, the project management team will integrate strict QC/QA processes (Task 10) to ensure that the data and model remain accurate throughout the project's life cycle.

Michael Baker will deliver the flowing items as deliverables of this task:

Project Management Plan (PMP): A comprehensive document detailing scope, schedule, milestones, communication protocols, and QC/QA integration points.

Kickoff Meeting Summary: Formal record of decisions, finalized PMP, and agreed communication/reporting formats.

Monthly Progress Reports: Summarizing completed activities, upcoming tasks, risks, and resource utilization.

Project Archive: Organized repository of all project files, datasets, and documentation for RPC reference.

Task 2: Data and Model Architecture

The MBI team will create a clear, iterative modeling framework to ensure that it works seamlessly with RPC's current GIS environment, is easy to understand, and can be easily reused.

Workflow Definition: MBI team will work with RPC to determine the exact steps required to implement the LDII, Runoff Coefficient Model, and PFRI. This includes ensuring the final spatial resolution (such as the size of the raster cell or the arrangement of block groups) and the precise equations or algorithms that will be used to determine coefficients and index scores.

Data Requirements: Precise thematic attributes needed from the datasets supplied by RPC (for instance, mapping SSURGO soil texture classes to Hydrologic Soil Group (HSG) categories, or NLCD land cover classes to Manning's 'n' or Curve Number values) will be specified

Model Report: A Draft Model Architecture Report will be provided, which includes the suggested algorithms, assumptions (such as how to determine the standard time of concentration), and the data-to-parameterization schema. The RPC will review this draft, and it will then be finalized as the project's technical blueprint.

Deliverables include:

Draft Model Architecture Report: Outlining workflow, algorithms, assumptions, and data-to-parameter schema.

Final Model Architecture Report: Incorporating RPC feedback and serving as the technical blueprint for all modeling tasks.

Task 3: Data Aggregation or Acquisition (if applicable)

This task is guided by the Model Architecture Report (Task 2). Before modeling, we will review available datasets to confirm all required data is in place.

Gap Assessment: The datasets provided by RPC will be compared to the required inputs defined in Task 2. The gaps will be prioritized based on their importance (E.g., missing soil data >missing road data).

Acquisition Strategy (Prioritized):

- **Public/Open-Source Datasets:** To keep costs down, focus will be given on data that is already publicly available, such as Census Bureau block group boundaries and USGS HUC data.
- **Commercial/Specialized Data:** Commercial datasets (e.g., highly detailed building footprints) will only be acquired if they are identified as a critical gap that public sources cannot fill and if RPC grants approval.

Licensing and Documentation: All acquired data will be accompanied by detailed information regarding its origin, collection date, and terms of use, ensuring RPC adheres to the rules and can keep this information up to date in the future.

Deliverables include:

Gap Assessment Summary: Document identifying missing datasets and prioritization strategy.

Acquired Datasets Package: All supplemental datasets aggregated or purchased, fully licensed and documented.

Data Source Documentation: Metadata for each dataset, including origin, collection date, and licensing terms.

Task 4: Geographic Base Layer Inputs and Standardization

This is a fundamental step that ensures all datasets adhere to a consistent, high-accuracy geospatial framework. Michael Baker International as a prime consultant of LWI Region 6 and task order 4 also modeled partial coverage of Region 8. For the Environmental Data and Model Catalog (EnDMC) tasks, MBI team successfully performed standardizing the GIS base layer inputs, metadata creation, uploading and publishing the digital assets for public use. Therefore, MBI team understands the importance of this task and have already developed methods, computer generated scripting, and AI/ ML enabled automation methods that can be employed to serve RPC's purpose.

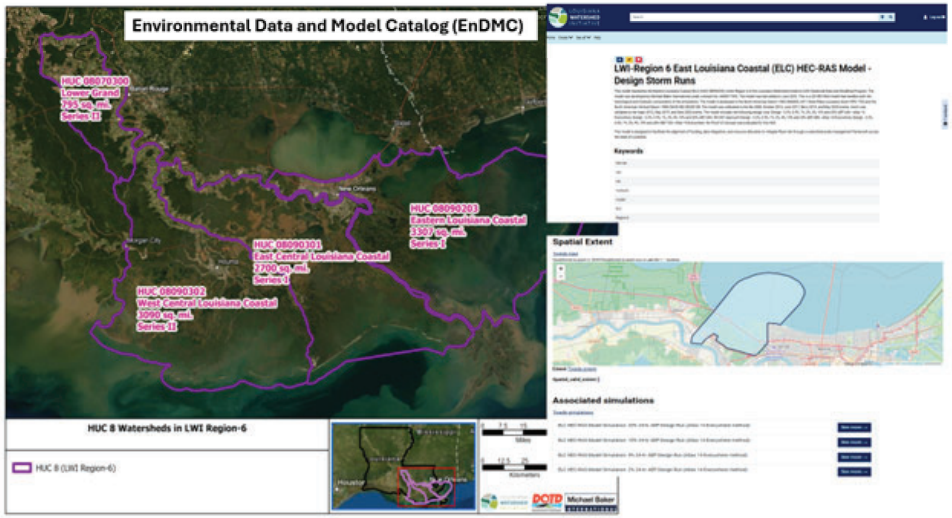


Figure2. LWI Region 6 and Part of Region 8 modeled by Michael Baker International Team involves extensive GIS operations to generate structure incorporated hydro-conditioned DEM and digital dataset publication on EnDMC platform.

Projection Standardization: All datasets provided by RPC or acquired by RPC will be immediately reprojected and standardized to a single, consistent State Plane Coordinate System (or similar specified by RPC) to ensure perfect alignment.

Data Harmonization: Administrative boundaries and hydrographic features will be topologically corrected to ensure logical consistency (e.g., parish boundaries align perfectly; water bodies are correctly routed).

Attribute Standardization: Key attributes will be standardized (e.g., naming conventions, data types). For example, road network data from different sources will be merged and standardized for use in the R-DEM (Task 6).

QC/QA: A strict QC process will be implemented, which will verify topology errors, sliver polygons, and unintended overlaps or gaps in features. The topology of all vector data will be verified to ensure that spatial integrity is correct (for example, that there are no overlapping polygons and that lines are connected correctly) and that attributes are complete. This prepares datasets for hydrologic conditioning and modeling without any issues.

Feature Preparation: Parcel or building footprint data will be prepared for use in Task 7 by ensuring standardized geometry and attributes required for intensity calculation.

Deliverables include:

Standardized Base Layers: Fully harmonized datasets (administrative boundaries, hydrography, transportation) in GIS-compatible formats.

Metadata: FGDC/ISO-compliant metadata for each base layer.

Technical Documentation: Detailing preprocessing steps, projection standards, and QC/QA procedures.

Task 5: Digital Elevation Model (DEM)

The DEM is the most critical input for hydrologic modeling. The high-resolution LiDAR data will be leveraged to create a hydro-conditioned DEM ready for flow analysis. MBI was the prime consultant for Louisiana Watershed Initiative (LWI) Task Order 04 (T04) for developing the detailed H&H model for entire Region 06 and part of Region 08. So, the proposed team is well aware of the terrain in this area and if needed, MBI can use already modified high-resolution LiDAR for better DEM generation.

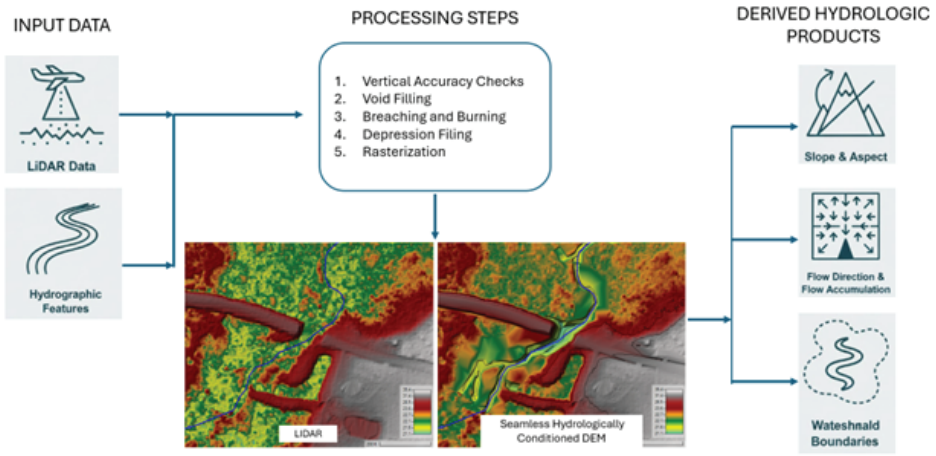


Figure3. LIDAR-based Hydro-Conditioning and feature Extraction for generating Seamless Digital Elevation Model (DEM) and Hydrologic Derivatives

LiDAR Preprocessing: The RPC-supplied LiDAR data will be converted into a high-resolution raster DEM.

Vertical Accuracy Check: To make sure the DEM meets or exceeds the standards set by the American Society for Photogrammetry and Remote Sensing (ASPRS) or the Federal Emergency Management Agency (FEMA), validation will use the ground control points (GCPs) or reliable survey benchmarks provided by the RPC to calculate the Vertical Root Mean Square Error (RMSEz).

Hydrologic Conditioning: Hydrologic conditioning is particularly important in areas with low relief, such as the NOLA RPC region. To make sure that the water flow paths are realistic, the DEM will be changed to include:

- **Void Filling:** Interpolating elevation in areas of missing data.
- **Breaching/Burning:** Using hydrographic feature data (rivers, canals, culverts) to "burn in" flow paths and "breach" artificial topographic high points that would artificially block flow. Standard GIS/hydrologic tools (e.g., using ArcGIS Pro or specialized hydrologic software extensions) to create a "burn-in" of hydrographic features (such as rivers, canals, culverts) from the vector data. This ensures the DEM's surface accurately reflects the path of water flow by removing artificial barriers and filling artificial sinks.
- **Depression Filling:** Filling minor, non-critical depressions while keeping important topographic features like sinkholes or flood control basins.

Derived Secondary Layers Generation: Using standard GIS tools like ArcGIS Spatial Analyst or similar Python libraries, important hydrologic layers like Slope, Aspect, Flow Direction, Flow Accumulation, and Watershed/Subwatershed Delineation will be developed using the D8 or multi-flow direction algorithm.

Validation: The accuracy of the DEM will be checked against USGS/NGA standards and benchmarks.

Deliverables include:

Standardized Base Layers: Fully harmonized datasets (administrative boundaries, hydrography, transportation) in GIS-compatible formats.

Metadata: FGDC/ISO-compliant metadata for each base layer.

Technical Documentation: Detailing preprocessing steps, projection standards, and QC/QA procedures.

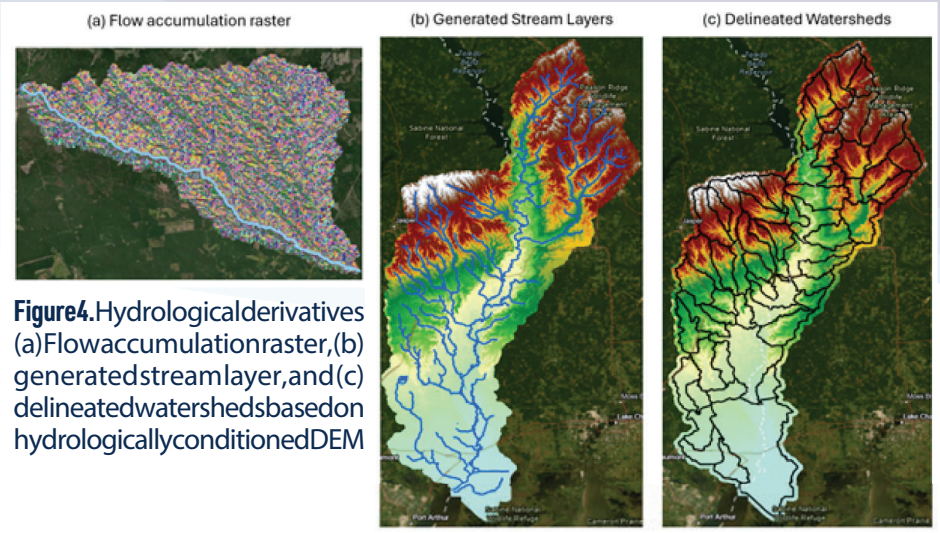


Figure 4. Hydrological derivatives (a) Flow accumulation raster, (b) generated stream layer, and (c) delineated watersheds based on hydrologically conditioned DEM

Task 6: Road and Bridge Digital Elevation Model (R-DEM)

The R-DEM is an enhanced version of the DEM that focuses on how transportation infrastructure impacts water flow. For achieving this task, the following steps will be performed:

Infrastructure Dataset Integration: RPC-provided transportation features (roads, bridges, culverts) will be integrated by using their known elevation profiles or design specifications to adjust the base DEM (Task 5).

Hydrologic Conditioning with Infrastructure:

- **Road Embedding:** The DEM will have the elevation profiles of roads embedded within it, ensuring that they function as realistic barriers or channels for surface flow.
- **Bridge Representation:** Bridges will be modeled as elevated structures, allowing water to flow beneath them.
- **Culvert Integration:** To prevent deliberate flow blockages, culverts and overpasses will be clearly identified, utilizing the attributes of hydraulic structures (diameter, invert elevation).
- **Flow Adjustment:** To ensure that routing across transportation corridors is realistic, flow direction and flow accumulation rasters will be recalculated to account for the effects of infrastructure.

Validation and Quality Assurance

- **Field Verification:** Heights of the embedded infrastructure will be checked against surveyed benchmarks, GPS points, or design specifications.
- **Cross-Checks:** Hydrologic connectivity will be validated by comparing modeled flow paths with observed drainage patterns and flood-prone areas.
- **Accuracy Standards:** Compliance with USACE hydrologic modeling requirements and FEMA flood risk modeling guidelines will be ensured.

Derivation of Hydrologic Products

- **Updated Flow Direction and Accumulation:** Rasters will be generated to account for the effects of infrastructure, highlighting areas where water may pool or flow in a different direction.
- **Watershed Delineation Adjusted for Infrastructure:** Watershed and subwatershed boundaries will be recalculated to incorporate transportation features that alter drainage divides.
- **Runoff Coefficients and Pluvial Flood Risk Index:** R-DEM will be used to support refined calculations of runoff coefficients and localized flood risk indices.

Deliverables include:

Hydrologically Conditioned R-DEM: DEM integrated with transportation features (roads, bridges, culverts).

Updated Flow Layers: Flow direction and accumulation rasters adjusted for infrastructure impacts.

Infrastructure-Adjusted Watershed Boundaries: Reflecting transportation influence on drainage divides.

Validation Documentation: Field verification and compliance with FEMA/USACE standards.

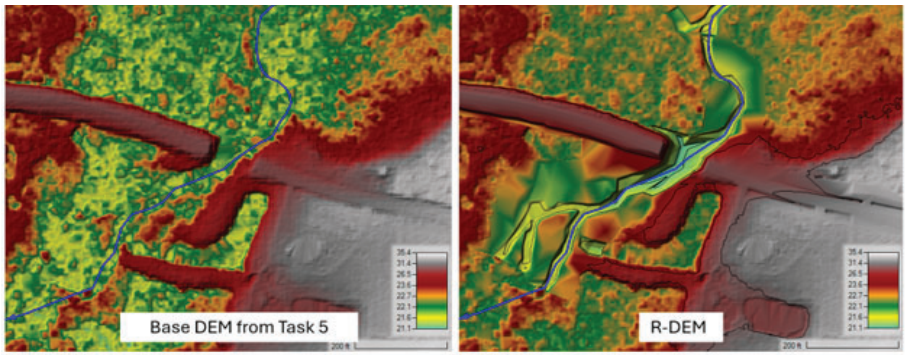


Figure 6. R-DEM after processing the Base DEM

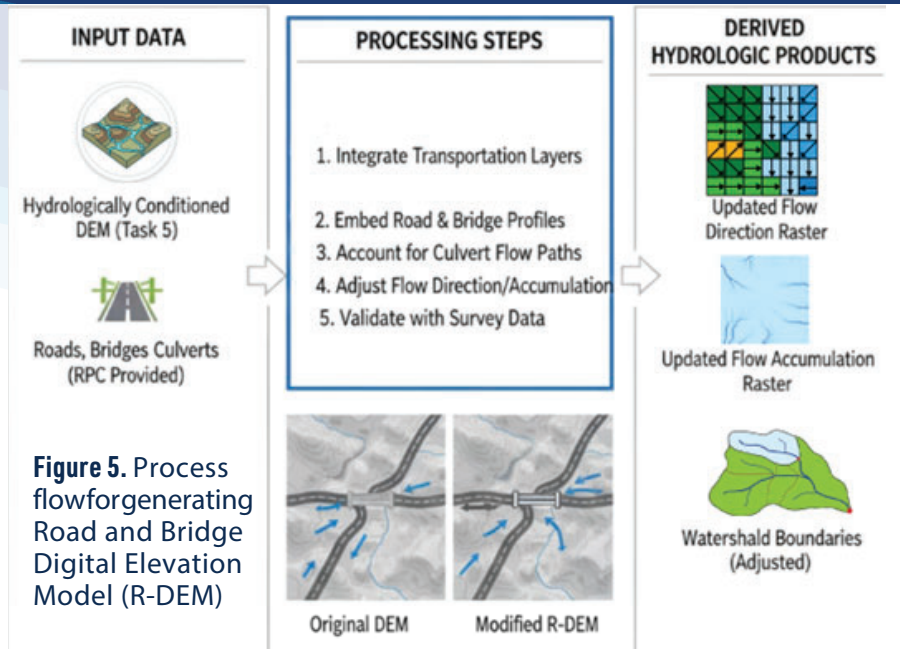


Figure 5. Process flowforgenerating Road and Bridge Digital Elevation Model (R-DEM)

Task 7: Landscape Development Intensity Index (LDII) Methodology

The LDII measures the degree of human modification and development within a specific region. This index serves as a spatially explicit alternative for imperviousness and the influence of urbanization on potential runoff. So, it is an important part of both the Runoff Coefficient Model (Task 8) and the Pluvial Flood Risk Index (Task 9, as a Vulnerability factor).

LDII Governing Equation: A spatial unit (SU), such as a block group, is determined by a weighted additive model that incorporates the fractional area of various land cover types within the unit, with each land cover type receiving a Development Intensity Coefficient (DICi). A simplified mathematical expression is represented in the box below.

$$LDII_{SU} = \sum_{i=1}^{n} FLC_i . DLC_i$$

Variable	Description
$LDII_{SU}$	The final, dimensionless LDI Index score for the SU. The resulting score is typically scaled from 0 (natural) to 10 (maximum intensity).
n	The total number of distinct Land Cover/Land Use categories are present within the SU.
FLC_i	**Fractional Land Cover:** Area fraction of land cover category i within $SU \sum FLC_i$=1
DLC_i	**Development Intensity Coefficient:** A standardized value assigned to Land Cover category i that reflects its hydrologic impairment potential, typically ranging from 0 (natural) to 10 (maximum development).

Development Intensity Coefficients (DICs): The DICs will be assigned based on published hydrologic engineering standards, reflecting the degree of imperviousness and the presence of infrastructure. This table serves as an example set for initial modeling (values to be refined in Task 2)

Land Cover Type (i)	DIC Value (Example)	Hydrologic Interpretation
Natural Forest/ Wetland	0.5-1.0	Minimal alteration; high infiltration & evapotranspiration
Agriculture/Rural Grassland	2.0-3.5	Moderate alteration; some compaction and minor impervious surfaces.
Low-Density Residential	4.0 - 6.0	Partial imperviousness (10% - 30%); scattered infrastructure.
Medium/High Density Urban	6.5 - 8.5	Significant imperviousness (30% - 75%); substantial runoff generation.
High-Density Commercial/ Industrial	8.5 - 10.0	Near-total imperviousness (>75%); maximum runoff.

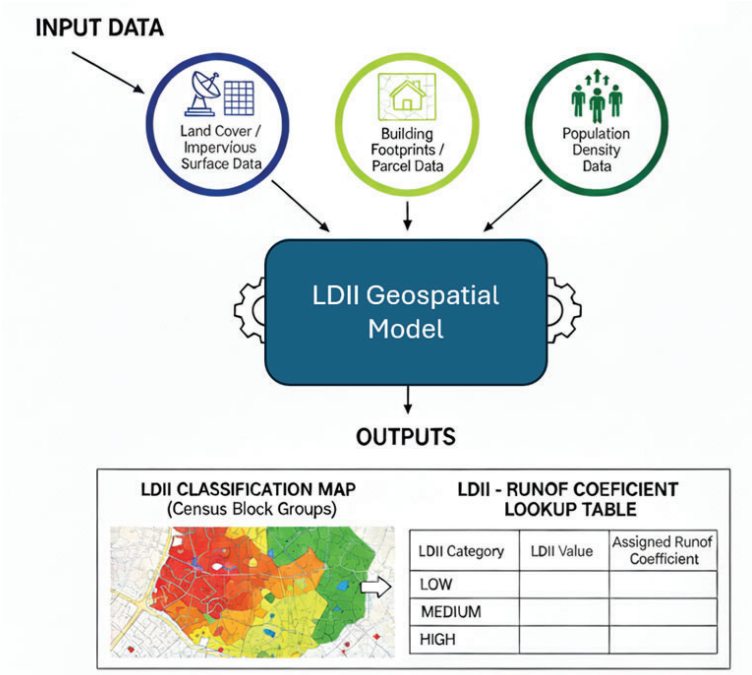


Figure 7. LDII Geospatial Model

Data Preprocessing and Unit Definition:

- **Land Cover Data:** The NLCD (National Land Cover Database) will be obtained, and/ or RPC-provided land cover datasets will be used to develop baseline land use categories.
- **Impervious Surface Data:** High-resolution imperviousness layers (e.g., NLCD impervious surface products, municipal GIS datasets) will be combined to measure paved and built-up areas.
- **Input Compilation:** Datasets, including Land Cover (with impervious surface classification), building footprints, and Census block group population data, will be compiled and standardized (Task 4) to capture demographic intensity and urbanization patterns. Where available, RPC-provided or municipal building footprint datasets will be embedded to refine development intensity at parcel-level resolution
- **Aggregation Unit:** The LDII will be calculated at the highest possible spatial resolution (e.g., raster cell or parcel) and then combined using a weighted average to obtain the required output scale for the Census Block Group.

Calculation and Classification Scheme: Normalizing the input variables (land cover, imperviousness, population density, and building footprint density) and using weighted scoring to show how hydrologically important they are (for example, imperviousness will be given more weight than population density).

For each SU, the scores will be summed to create a single LDII value. To classify, thresholds will be set for low, moderate, and high development intensity based on hydrologic modeling standards and the needs of regional planning. Categories will be ensured that they are scalable across multiple geographic levels (block group, subwatershed, parish, region).

Validation and Runoff Linkage:

- **Validation:** The LDII layer will be checked for quality control and quality assurance by comparing it to recent high-resolution aerial images and local planning data (e.g., zoning maps).
- **LDII outputs will be compared with municipal zoning, land use plans, or development permits.**
- **Random spot checks will be performed in representative areas to validate imperviousness and development intensity.**
- **LDII categories will be compared with actual runoff coefficients to make sure they are hydrologically relevant.**
- **Lookup Table Generation:** The LDII-Runoff Coefficient Lookup Table is a key outcome of the task. It formally connects each LDII category to a set of initial Runoff Coefficient (C) values that can be used in the Runoff Coefficient Model (Task 8).
- **Scenario Modeling:** LDII will need to be enabled to support scenario-based flood risk analysis by adjusting coefficients under different development scenarios (e.g.,

urban expansion, green infrastructure adoption).

- **Role in Pluvial Flood Risk Index (PFRI):** The final LDII layer (Task 7 output) will be normalized and integrated into the PFRI (Task 9) as a direct measure of the Vulnerability component, quantifying the reduced capacity of the landscape to absorb and manage rainfall.

Deliverables include:

LDII GIS Layer: Polygon-level classifications of development intensity.

LDII–Runoff Coefficient Lookup Table: Linking LDII categories to hydrologic parameters.

Summary Maps and Statistics: Visualizing development intensity across the RPC region.

Metadata and Methodology Report: Including governing equation, assumptions, and validation steps.

References

Brown, M. T., and L. M. Vivas. (2005). Landscape Development Intensity (LDI) Index. Environmental Science & Policy. (Basis for the LDII calculation structure: weighted fractional land cover analysis.)

Task 8: Runoff Coefficient Model

The Runoff Coefficient Model is a spatially explicit implementation of the Rational Method's core principle, linking rainfall, land characteristics, and flow generation. To develop the geospatial Runoff Coefficient Model, our team will implement an integrated GIS-based methodology that combines industry-standard hydrologic principles with GIS spatial analysis. MBI will collaborate with the Water Institute (TWI) to execute this undertaking. TWI's novel methodology enhances the MBI workflow, demonstrating robust industry-academic collaboration through the application of advanced research techniques to practical real-world applications.

Hybrid Approach Method:

- MBI and TWI will assemble a seamless regional dataset that includes hydrologically conditioned DEMs, land cover and impervious surfaces, hydrologic soil groups, vegetation indices, ET estimates, IDF precipitation metrics, LDII, and transportation infrastructure. These datasets will directly inform the hybrid Curve Number/Rational Method framework: CN inputs (land cover, impervious area, soils, vegetation, moisture/ET conditions) determine infiltration capacity and runoff production, while Rational Method inputs (slope, flow length, time of concentration, IDF curves) govern the translation of excess rainfall into peak runoff rates.
- By harmonizing these layers to a common spatial resolution and generating terrain derivatives (slope, aspect, flow direction, flow accumulation), we create the physically based spatial parameters required to calculate a standardized runoff coefficient for every polygon (e.g., block group, subwatershed, parish). This ensures the approach remains consistent with established hydrologic practice while leveraging spatial detail not typically available in traditional methods.

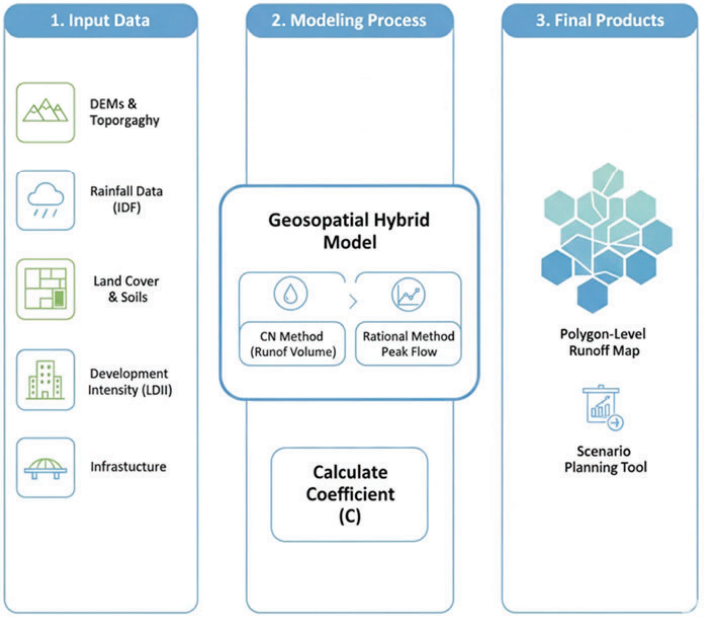


Figure 8. Rainfall-runoff coefficient workflow

Runoff coefficient determination:

- Each polygon's runoff coefficient will be computed through spatial averaging of the hydrologic variables that drive both infiltration and peak-flow response.
- CN-governed parameters like soil group, impervious fraction, vegetation/ET condition, and LDII measure how much rainwater turns into extra runoff. Rational Method–governed parameters like slope, flow path characteristics, and IDF intensities measure how quickly that runoff gets to the drainage network. Transportation infrastructure layers, like roads, bridges, and culverts, make the coefficient even more precise by showing where engineered drainage, flow obstruction, or conveyance efficiency changes routing and concentration times.
- A rule-based weighting system based on NRCS methods and real-world data from the region connects these variables to the final coefficient. All calculations are kept in the attribute table for clarity, reproducibility, and legal protection.

Scenario Testing: To support scenario-based planning, the workflow is constructed as a reproducible geoprocessing pipeline that can be rapidly recalculated under alternative climate or land-use futures. Changes in imperviousness, vegetation, soil moisture regime, land-development intensity (LDII), or rainfall intensity (IDF) automatically propagate through the hybrid model, updating both the CN-based runoff ratio and the Rational Method-based peak-flow factors.

For the Runoff coefficient modeling task MBI team will deliver the following action items:

- **Runoff Coefficient GIS Layer:** Polygon-level coefficients linked to environmental attributes.
- **Attribute Tables:** Connecting coefficients to LDII, land cover, soil type, slope, and vegetation.
- **Scenario Analysis Outputs:** Runoff variability under different precipitation and land use conditions.
- **Technical Documentation:** Detailing modeling approach, assumptions, and validation procedures.

Value-Added Enhancement (If desired by RPC): In addition to the standard GIS-based runoff coefficient framework, the project team can provide a more advanced and modern alternative originally developed for compound flooding analyses in southern Louisiana and later applied across the St. Johns and Nassau River basins in Florida. This approach is grounded in a recently published peer-reviewed study—Bartlett et al. (2025), Water Resources Research—which presents a calibrated analytical hydrology framework that unifies stochastic ecohydrology, semi-distributed hydrology, and the SCS-CN rainfall–runoff model. Rather than relying solely on tabulated coefficients, the model quantifies how rainfall is partitioned into runoff, infiltration, evapotranspiration, and groundwater processes on a unit-area basis. The resulting runoff coefficients reflect actual watershed behavior and benefit from comprehensive validation against USGS gage observations—a level of empirical rigor rarely achieved in traditional GIS-only approaches, which often result in an error on the order of +/- 100 percent in comparison to runoff observations at USGS gages.

Within this framework, hydrologic parameters such as storage capacity, runoff fraction, baseflow index, and upper- versus lower-layer soil moisture are either calibrated directly to observed flow records or inferred using machine-learning models tied to terrain attributes, soils, vegetation, and climate indicators. These calibrated parameters are then spatially extrapolated to all subwatersheds and downscaled to polygon boundaries, ensuring hydrologically consistent and spatially coherent runoff behavior across the region. Because this approach accounts for the full water balance, it captures key drivers—such as antecedent moisture, seasonal variability, long-term aridity, and soil storage dynamics—that strongly influence the runoff response but are absent from standard hydrology runoff estimation.

A particularly valuable enhancement enabled by this analytical model is the ability to generate multiple runoff coefficients across a full spectrum of antecedent conditions—very dry, dry, normal, wet, and very wet. This gives planners a realistic, data-driven way to assess runoff sensitivity under drought conditions, saturated soils, typical conditions, or wet-season conditions—factors that control runoff severity but are not represented in single-value runoff coefficients. The method also incorporates a suite of additional high-value remote-sensing and terrain datasets, including MODIS PET, SMAP soil moisture from NASA, Daymet precipitation, gNATSGO soils, DEM-derived wetness indices, and USGS gage observations for validation of runoff, baseflow, and the total water balance. Collectively, these elements elevate the runoff-coefficient product from a static GIS layer to a fully observation-driven, climate-aware hydrologic decision-support tool—available as an optional module at the RPC's discretion.

References:

Bartlett, M. S., Cultra, E., Geldner, N., & Porporato, A. (2025). Stochastic ecohydrological perspective on semi-distributed rainfall-runoff dynamics. Water Resources Research, 61(9), e2025WR040606.

Task 9: Pluvial Flood Risk Index (PFRI)

The Pluvial Flood Risk Index (PFRI) task involves developing a composite, planning-level risk score to identify and quantify areas most vulnerable to rain-induced (pluvial) flooding across the region. The task will integrate the final, validated outputs from the Runoff Coefficient Model (Task 8) and the Landscape Development Intensity Index (LDII, Task 7). The primary objective is to create a defensible, planning-level tool that adheres to the established framework (IPCC, 2014; FEMA, 2020). The PFRI is a function of three main components: **Hazard, Exposure, and Vulnerability,** which support data-informed decision-making for land use planning and infrastructure investment.

$$\text{Risk} = f(\text{Hazard}, \text{Exposure}, \text{Vulnerability})$$

Framework Establishment: A simplified weighted additive risk model will be implemented, which is a standard methodology for creating composite indices in hazard mitigation and climate adaptation planning. The conceptual framework is formally expressed as:

$$PFRI = (W_H \cdot I_H) + (W_E \cdot I_E) + (W_V \cdot I_V)$$

Where I_H, I_E, and I_V are the normalized indices for Hazard, Exposure, and Vulnerability, and W_H, W_E, and W_V are the associated weights ($\sum W=1$).

Input Component Development: The following validated layers will be integrated to generate the three risk components:

- **Hazard (I_H) :** Derived primarily from the validated Runoff Coefficient Model (Task 8). This component quantifies the physical threat by calculating peak runoff depths for multiple Intensity-Duration-Frequency (IDF) scenarios (e.g., the 100-year storm event).
- **Exposure (I_E):** Quantifies assets located in potentially flooded areas, including Population Density (using Census data) and Critical Infrastructure (using the R-DEM output from Task 6).
- **Vulnerability (I_V):** Quantifies the reduced capacity of the land to manage water and the inherent sensitivity of the built environment. Key inputs include Low-Lying Terrain (derived from the DEM/R-DEM) and the LDII Score (Task 7), which acts as a direct proxy for imperviousness and development sensitivity.

Normalization and Weighting: The contributing data layers, which vary widely in scale and units, will be standardized and combined using the following steps:

- **Normalize Inputs (Min-Max Scaling):** All input component layers will be normalized to a common dimensionless scale (e.g., 0 to 1) to allow for fair comparison and combination, a prerequisite for weighted additive modeling.
- **Assign Weights:** Based on the Model Architecture Report (Task 2) and best practices in regional flood risk modeling, final weights will be assigned to the Hazard, Exposure, and Vulnerability components to reflect their relative contribution to overall risk in the RPC region.
- **Calculate Composite Score:** The normalized and weighted components will be combined using the formula above to produce a final, continuous PFRI score for each Census Block Group.
- **Classification and Output Generation:**
  - *Classify into Risk Levels:* The continuous PFRI scores will be classified into policy-actionable categories, typically Low, Moderate, and High Risk, using thresholds determined collaboratively with RPC staff to reflect regional planning priorities.
  - *Scenario Maps:* Thematic maps showing risk under specific rainfall conditions (e.g., a "Current" risk map and a "Future" risk map incorporating climate projections or different land use scenarios) will be generated.

Deliverables include:
PFRI GIS Layer: Block group-level risk scores normalized and weighted by hazard, exposure, and vulnerability.
Risk Classification Maps: Low, moderate, and high-risk categories for planning purposes.
Scenario Maps: Flood risk under current and future rainfall/development conditions.
Analytical Tables and Metadata: Supporting transparency and reproducibility.

References:
IPCC (Intergovernmental Panel on Climate Change). (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report.
FEMA (Federal Emergency Management Agency). (2020). Risk Assessment, Planning, and Response.
Peduzzi, P., Dao, H., Herold, C., & Mouton, F. (2009). Global risk and vulnerability index trends and hot spots. Natural Hazards, 51(2), 317-327.

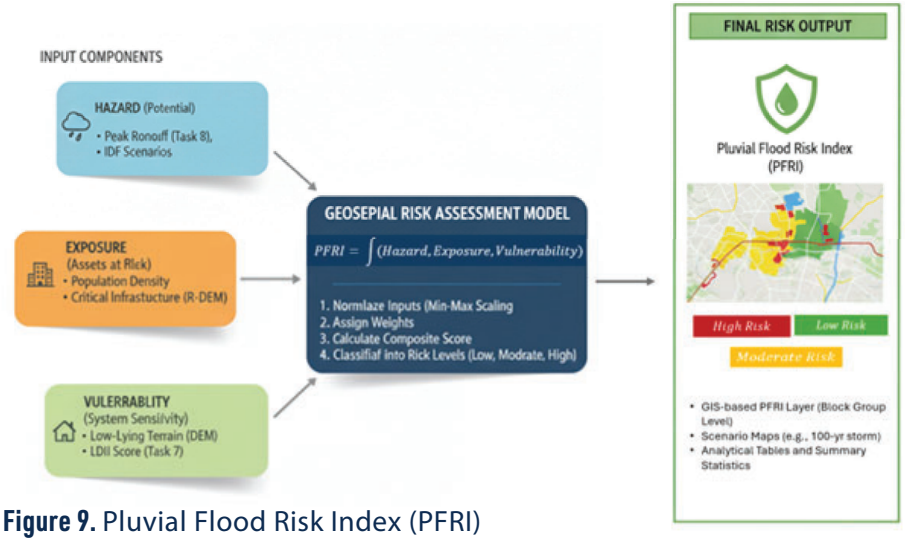


Figure 9. Pluvial Flood Risk Index (PFRI)

Task 10: Quality Control, Assurance, and Statistical Validation

Michael Baker has a dedicated QA/QC team to ensure the quality of the GIS datasets and models. The project team commits to delivering geospatially accurate and hydrologically reliable data. The rigorous Quality Control, Quality Assurance (QC/QA), and Validation process ensures that every delivery is reliable and appropriate for the critical infrastructure and planning decisions facing the RPC region.

QC/QA for Input Data:

- **Spatial Accuracy:** Coordinate system alignment and topology integrity for all vector and raster layers will be checked.
- **Attribute Consistency:** Completeness and logical consistency of attributes will be validated (e.g., soil group codes, land cover classes).
- **Error Detection:** Using automated GIS topology rules and manual duplication, silver polygons, and gaps will be identified.

Model Output Verification: All derived products, including DEM, R-DEM, LDII, and Runoff Coefficients, will be systematically checked. This includes:

- **Hydrologic Verification:** Verification will be done to ensure that hydro-conditioning (Task 5) and the integration of infrastructure (Task 6) result in realistic flow paths, particularly in the low-relief terrain, avoiding artificial barriers or sinks.
- **Coefficient Determination:** Verification that all computed Runoff Coefficients are within accepted hydrologic ranges and demonstrate rational spatial variation according to the integrated LDII categories and Hydrologic Soil Groups.
- **PFRI Correlation:** Ensuring that the normalization and weighting method (Task 9) is mathematically sound, so that the risk scores make sense when compared to known regional flood hazards.

Statistical Validation for Model Reliability: The validation plan employs standard statistical measures to assess the accuracy of the outputs, providing a quantitative basis for evaluating the model's reliability.

- **Calibration:** Comparing modeled runoff and flow accumulation against observed hydrologic data (e.g., stream gauge records, historical flood extents).
- **Independent Validation:** Use external benchmarks (e.g., FEMA flood maps, USGS hydrologic datasets).
- **Sensitivity Analysis:** Assess robustness under varying IDF scenarios and land use conditions.
- **Performance Metrics: 1)** Nash-Sutcliffe Efficiency (NSE) 2) Percent Bias (PBIAS) 3) Root Mean Square Error (RMSE)

Deliverables include:
QC/QA Documentation: Detailing error detection, corrective actions, and quality assurance protocols.
Draft Validation Report: Preliminary results of calibration and performance metrics.
Final Validation Report: Comprehensive statistical validation including NSE, PBIAS, and RMSE.
Metadata for Validated Datasets: FGDC/ISO-compliant metadata for all outputs.

Task 11: Ensuring Maintainability and Transparency (Documentation)

Michael Baker will develop comprehensive documentation for all modeling components. All final spatial data layers will include FGDC/ISO-compliant metadata. This will ensure that the data is organized systematically and can be easily integrated into the RPC's existing GIS enterprise environment.

Model Development Report: This report serves as the final technical reference for the project, ensuring full transparency and enabling future updates by the RPC.

- **Input Data Source:** Complete documentation of all data used (RPC-provided, acquired, or public), including temporal coverage and licensing, as defined in Task 3.
- **Methodology:** Detailed, step-by-step descriptions of all modeling procedures, including the specific formulas, coefficients, and parameterization frameworks used for the LDII, Runoff Coefficient Model, and PFRI calculation.
- **Assumptions and Limitations:** A formal documentation of all model assumptions and the constraints of the methods, which is crucial for responsible application in policy and engineering contexts.

User Guide and Communication Materials:

- **User Guide:** A short, useful guide for RPC technical staff that explains how to access, visualize, and understand the main GIS deliverables in ArcGIS Pro or another GIS environment so that they can be used right away.
- **Communications Guide:** A resource for policymakers and people who want to communicate to the public that does not require technical knowledge. This document clarifies what the Pluvial Flood Risk Index is for and what it isn't for, ensuring that the message is clear and consistent.
- **Official Data Disclaimer:** A written statement that will be included with all deliverables that clearly explains what the planning data is intended for, and the user's responsibility when using the information to make specific decisions.

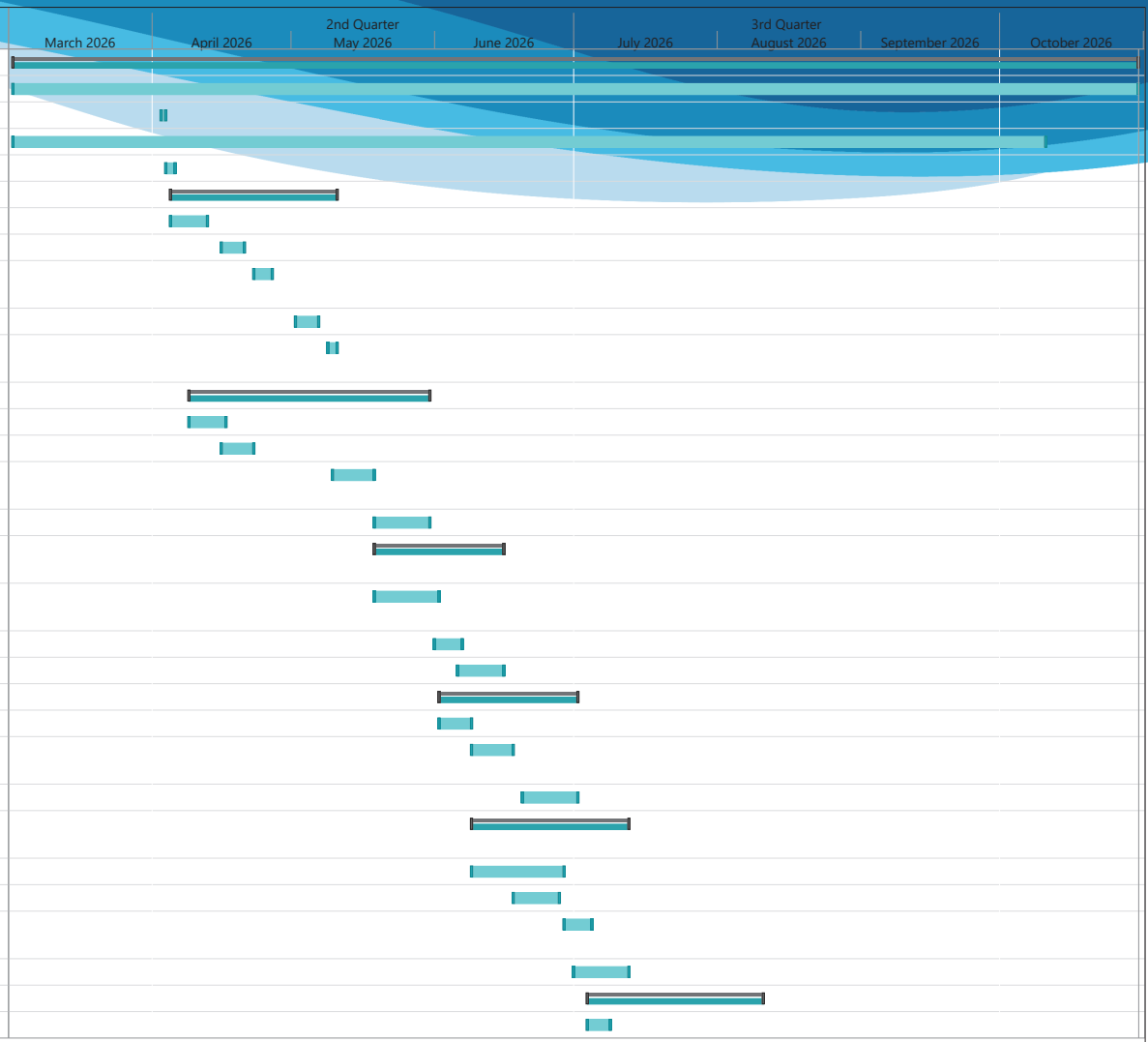
Deliverables include:

Model Development Report: Complete technical reference including data sources, methodologies, assumptions, and limitations.
User Guide: Instructions for accessing and visualizing GIS deliverables in ArcGIS Pro/ other GIS platforms.
Communications Guide: Non-technical summary for policymakers and stakeholders.
Official Data Disclaimer: Clarifying intended use and user responsibility.
Metadata Package: FGDC/ISO-compliant metadata for all final datasets.

SECTION 14
PROJECT SCHEDULE

14. PROJECT SCHEDULE

ID	Task Mode	Task Name	Duration	Start	Finish
1		**1.0 Project Management**	**243 days**	**3/2/26**	**10/30/26**
2		Project Management Plan	243 days	3/2/26	10/30/26
3		Kickoff Meeting	1 day	4/3/26	4/3/26
4		Project Reporting Monthly	223 days	3/2/26	10/10/26
5		Archive Project Files and Data	2 days	4/4/26	4/5/26
6		**2.0 Data and Model Architecture**	**36 days**	**4/5/26**	**5/10/26**
7		Coordinate with RPC for Model Structures	8 days	4/5/26	4/12/26
8		Identify Model Datasets	5 days	4/16/26	4/20/26
9		Determine Recommended Validation Parameters/Metrics	4 days	4/23/26	4/26/26
10		Technical Memo of Model Framework	5 days	5/2/26	5/6/26
11		Presentation of RPC Summarizing Model Architecture and Development	2 days	5/9/26	5/10/26
12		**3.0 Data Aggregation or Acquisition**	**52 days**	**4/9/26**	**5/30/26**
13		Review Provided Datasets	8 days	4/9/26	4/16/26
14		Identify Missing Datasets Required For Project	7 days	4/16/26	4/22/26
15		Acquired Additional Datasets Through Purchase	9 days	5/10/26	5/18/26
16		Create Data Gap Technical Report	12 days	5/19/26	5/30/26
17		**4.0 Geographic Base Layer Inputs and Standardization**	**28 days**	**5/19/26**	**6/15/26**
18		Develop Standardized Geographic Base Layers in GIS Format	14 days	5/19/26	6/1/26
19		Prepare Metadata For Each Dataset	6 days	6/1/26	6/6/26
20		Provide Technical Memo	10 days	6/6/26	6/15/26
21		**5.0 Digital Elevation Model (DEM)**	**30 days**	**6/2/26**	**7/1/26**
22		Prepared Hydroenforce DEM	7 days	6/2/26	6/8/26
23		Derive Slope, Aspect, Flow Direction, Flow Accumulation and Watershed Boundary	9 days	6/9/26	6/17/26
24		Provide Metadata and Technical Memo	12 days	6/20/26	7/1/26
25		**6.0 Road and Bridge Digital Elevation Model (R-DEM)**	**34 days**	**6/9/26**	**7/12/26**
26		Prepare Hydroenforced R-DEM	20 days	6/9/26	6/28/26
27		Prepare Flow-Direction Rasters	10 days	6/18/26	6/27/26
28		Define Watershed Boundaries and Subwatershed Boundaries Adjusted for	6 days	6/29/26	7/4/26
29		Provide Metadata and Technical Memo	12 days	7/1/26	7/12/26
30		**7.0 Landscape Development Intensity Index (LDII)**	**38 days**	**7/4/26**	**8/10/26**
31		Prepare Input Datasets	5 days	7/4/26	7/8/26



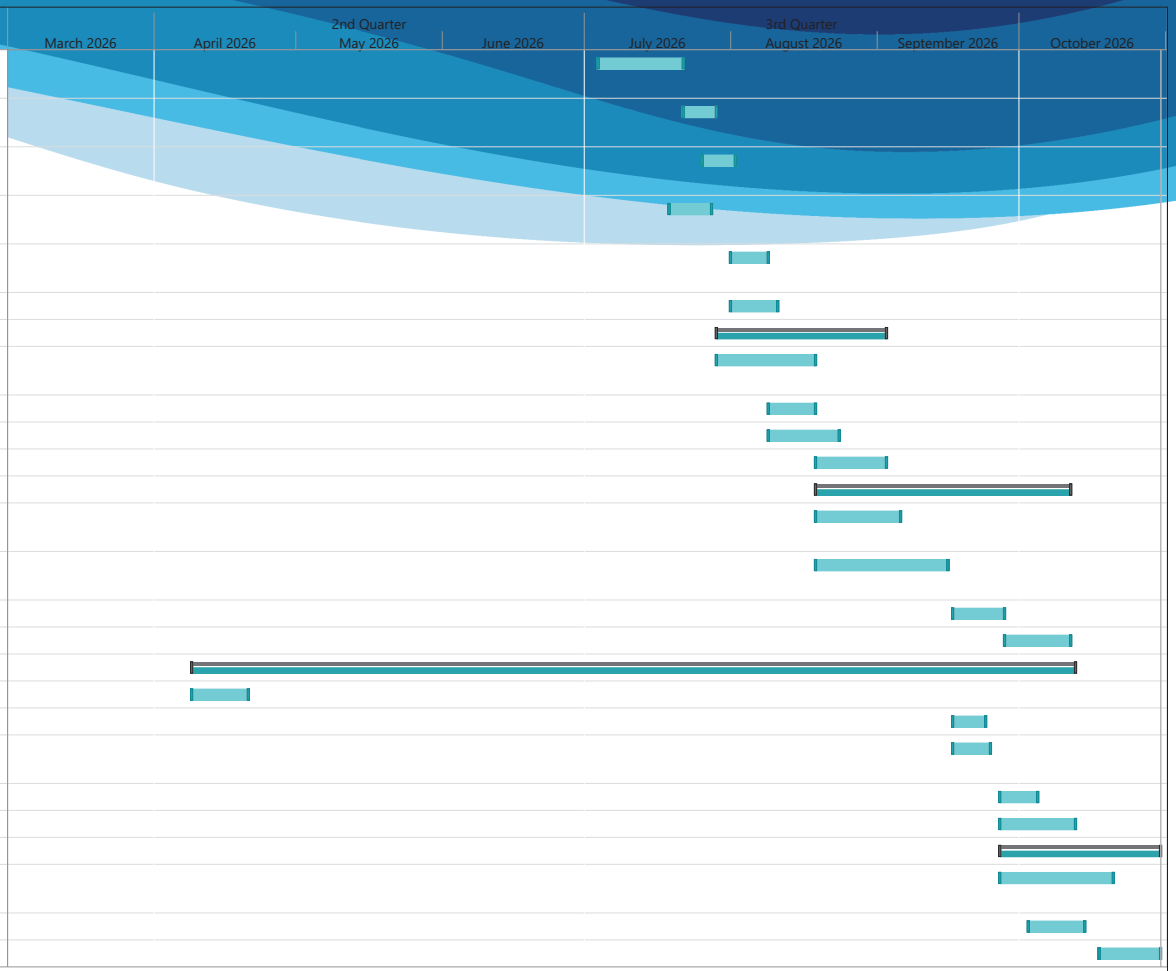
New Orleans Regional Planning Commission - Flood Risk LWI Region 8

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

Page 1

Prime Consultant Name: **Michael Baker International, Inc.**

ID	Task Mode	Task Name	Duration	Start	Finish
32		Develop Geospatial Model to Calculate LDII Values	18 days	7/4/26	7/21/26
33		Validate LDII Results With Aerial Photos and Other Available Information	7 days	7/22/26	7/28/26
34		Prepare Lookup Database Linking LDII Categories to Runoff Coefficients	7 days	7/26/26	8/1/26
35		Prepare GIS Layer for LDII With Polygon Level Classifications	9 days	7/19/26	7/27/26
36		Prepare Summary Maps and Statistics Showing Development Intensity	8 days	8/1/26	8/8/26
37		Provide Metadata and Technical Memo	10 days	8/1/26	8/10/26
38		**8.0 Runoff Coefficient Model**	**36 days**	**7/29/26**	**9/2/26**
39		Prepare GIS Layer for Runoff Coefficients (Including Multiple Datasets)	21 days	7/29/26	8/18/26
40		Prepare Attribute Tables	10 days	8/9/26	8/18/26
41		Prepare Hydrologic Layers	15 days	8/9/26	8/23/26
42		Provide Metadata and Technical Memo	15 days	8/19/26	9/2/26
43		**9.0 Pluvial Flood Risk Index**	**54 days**	**8/19/26**	**10/11/26**
44		Prepare GIS Flood Risk Layer With Block Group Resolution	18 days	8/19/26	9/5/26
45		Prepare Flood Risk Maps for 7 Rainfall Events (20%, 10%, 4%, 2%, 1%,0.5%,0.2%)	28 days	8/19/26	9/15/26
46		Provide Summary Statistics Table	11 days	9/17/26	9/27/26
47		Provide Metadata and Technical Memo	14 days	9/28/26	10/11/26
48		**10.0 QA/QC and Statistical Validation**	**187 days**	**4/9/26**	**10/12/26**
49		QA/QC Plan	12 days	4/9/26	4/20/26
50		QA/QC Checks On All Input Data	7 days	9/17/26	9/23/26
51		QA/QC Checks On All Model Outputs, LDII, Flood Risk Index	8 days	9/17/26	9/24/26
52		QA/QC Documentation	8 days	9/27/26	10/4/26
53		Validation Report (Draft and Final Submission)	16 days	9/27/26	10/12/26
54		**11.0 Documentation**	**34 days**	**9/27/26**	**10/30/26**
55		Model Development Report (Draft and Final Submission)	24 days	9/27/26	10/20/26
56		Model User Guide	12 days	10/3/26	10/14/26
57		Geodatabase	13 days	10/18/26	10/30/26



New Orleans Regional Planning Commission - Flood Risk
LWI Region 8

Task | Project Summary | Manual Task | Start-only | Deadline
Split | Inactive Task | Duration-only | Finish-only | Progress
Milestone | Inactive Milestone | Manual Summary Rollup | External Tasks | Manual Progress
Summary | Inactive Summary | Manual Summary | External Milestone

SECTION 15
COST AND BUDGET

15. COST AND BUDGET

Michael Baker International Budgetary Estimate for NORPC Flood Risk Assessment Geospatial Dataset Development

TASK NO.	TASK DESCRIPTION	MICHAEL BAKER INTERNATIONAL							Total Hours	Total Cost
		Principal	Supervisor Engineer	Engineer	Engineer Other	GIS Analyst	Engineer Intern	Clerical		
	Audited Rates as of 8/1/2024 =====>	$121.47	$103.54	$68.40	$69.07	$57.93	$37.28	$34.15		
1.0	**Project Management**	**4**	**62**	**31**	**0**	**23**	**42**	**9**	**171**	**$12,231.26**
	Project Management Plan	1	8	2	0	2	12		25	$1,649.81
	Kick-off Meeeting with minutes	1	6	4	0	4	4		19	$1,397.15
	Monthly progress reports	1	40	9	0	9	18	9	86	$6,378.43
	Archive project files and data	1	8	16	0	8	8		41	$2,805.87
2.0	**Data and Model Architecture**	**4.5**	**10**	**54**	**0**	**40**	**64**	**4**	**176.5**	**$10,115.34**
	Coordinate with RPC for model structures	**1**	2	16	0	12	4		35	$2,267.23
	Identify model datasets	1	2	8	0	12	12		35	$2,018.27
	Determine recommended validation parameters / metrics	1	2	8	0	4	4		19	$1,256.59
	Technical memo of Model framework	1	2	16	0	6	32	4	61	$3,100.09
	Presentation to RPC summarizing model architecture and development approach	0.5	2	6	0	6	12		26.5	$1,473.16
3.0	**Data Aggregation or Acquistion (If applicable)**	**2**	**8**	**40**	**0**	**36**	**104**	**4**	**194**	**$9,906.46**
	Review Provided Data Sets	0.5	2	16	0	16	32		66.5	$3,482.06
	Identify missing data sets required for project	0.5	2	16	0	8	24		50.5	$2,720.38
	Acquire additional data sets through purchase	0.5	2	4	0	8	8		22.5	$1,303.10
	Create Data Gap Technical Report	0.5	2	4	0	4	40	4	54.5	$2,400.94
4.0	**Geographic Base Layer Inputs and Standardization**	**2.5**	**8**	**28**	**0**	**68**	**60**	**4**	**170.5**	**$9,359.84**
	Develop standardized geographic base layers in GIS format	1	2	12	0	40	12		67	$3,913.91
	Prepare metadata for each dataset	0.5	4	8	0	24	8		44.5	$2,710.66
	Provide Technical Memo	1	2	8	0	4	40	4	59	$2,735.27
5.0	**Digitial Elevation Model (DEM)**	**2.5**	**8**	**40**	**0**	**44**	**72**	**4**	**170.5**	**$9,237.68**
	Prepare hydro enforced DEM	0.5	2	16	0	4	16		38.5	$2,190.42
	Derive slope, aspect, flow direction, flow accumulation and watershed boundary layers	1	2	16	0	16	16		51	$2,946.31
	Provide Metadata and Technical Memo	1	4	8	0	24	40	4	81	$4,100.95
6.0	**Road and Bridge Digital Elevation Model (R-DEM)**	**2.5**	**10**	**56**	**0**	**32**	**80**	**4**	**184.5**	**$10,142.24**
	Prepare hydro enforced R-DEM	0.5	2	16	0	0	16		34.5	$1,958.70
	Prepare flow direction rasters	0.5	2	16	0	4	16		38.5	$2,190.42
	Define Watershed boundaries and subwatershed boundaries adjusted for trans infra.	0.5	2	16	0	4	8		30.5	$1,892.18
	Provide Metadata and Technical Memo	1	4	8	0	24	40	4	81	$4,100.95

7.0	**Landscape Development Intensity Index (LDII)**	**7**	**16**	**116**	**34**	**124**	**132**	**4**	**433**	**$25,030.59**
	Prepare input datasets	1	2	24	2	4	16		49	$2,936.49
	Develop Geospatial model to Calc LDII values	1	2	40	12	24	32		111	$6,476.67
	Validate LDII results with aerial photos and other avaialble info	1	2	16	4	8	12		43	$2,610.03
	Prepare look up tables linking LDII categories to runoff coeficeints (other Hydro data)	1	2	16	4	8	12		43	$2,610.03
	Prepare GIS layer for LDII with polygon level classifications	1	2	4	4	40	8		59	$3,493.87
	Prepare Summary maps and statistics showing development intensity	1	2	8	4	16	12		43	$2,526.27
	Provide Metadata and Technical Memo	1	4	8	4	24	40	4	85	$4,377.23
8.0	**Runoff Coeffiecient Model**	**2.5**	**24**	**88**	**16**	**144**	**88**	**4**	**366.5**	**$21,672.12**
	Prepare GIS layer for runoff coefficients (including multiple datasets)	0.5	12	24	8	64	16		124.5	$7,801.38
	Prepare Attribute Tables	0.5	4	24	2	16	16		62.5	$3,778.00
	Prepare Hydrologic Layers	0.5	4	24	4	40	16		88.5	$5,306.46
	Provide Metadata and Technical Memo	1	4	16	2	24	40	4	91	$4,786.29
9.0	**Pluvial Flood Risk Index**	**3**	**20**	**76**	**10**	**160**	**104**	**4**	**377**	**$21,606.83**
	Prepare GIS flood risk layer with block group resolution	0.5	4	16	4	64	8		96.5	$5,851.34
	Prepare Flood Risk maps for 7 rainfall events. (20%, 10%, 4%, 2%,1%, 0.5%,0.2% AEP events)	1	8	40	4	64	40		157	$9,160.79
	Provide Summary Statics Tables	0.5	4	16	2	8	16		46.5	$2,767.36
	Provide Metadata and Technical Memo	1	4	4	0	24	40	4	77	$3,827.35
10.0	**Quality Control , Auality Assurance (QA/QC) and Statistical Validation**	**4**	**14**	**88**	**12**	**10**	**88**	**4**	**220**	**$12,780.02**
	QA/QC Plan	0.5	4	8	2		16		30.5	$1,756.72
	QA/QC Checks on all input data	1	2	16	2	2	8		31	$1,975.19
	QA/QC Checks on all model outputs, LDII, Flood Risk Index	1	2	16	2	2	8		31	$1,975.19
	QA/QC documentation	0.5	2	16	2	2	24		46.5	$2,510.94
	Validation Report (Draft and Final Submission)	1	4	32	4	4	32	4	81	$4,561.99
11.0	**Documentation**	**3**	**8**	**64**	**4**	**40**	**136**	**16**	**271**	**$13,780.29**
	Model Development Report (Draft and Final Submission)	1	4	40	4		80	8	137	$6,803.51
	Model User Guide	1	2	16			40	8	67	$3,187.35
	Geodata base	1	2	8		40	16		67	$3,789.43
	HOURS TOTAL	37.5	188	681	76	721	970	61	2734.5	**$155,862.65**
	PERSONNEL COST	$4,555.13	$19,465.52	$46,580.40	$5,249.32	$41,767.53	$36,161.60	$2,083.15	2734.5	**$155,862.65**

Anticipated Direct Expenses:	
Printing supplies	$ 750.00
Data transfer supplies	$ 250.00
Data Set Purchase	$ 5,000.00
Travel Expenses	$ 350.00
	$ 6,350.00

SUMMARY	
3-Year Average Overhead Rate	148.05%
Overhead Cost	$230,754.65
TOTAL LABOR AND OVERHEAD	**$386,617.29**
Base Profit Percentage	12.0%
PROFIT	$46,394.07
DIRECT EXPENSE	$6,350.00
TOTAL LUMP SUM COST FOR ENGINEERING SERVICES	**$439,361.37**

SECTION 16
STAFF EXPERIENCE

16. Staff Experience:

Firm employed by	Michael Baker International, Inc.				
Name	**Daniel Thornhill, PE**		*Years of relevant experience with this employer*	5	
Title	Principal In Charge		*Years of relevant experience with other employer(s)*	23	
Degree(s) / Years / Specialization			B.S. / 1997 / Civil Engineering / Louisiana State A&M University		
Discipline	Civil	*Certifications*	Professional Engineer - Louisiana		
Contract role(s) / brief description of responsibilities			Mr. Thornhill has over two decades of consulting experience in a variety of engineering projects, including roadway design, corridor/traffic operation concept analysis, bridge design, hydraulics design, subsurface drainage design, and sidewalk beautification projects. Before joining Michael Baker International, Mr. Thornhill served as a Project Manager/Senior Engineer in the Baton Rouge area since 2006, responsible for roadway and transportation design, as well as corridor studies, for various clients, including EBR DOTD, DOTD, Lafayette Consolidated Government, and the St. Tammany Parish Department of Public Works. Mr. Thornhill will serve as the Principal-in-Charge of this project.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
04/22 - Ongoing	**Louisiana Watershed Initiative (LWI) Region 6, Louisiana, DOTD.** *Principal in Charge.* Responsible for providing contract administration and assisting the project manager in general project management duties such as resource allocation, scheduling, coordination of team members, and financial analysis. Michael Baker supplemented data collection and analysis, continued stakeholder engagement services, and performed topographic, bathymetric, and channel surveys. Specifically, Mr. Thornhill was responsible for the overall execution of the project, contract administration, and client relations.
03/13 - 04/14, 08/14 - 01/16	**LWI/SPP Group 1 Bundick Lake Flood Surcharge Management, Beauregard Parish, Louisiana**, *DOTD. Principal in Charge.* Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. Thornhill was responsible for the overall execution of the project, contract administration, and client relations.
11/12 - 04/14	**LWI/SPP Group 1 Anacoco Creek Watershed, Upper and Lower, Vernon Parish, Louisiana,** *DOTD. Principal in Charge*. Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. Thornhill was responsible for the overall execution of the project, contract administration, and client relations.
08/12 - 01/18	**LWI/SPP Group 1 Three Mile Lake, St. Landry Parish, Louisiana,** *DOTD. Principal in Charge*. Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. Thornhill was responsible for the overall execution of the project, contract administration, and client relations.

10/21 - Ongoing	**Juban Road (LA 1026) Widening (I-12 to US 190), Livingston Parish, Louisiana.** *Livingston Parish. Project Manager/Lead Design Engineer.* Responsible for the development of construction plans for the widening of Juban Road from a 2-lane roadway to a 4-lane boulevard from just north of the I-12 Interchange to US 190. Improvements included three (3) multi-lane roundabouts along Juban Road while including side paths on both sides of Juban Road to meet the DOTD complete streets initiative. Access Management was a priority along this route, therefore the median was reduced to 6' to 8' to discourage left turn movements and make all driveways right-in/right-out while utilizing the roundabouts for U-turn movements. The first roundabout was located at future driveway number 5 for the Juban Crossing Development. The second roundabout was located midway along the project, with the addition of service roads to encourage Livingston Parish to extend during future development to reduce driveways along Juban Road. The third roundabout was located at the Juban Road at the US 190 intersection. The roundabout would replace an existing signal that causes traffic congestion, especially during peak afternoon traffic. Project included all necessary improvements along US 190 for the new roundabout and additional turn lane for the new Sanctuary Development. Mr. Thornhill responsibilities included coordination with DOTD project manager, all geometric design both horizontal and vertical, coordination of topographic surveys and development of right-of-way maps for acquisition, development of existing and design drainage maps, analysis of both subsurface and storm water drainage using DOTD's Hydraulics Manual and HYDRWin, development of construction plans for both preliminary and final design, and development of public meeting displays and coordination with DOTD environmental section for the update to the Environmental Document for environmental clearance. Additionally, he was responsible for separating the project construction plans into two separate construction plans (LA 1026 Roundabout at US 190 and LA 1026 Widening) for bidding due to the need for an air conformity permit for the improvements along Juban Road south of the US 190 intersection. Recommendations from the Stage 0 Traffic Operations study were carried forward. Mr. Thornhill was Project Manager/Lead Design Engineer over the Line & Grade portion of the EA. He was responsible for the development of the Plan & Profile sketches for the Stage 1 report, development of the project implementation cost, and creation of the public meeting exhibits. For the Line & Grade, LiDAR was utilized with the Horizontal Alignments and Aerial Photography from the Stage 0 report. The updated sketches were used to develop the opinion of probable construction cost from the Line & Grade improvements, along with developing estimated cost for relocation of utilities, acquisition of additional right-of-way, engineering cost (design & survey) and CE&I. A staging phase approach was required to break the project out in several phases to be designed and constructed as funding became available. A priority matrix was created to determine the order in which the different phases should be constructed to provide the best Traffic Operation.
05/16 – 01/18	**Green Light Plan (GLP), East Baton Rouge Parish, Louisiana.** *East Baton Rouge Parish. Project Manager.* Responsible for the design and construction of 7 projects in East Baton Rouge Parish: Siegen Lane - Highland Road to Perkins Road (DOTD Roadway); Highland Road - Old Perkins Road to Airline Highway (DOTD Roadway) (Included new bridges and railroad coordination for at grade crossing); Jones Creek Road – Coursey Blvd to South Harrell's Ferry Road (Included new bridges); South Harrell's Ferry Road – Millerville Road to O'Neal Lane (Included new box culvert bridge); O'Neal Lane – South Harrell's Ferry Road to just south of I-12 (DOTD Roadway); and Lobdell Avenue – Government Street to Florida. Additional responsibilities included the preparation of bid documents, assisted DPW Field Engineering in construction progress meetings, distributed shop drawings and request for information for review and approval, made weekly site visits to projects to monitor the progress of the contractors, and assisted with in the field decisions in regard to adjustments due to utility conflicts or conflicts with the plans.
09/14 – 08/15	**Ham Reid Road at Lake Street (LA 3092) Intersection Improvement Project.** *Calcasieu Parish Police Jury. Project Manager/Lead Design Engineer.* Responsibilities included the development of construction plans for a new single lane roundabout at the intersection of Ham Reid Road and Lake Street (LA 3092). Project was studied as both a new signal and roundabout to provide traffic flow for land being developed along the southwest quadrant of the project. Through coordination with LA DOTD, it was determined a new single lane roundabout was the best alternative. The new roundabout would be a 4-leg roundabout that would connect to Spanish Mission Trail roadway of Trails Subdivision with one of roundabout legs to provide seamless connectivity with Ham Reid Road to eliminate a possible Z-intersection configuration with only a 3-leg roundabout. Mr. Thornhill's responsibilities included coordination with both Calcasieu Parish Project Manager, LA DOTD District 7 Engineers, and LA DOTD Project Permit Specialist; development of geometric layouts both horizontally and vertically, development of right-of-way taking lines and coordination of right-of-way maps with surveyor, and hydraulic analysis for both subsurface and storm water flow. Project was being done as a permit project for Calcasieu Parish through LA DOTD District 7.

16. Staff Experience:

Firm employed by	Michael Baker International, Inc.		
Name	**L.R. "Eric" Erikson, PE, CFM**	*Years of relevant experience with this employer*	3
Title	Department Manager – Water Resources	*Years of relevant experience with other employer(s)*	24
Degree(s) / Years / Specialization	M.S. / 2003 / Engineering and Technology Management / Louisiana Tech University B.S. / 1999 / Civil Engineering / Louisiana Tech University		
Discipline	Civil	*Certifications*	Professional Engineer 0031061 / Louisiana Certified Floodplain Manager US-23-12645
Contract role(s) / brief description of responsibilities	Mr. Erikson has served as the Project Manager for several water resource projects. He has experience working with several members of the LADOTD Public Works section, as well as the LADOTD Hydraulics section. He has completed several water resource and hydraulic projects with LADOTD. He has many years of experience with LADOTD hydraulic guidelines, specifications, pay items, regulations, and software. Mr. Erikson will fill the role of task manager for the team while also ensuring QA/QC for any hydraulic analysis tasks that may be required.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
01/23 - Ongoing	**Louisiana Watershed Initiative (LWI) Region 6, Louisiana**. *DOTD*. *Project Manager.* Responsible for providing contract administration and assisting the project manager in general project management duties such as resource allocation, scheduling, coordination of team members, and financial analysis. Michael Baker supplemented data collection and analysis, continued stakeholder engagement services, and performed topographic, bathymetric, and channel surveys. Specifically, Mr. Erikson completed project management duties such as being a point of contact for the LWI Project Manager, directed resource management to complete all task orders, provided QA/QC on all deliverables, and provide stakeholder engagement in the form of presentations to various stakeholders. This task includes 4 HUC8 Watershed models.
01/23 – 12/2024	**Louisiana Watershed Initiative (LWI) Region 1, Louisiana.** *DOTD*. *Deputy Project Manager.* Responsible for contract administration and assisting the project manager in general project management duties such as resource allocation, scheduling, team coordination, and financial analysis. This task includes 3 HUC8 Watershed models. Mr. Erikson assisted in the QA/QC of deliverables, directed resource management to complete all required tasks.
01/23 – 12/2024	**Louisiana Watershed Initiative (LWI) Region 4, Louisiana**. *DOTD*. *Deputy Project Manager.* Responsible for contract administration and assisting the project manager with general project management duties such as resource allocation, scheduling, team coordination, and financial analysis. This task includes 1 HUC8 Watershed model.
11/22 – 12/2024	**Parish Comprehensive Drainage Plan, St. Tammany Parish, Louisiana**. *St. Tammany Parish*. *Project Manager*. Responsible for contract administration and assisting with general project management duties, such as resource allocation, team coordination, scheduling, and financial analysis. Attended public outreach meetings and assisted the public in understanding the project objective and goals. Provided review and QC of the Phase 1 final report, community outreach at two public meetings, and scoping of future phases.
11/22 – 12/2024	**IIJA Bridge Replacement Program Region 7, Louisiana**. *DOTD. Task Manager.* Responsible for directing the completion of 12 Bridge Replacement Structure Hydraulic Studies in accordance with LADOTD regulations. Studies included 2D HEC-RAS models, replacement alternative analysis, scour analysis, and "No-Rise" Certificates where required. Mr. Erikson provided overall production oversight , task management, and QA/QC of the final reports.

11/22 – 12/2024	**LWI/SPP Group 1 Bundick Lake Flood Surcharge Management, Beauregard Parish, Louisiana**. *DOTD*. *Project Manager.* Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. Erikson completed the PFM, and SQRA assessments, and provided QA/QC for all modeling. The project will determine improvements to Bundick Lake outlet works in order to reduce flooding within the watershed.
11/22 – 12/2024	**LWI/SPP Group 1 Anacoco Creek Watershed upper and Lower, Vernon Parish, Louisiana**. *DOTD*. *Project Manager.* Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. Erikson completed the PFM, and SQRA assessments, and provided QA/QC for all modeling. The project will determine improvements to both Vernon Lake and Anacoco Lake outlet works in order to reduce flooding within the watershed.
7/23 – 12/2024	**LWI/SPP Group 1 Three Mile Lake, St. Landry Parish, Louisiana**. *DOTD*. *Project Manager.* Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. Erikson completed the on-site inspection, improvement alternatives strategy, and provided QA/QC for all modeling. The project will determine improvements to infrastructure around Three Mile Lake in order to reduce backwater flooding from the Atchafalaya Floodway.
7/23 – 12/2024	**Little Bogue Falaya Regional Detention Pond, St. Tammany Parish, Louisiana**. *St. Tammany Parish. Project Manager.* Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. Erikson completed the overall strategy for modeling of several pond locations and sizes, QA/QC 2D HEC-RAS models, QA/QC Preliminary Engineering Report, Provide oversight and final review of cost estimates, and reviewed damage calculations for BCA calculations.
01/23 - Ongoing	**Jones Creek Regional Detention Pond, Baton Rouge, Louisiana**. *City Parish of East Baton Rouge DPW*. *H&H Task Manager.* Responsible for the overall execution of the H&H portion of the project, contract administration, and general task management duties, which include H&H resource allocation, H&H team coordination, scheduling, and financial analysis. Specifically, Mr. Erikson completed the overall strategy for modeling of the detention pond configurations, QA/QC 2D HEC-RAS models, QA/QC Preliminary Engineering Report, and provided QA/QC review of preliminary construction plans.

16. Staff Experience:

Firm employed by	Michael Baker International, Inc.		
Name	**Manoj KC, PhD, PE, CFM**	*Years of relevant experience with this employer*	13
Title	Coastal Engineering	*Years of relevant experience with other employer(s)*	7
Degree(s) / Years / Specialization	Ph.D. Civil Engineering (Water Resources), Auburn University, 2014 M.S. Civil Engineering (Water Resources), Auburn University, 2012 B.S., Civil Engineering, Tribhuvan University, 2007		
Discipline	Civil	*Certifications*	Professional Engineer 45281 / Louisiana Certified Floodplain Manager
Contract role(s) / brief description of responsibilities	**QUALITY ANALYSIS / QUALITY CONTROL MANAGER.** Dr. KC is a water resources engineer with diverse experience in applied surface water, H&H modeling research, civil and hydraulic engineering design, research experience in hydrogeomorphology, ecosystem, and climate modeling. He has published several technical papers in peer-reviewed journals. His previous experience includes modeling for H&H Studies using HEC-HMS/HEC-RAS, FLO-2-D, TR-55, TR-20, StormCAD, XPSWMM, and ArcGIS, Dr. KC is also experienced in statistical analysis of large datasets; LiDAR point cloud pre/post processing; and programming using R, Visual Basic, Python, NCL, and Bash. Dr. KC excels at developing scripts to expedite the development of input data for HEC-HMS and HEC-RAS models. He has performed cloud-based HEC-RAS modeling to expedite run times and impact analyses, as he did for a 200-mile 2-D model along the Rio Grande, and delivered the completed study to USACE within schedule.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
2022 - 2024	**Louisiana Watershed Initiative Modeling Contract - Region 6, LA.** *Louisiana Department of Transportation and Development (LADOTD)* Louisiana Statewide *Water Resources Engineer.* Responsible for providing support for the data collection and analysis of hydraulic datasets, models, and studies; and the proposition of modeling design approaches for 4 HUC's of Region 6 for the Louisiana Watershed Initiative (LWI). Michael Baker is providing engineering and modeling services to the DOTD for Region 6 for the Louisiana Watershed Initiative (LWI). The LWI project was launched in 2018 and introduced a watershed-based approach to reducing flood risk in Louisiana. It is organized by seven modeling regions, each of which encompasses multiple HUC-8 watersheds. For the first task order of the contract, Michael Baker will collect existing watershed datasets, models, and studies, develop and propose a detailed modeling design approach with schedules and cost estimates, and prepare a data gap analysis and collection report.
2019 - 2021	**Programmatic Floodplain Modeling Impact Analysis Programs Support, Laredo, TX.** *Water Resources Engineer.* Responsible for hydraulic modeling to assess the impacts of proposed wall projects and to ensure that the U.S. Section of the International Boundary and Water Commission (USIBWC) criteria on no adverse impact can be met. An 80-mile complex 1-D/2-D riverine HEC-RAS model was developed for the impact assessment of fence/wall on the Rio Grande River, which included H&H analysis, QC, floodplain analysis, and a report. Created novel solutions for modeling, which expedited the project schedule and improved model accuracy.
2019 - 2021	**Laredo and Rio Grande H&H Analysis, Webb County, TX.** *USACE, Fort Worth District. Water Resource Engineer.* Water Resources Engineer. Responsible for hydraulic modeling for the assessment of the impacts of the proposed wall projects and to ensure that the USIBWC criteria can be met. A complex 1-D/2-D HEC-RAS model of 150 miles 150-mile-long riverine model with more than 140 miles of proposed wall is being used for the assessment of fence/wall on both the Rio Grande River and its floodplain.

2019 - 2019	**Vince Bayou Watershed Planning Project, Harris County, TX.** *HCFCD. Water Resource Engineer.* Responsible for the development of a high-level watershed master plan for the Vince Bayou watershed for CDBG Funding of 15MM. Developed rain-on-grid analyses and 1-D/2-D coupled models with NOAA Atlas 14 precipitation estimates for nine streams and seven tributaries, totaling approximately 21.3 miles, to identify flood-prone areas. Prioritized problem areas and developed targeted mitigation alternatives and performed benefit-cost analysis for each alternative, prioritizing projects with the best score and lowest environmental constraint.
2021 - 2021	**Subsidence Impacts on Spring Creek Watershed, Harris and Montgomery Counties, TX**. *HGSD. Senior Engineer.* Mr. KC incorporated subsidence into the 1-D/2-D models and developed impact analyses to reflect how subsidence will impact flood risk and infrastructure replacement costs in the watershed. Michael Baker is providing engineering services to evaluate the projected increases in flood risks and economic impacts of subsidence associated with multiple scenarios of groundwater withdrawal in the Spring Creek watershed. Michael Baker is providing data collection and analysis, developing H&H modeling for multiple subsidence scenarios, quantifying impacts, and preparing documentation for the study.
2019 - 2022	**Indefinite Delivery Indefinite Delivery Contract, TX.** *USACE, Fort Worth District. Water Resource Engineer.* Responsible for hydraulic modeling for the assessment the impacts of the proposed wall projects and to ensure that the USIBWC criteria can be met. Those criteria state that the design flood Water Surface Elevations (WSE), in proposed conditions, shall not increase more than 6-inches in rural areas or 3-inches in urban areas when compared to the existing floodplain conditions (existing condition with no wall) and have no more than a 5% increase in flow deflection. The model named as RGV-63 spans from the outlet of Falcon Dam to Penitas (RGV07-RGV08-RGV09), along USBP Zones 1 through 5 was modeled for the impact analysis of the 63-miles of proposed bollard wall along the Rio Grande from Falcon Dam to Penitas in Texas. A complex 1-D/2-D HEC-RAS model of 90 miles long 1-D riverine model integrated with 186 square miles 2-D Model with 63 miles of proposed wall is being used for the assessment of fence/wall on both the Rio Grande River and its floodplain.
2019 - 2021	**Placer County Flood Risk Project, Auburn, CA.** *Placer County Flood Control and Water Conservation. Water Resources Engineer.* Responsible for guiding the development of 1D/2D HEC-RAS models for 11 mile stretch of Markham Ravine. The objective of this Flood Risk Project is to support the development and finalization of select Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) reports for Placer County. Five new detailed studies for the watersheds of Coon Creek, Doty Ravine, Blackwood Creek, Tahoe Vista Creek and Griff Creek will be prepared while existing, effective detailed studies for six other watersheds (including South Branch Pleasant Grove Creek, Secret Ravine Upper Fork/Loomis Tributary, Dry Creek, Cirby Creek, Linda Creek and Markham Ravine) will be revised and finalized. Letter of Map Revision (LOMR) applications will also be incorporated, if available.
2019 - 2019	**Cypress Regional Drainage Plan, Harris County, TX.** *Harris County Flood Control District. Water Resources Engineer.* Responsible for reviewing 1D and 2D unsteady HEC-RAS models for different sub-watersheds of Cypress Creek Watershed. Michael Baker updated a drainage master plan for Cypress Creek tributary watersheds in northwest Harris County and expanded it to include Cypress Creek. As part of this fast-paced project, Michael Baker harnessed advances in modeling capabilities and more recent LiDAR and rainfall data to update a study prepared in 2003 for all Cypress Creek Tributary watersheds, except for Little Cypress Creek. Michael Baker studied 17 streams in the eight tributary watersheds to evaluate feasible flood mitigation alternatives and recommended mitigation plans that can be advanced to design. It also evaluated the effectiveness of large regional detention ponds along 27 miles of Cypress Creek at Eldridge Parkway and at Stuebner Airline Road. Michael Baker's tasks included data collection, review, structure inventory updating, and a site visit; developing revised existing and future hydrologic and hydraulic models; developing drainage plans; performing an EA; natural channel design (NCD); and project coordination and meetings

16. Staff Experience:

Firm employed by	Michael Baker International, Inc.		
Name	**Kushal Regmi, PE**	*Years of relevant experience with this employer*	6
Title	Bridge Engineer	*Years of relevant experience with other employer(s)*	9
Degree(s) / Years / Specialization	M.S. / 2019 / Civil Engineering / University of Memphis B.S. / 2015 / Civil Engineering / Tribhuvan University		
Discipline	Civil	*Certifications*	Professional Engineer / Texas
Contract role(s) / brief description of responsibilities	Mr. Regmi is a professional engineer focused on water resources engineering. He specializes in advanced hydrologic and hydraulic modeling, large-scale spatial analysis, and automation of complex GIS workflows. He possesses strength in LiDAR processing, DEM development, land-use and soil data preparation, and raster-based hydrologic parameter extraction to support 1D, 2D, and coupled 1D-2D RAS/HMS models. Mr. Regmi has a proven track record in delivering flood risk identification and watershed planning projects. His expertise extends to developing custom Python and ArcGIS-based tools, including GUI-driven applications that reduce labor-intensive analysis to minutes, improving accuracy, reproducibility, and project efficiency. He has extensive experience in developing FEMA-compliant mapping databases as well as large-scale federal, state, and county flood mitigation programs.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
10/19-10/23	**Harris County MAAPnext Watershed Floodplain Modeling and Mapping:** *Harris County Flood Control District. Civil Associate.* Responsible for the preparation of HEC-RAS models for multiple riverine systems, including a 70-mile-long 1D riverine model for Brays Bayou and its tributaries integrated with a 127-square-mile 2D model of its watershed, a 17-mile-long 1D riverine model for Jackson Bayou and its tributaries integrated with a 26-square-mile 2D model of its watershed, and a 20-mile-long 1D riverine model for Goose Creek and its tributaries integrated with a 32-square-mile 2D model of its watershed. Key duties included extracting survey data from available effective FEMA models, updating LiDAR data for the channel areas not adequately captured, developing automation codes to streamline repetitive tasks such as structure data entry, interconnecting all HEC-RAS models of individual tributaries using storage areas, model stabilization, and calibration using historical major flood events. Additionally, responsible for generating TSDN Reports for both Phase 1 (Brays Bayou) and Phase 2 (Goose Creek and Jackson Bayou) Watersheds, involving Combined Probability and Annual Chance analyses, FIS profile and Floodway Data Table preparation, creation of Flood Risk Products, and the compilation of various necessary tables for the TSDN narrative. Performed crucial role in developing approaches involving complex spatial analysis to produce combined probability and annual chance raster grids.
03/22-08/23	**LWI Region 4 - TO 2.** *C.H. Fenstermaker & Associates, Inc. Civil Engineer.* Responsible for performing the role of a task lead in the development of the hydrology and hydraulics model for the Lower Sabine Watershed. Responsibilities included coordinating and guiding the team in the creation of an HEC-HMS model for half of the Lower Sabine HUC08 watershed on the Texas side, as well as developing a hydraulic HEC-RAS model for the Louisiana side of the watershed. Additionally, responsible for devising solutions and establishing a work structure for calibrating the extensive HEC-RAS model covering approximately 1500 square miles which involved the creation of automation scripts to extract data from HEC-RAS, conduct automated quality QAQC of the HEC-RAS model, and generate automated plots and charts for reports. Other duties included coordination with the project prime, C.H. Fenstermater, regarding progress updates, schedules, and deliveries. As part of the project, I was also responsible for gathering latest available LiDAR data from various sources including USGS, Texas Geographic Information Data hub to build a terrain DEM model that was used for H&H analysis. This included extensive GIS processing such as DEM mosaicking, hydrologic conditioning, land-use/soil preprocessing, and creation of spatial inputs for watershed delineation and modeling.

02/22-06/23	**Louisiana Watershed Initiative – LWI Region 6.** *Louisiana Department of Transportation and Development. Civil Engineer.* Responsible for developing the Rain-on-Grid 2D HEC-RAS model for Eastern Louisiana Coastal and Eastern Central Louisiana Coastal watersheds. Provided technical support in developing mesh elements and developed a tool for merging multiple 2D HEC-RAS models enabling multiple modelers to work on different portions of HUC boundary simultaneously. Performed substantial GIS tasks including watershed boundary processing, DEM hydro-enforcement, spatial rainfall distribution preparation, and dataset standardization required for robust rain-on-grid modeling.
05/22-06/22	**Seawolf Parkway Reconstruction at Pelican Island Channel over Gulf Intracoastal Waterway (GIWW), Pelican Island Channel, Gulf Intracoastal Waterway, Galveston County, Texas.** *Texas Department of Transportation. Civil Engineer.* Provided support in developing terrain file by importing L and XML tin file into civil 3D and converting it to a GIS and RAS readable TIFF format. Integrated roadway profiles, bridge geometry, and elevation data into a unified spatial terrain model for drainage design.
03/22-03/23	**San Jacinto River Tributaries Study for Watersheds East of Lake Houston, San Jacinto River Watershed, Harris County, Texas.** *Harris County Flood Control District. Civil Associate.* Responsibilities included conducting on-site visits to assess structures requiring inclusion in the HEC-RAS model, gathering pertinent data and digitizing bridge/culvert attributes using ArcGIS for accurate modeling within HEC-RAS. Additionally, involved in the development of HEC-RAS 1D-2D models for developing different mitigation alternatives as part of the watershed planning for the San Jacinto River tributaries east of the Lake Houston watershed. Further tasks included performing GIS-based mitigation benefit analysis, overlaying RAS depth grids with structure footprints to quantify flooded structures, coordinating the technical aspects of the mitigation analysis with the client, computing project costs and scoring the alternatives. Also responsible for preparing the Final Engineering Report. Created maps, flood extents and comparative spatial analyses to support alternative evaluations.
12/21-01/22	**Spring Creek Subsidence Impacts Study, Harris and Montgomery Counties, Texas.** *Harris-Galveston Subsidence District. Civil Associate.* Provided support in performing GIS spatial computations to calculate the subsidence impact on buildings and structures within the Spring Creek Watershed. Prepared various exhibit maps in ArcGIS showing the impact on different Structure types in different counties within Spring Creek Watershed. Michael Baker is providing engineering services to evaluate the projected increases in flood risks and economic impacts of subsidence associated with multiple scenarios of groundwater withdrawal in the Spring Creek watershed. Spring Creek forms the northwestern boundary between Harris and Montgomery Counties. The watershed covers more than 284 square miles, with its headwaters in Grimes, Waller, and Montgomery Counties. The watershed also includes portions of the recharge zone for the Chicot aquifer, an important groundwater source for the Harris Galveston Subsidence District's jurisdictional region. Michael Baker is providing data collection and analysis, developing hydrologic and hydraulic modeling for multiple subsidence scenarios, quantifying impacts, and preparing documentation for the study.

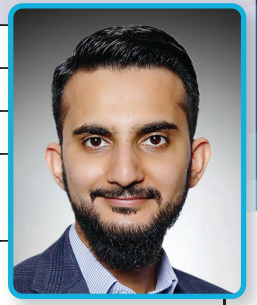
16. Staff Experience:

Firm employed by	Michael Baker International, Inc.				
Name	**Justin West, PE, CFM**		*Years of relevant experience with this employer*	3	
Title	Civil Engineer		*Years of relevant experience with other employer(s)*	3	
Degree(s) / Years / Specialization			BS / 2019 / Environmental Engineering / Louisiana State A&M University		
Discipline	Civil	*Certifications*	Professional Engineer 0049277 / Louisiana Certified Floodplain Manager US-22-12180		
Contract role(s) / brief description of responsibilities			**HYDROLOGY AND HYDRAULIC ENGINEER**. Mr. West has experience in Hydraulics & Hydrology and Natural Channel Design. He is experienced in HEC-RAS modeling, CAD design, and ArcGIS projects. He has utilized those skills in hydraulic and hydrologic models and recommendations for multiple municipalities.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
11/22 – 12/2024	**LWI/SPP Group 1 Bundick Lake Flood Surcharge Management, Beauregard Parish, Louisiana**. *DOTD. Hydraulic Modeler.* Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. West provided HEC-RAS troubleshooting and QA/QC for the models, as well as inundation mapping. The project will determine improvements to Bundick Lake outlet works to reduce flooding within the watershed.
11/22 – 12/2024	**LWI/SPP Group 1 Anacoco Creek Watershed, Upper and Lower, Vernon Parish, Louisiana.** *DOTD. Hydraulic Modeler.* Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. West provided HEC-RAS troubleshooting and QA/QC for the models and provided inundation mapping. The project will determine improvements to both Vernon Lake and Anacoco Lake outlet works to reduce flooding within the watershed.
7/23 – 12/2024	**LWI/SPP Group 1 Three Mile Lake, St. Landry Parish, Louisiana**. *DOTD. Hydraulic Modeler*. Responsible for the overall execution of the project, contract administration, and general project management duties, which include resource allocation, team coordination, sub-consultant coordination, scheduling, and financial analysis. Specifically, Mr. West completed all HEC_RAS modeling of the watershed basin, provided on-site inspection, improvement alternatives modeling, and provided inundation mapping. The project will determine improvements to infrastructure around Three Mile Lake to reduce backwater flooding from the Atchafalaya Floodway.
04/24-Ongoing	**St. Tammany Parish Comprehensive Drainage Plan.** *St. Tammany Parish Government. Assistant Project Manager and Lead Modeler.* Mr. West is responsible for assisting with general project management duties, such as resource allocation, team coordination, scheduling, and financial analysis. Mr. West attended public outreach meetings and assisted the public in understanding the project objective and goals. Mr. West completed the existing models for the parish consisting of 12 models.
01/23 – Ongoing	**IIJA Off System Bridge Replacement, District 07 Parishes.** *DOTD. Hydraulics Reviewer.* Mr. West assisted in the technical QA/QC process through reviewing the hydraulic and hydrologic models completed for several of the watersheds delineated within the project area and the associated hydraulic reports.
09/21 – Ongoing	**Louisiana Watershed Initiative (LWI) Region 6, Louisiana**. *DOTD. HEC-RAS Modeler.* Mr. West is the Lead modeler for the Eastern Central Louisiana Coastal (Region 6) HEC-RAS model. Mr. West developed the loss method for infiltration, soils, and land use data. Mr. West created centerlines for the major streams in the watershed by filtering out small streams from the National Hydrology Database. Mr. West developed the hydraulic models' break lines, bridge structures, and mesh geometry, and simulated storms within the HEC-RAS models and adjusted calculated values to calibrate and validate the model.

09/21 – Ongoing	**Louisiana Watershed Initiative Modeling Contract – Region 1, Louisiana.** *DOTD. HEC-RAS Modeler.* Mr. West was the lead modeler for Black Lake Bayou (Region 1) HEC-RAS model and technical QC reviewer for Lower Sabine. He developed the loss method for infiltration, soils, and land use data. I created centerlines for the major streams in the watershed by filtering out small streams from the National Hydrology Database and the hydraulic models' break lines, bridge structures, and 1-D geometry. He simulated storms within the HEC-RAS models and adjusted calculated values to calibrate and validate the model.
02/22 – 02/23	L**CG Stormwater Master Plan, Lafayette Parish.** *Lafayette Consolidated Government*- Mr. West analyzed multiple watersheds with 2D hydraulic modeling in HEC-RAS. Mr. West completed the existing conditions model for one of the watersheds in this project. Mr. West assisted with the proposed alternatives to mitigate flooding for the basin that was also developed for the client. Mr. West was responsible for the proposed and existing models. Using the outcome of the proposed projects to establish mitigation alternatives for stormwater management. Mr. West reviewed the results and drafted a report highlighting the conclusions made
02/22 – 02/2023	**LCG Residential Buyout Plan, Lafayette Parish**. *Lafayette Consolidated Government* - Mr. West used GIS programming to create a structure map of Lafayette Parish to locate at-risk structures for a buyout program. Using the outcome of the proposed locations to establish a mitigation plan that distinguishes houses that would be the most at-risk alternatives from stormwater flooding. Mr. West reviewed the results and drafted a report highlighting the conclusions made.
05/22 – 02/23	**RESTORE Parish Matching Grant Program**. *CPRA* The CPRA Parish Matching Program was designed to help coastal parishes that received RESTORE funds prioritize Coastal Master Plan projects while also recognizing and responding to the needs of parishes to implement projects that may not be contained in the Coastal Master Plan. Mr. West is responsible for the Existing and proposed models completed in the USACE HEC-RAS modeling program. Using the projects to establish non-structural mitigation alternatives for stormwater management. Mr. West reviewed the results and drafted a report highlighting the conclusions made.
02/22 – 02/23	**Chennault Stormwater Plan**. *Calcasieu Parish Public Works* Mr. West analyzed the Chennault Airport's existing drainage conditions with 2D hydraulic modeling in HEC-RAS. Proposed alternatives to mitigate flooding for the Airport were also developed for the client. Mr. West was responsible for the proposed models. Using the outcome of the proposed projects to establish mitigation alternatives for stormwater management. Mr. West reviewed the results and drafted a report highlighting the conclusions made
05/22 – 02/23	**Comite River Improvements Feasibility Study.** *East Baton Rouge Parish Department of Transportation and Drainage.* For the Comite River improvements, it was proposed that the removal of debris from the Comite River would improve drainage for the channel. Mr. West was the lead modeler for the project which consisted of a review of all video data received from an aerial drone survey, marking and sizing obstructions made, an existing model consisting of over 200 impacted channel locations, a proposed model, and the associated technical report. Mr. West created presentations and assisted in stake holder meetings.
06/20 – 02/21	**Steady Flow 1D HEC-RAS Model, Beaver Creek, and Long-Slash Branch Watersheds.** Mr. West completed 1D hydraulic and hydrologic models for the Bever Creek and Long-Slash Branch watersheds. These studies involved the hydrologic and hydraulic analysis of drainage structures and drainage areas within the watersheds. Existing conditions and proposed conditions models were created along with a benefit-cost analysis for the improvements proposed in the proposed conditions model.

16. Staff Experience:



Firm employed by	Michael Baker International, Inc.		
Name	**Afaq Ahmad Durrani, EI**	*Years of relevant experience with this employer*	3
Title	Civil Associate	*Years of relevant experience with other employer(s)*	2
Degree(s) / Years / Specialization	B.S., 2019, Civil Engineering, COMSATS, Islamabad, PK M.S.E / 2022 / Civil Engineering / University of Louisiana at Lafayette		
Discipline	Civil	*Certifications*	Engineer Intern 0035541 / Louisiana CFM US-24-13499
Contract role(s) / brief description of responsibilities	**HYDROLOGY AND HYDRAULIC ENGINEER SUPPORT.** Mr. Durrani's experience includes H&H modeling, designing, and completing quality control on multi-million-dollar projects that range from large watershed modeling to individual bridge replacement hydraulic studies. Mr. Durrani is well-versed in a variety of hydrologic and hydraulic software, including the USACE HEC suite (HEC-HMS, HEC-RAS, HEC-DSSVue, HEC-FIA), ArcGIS Pro, ArcMap, Go Consequence, and LADOTD HydrWin suite.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
01/23 - 12/24	**Louisiana Watershed Initiative Modeling Contract – Region 1, Louisiana.** *DOTD. Hydraulics Modeler.* Modeler for Black Lake Bayou (Region 1) HEC-RAS model. Created a coupled 1D/2D hydraulic model, along with developing break lines, refinement regions, culverts, bridge structures, cross sections, and mesh geometry in the hydraulic model. Simulated storms within the HEC-RAS models and adjusted calculated values for calibration and validation of the model. Prepared hydraulics and structure logbook for Black Lake Bayou. Mr. Afaq created 1D models for other HUC 08s in region 1, which include Saline Bayou and Bodcau Bayou. The LWI project was launched in 2018 and introduced a watershed-based approach to reducing flood risk. It is organized by seven modeling regions, each of which encompasses multiple HUC-8 watersheds. These models will be instrumental in providing stormwater management decisions regarding land use, policy, and infrastructure.
01/23 - 12/24	**Louisiana Watershed Initiative Modeling Contract – Region 4, Louisiana.** *DOTD. Hydraulics Modeler.* Served as a Hydraulic modeler for Lower Sabine, located in Region 4 of the Louisiana Watershed Initiative. Responsibilities included calibrating and validating the hydraulic model for Lower Sabine and helping in preparing the modeler's logbook. Similar to the LWI Region 1 project above, these models will be instrumental in providing future stormwater management decisions regarding land use, policy, and infrastructure.
05/22 - 12/22	**St. Tammany Parish Comprehensive Drainage Plan,** *St. Tammany Parish, LA. Hydraulic Modeling/Calculations.* Responsible for helping with community and public outreach presentations. Assisted with data acquisition and processing to determine areas of high flood risk and reports. Michael Baker conducted a comprehensive drainage plan for Saint Tammany Parish, located on the north shore of Lake Pontchartrain. The plan evaluated the existing state of drainage in the parish, including flood risk, water quality, and development guidelines, recommended capital projects, and potential policy changes that would lead to reduced flood damage and increased safety. The Michael Baker team provided data gathering efforts, ranked a list of problem areas, and provided four in-person public and stakeholder outreach throughout Phase I of this project.

05/24 - Ongoing	**Little Bogue Falaya Pond**, *St. Tammany Parish, Louisiana*. *Hydraulics Engineer/Modeler.* Currently performing the Hydrological and Hydraulic analysis for this project. Little Bogue Falaya is located in Covington, St Tammany Parish. Identified and developed project alternatives by running multiple detention pond scenarios with different design details to ensure the most efficient pond characteristics are identified. Conceptual layouts of the different alternatives will be provided, as well as a Preliminary Engineering report that summarizes the hydrologic and hydraulic analysis efforts and their results. The BCA of the recommended pond alternative will be performed for 10%, 4%, 2% and 1% Annual Exceedance Probability events.
08/24 - Ongoing	**Jones Creek Detention,** *East Baton Rouge Parish, Louisiana. Hydraulics Engineer/Modeler.* Currently performing the Hydrological and Hydraulic analysis for this project. The Jones Creek Detention project is a 40-acre stormwater retention area that will help reduce flooding in the Jones Creek Watershed. Contracted by the City of Baton Rouge / Parish of East Baton Rouge, Michael Baker serves as a specialty sub-consultant to the prime consultant, GIS Engineering. Michael Baker will provide all hydraulic engineering and modeling for the project, utilizing HEC-RAS and other hydraulic modeling software.
05/23 - Ongoing	**IIJA Off System Bridge Replacement,** *District 07 DOTD. Hydraulics Engineer/Modeler.* Performed hydrological and hydraulic analysis and modeling in HEC-RAS. Hydraulic calculations were also performed in HYDRWIN. The hydraulic analysis consisted of HEC-RAS 1D and 2D models, where applicable, to identify the existing hydraulic performance of each structure and recommend an equivalent structure that meets or improves the hydraulic capacity of the existing structure. Mr. Durrani also performed scour analysis and no-rise analysis for proposed structures. Prepared the final Hydraulic reports that were submitted to LA DOTD for approval. This project program requires Michael Baker International to deliver 12 bridge replacements within the 30.3 million dollars allocated for District 07.

16. Staff Experience:

Firm employed by	Michael Baker International, Inc.		
Name	**Achutam Baral, PE, CFM**	*Years of relevant experience with this employer*	3
Title	Civil Engineering- Water	*Years of relevant experience with other employer(s)*	4.5
Degree(s) / Years / Specialization	M.Eng.Sc., 2019, Water Resources Engineering, University of Louisiana at Lafayette B.S.E., 2012, Civil Engineering, Tribhuvan University, Nepal		
Discipline	Civil	*Certifications*	Professional Engineer 48564 / Louisiana Certified Floodplain Manager US-24-13247
Contract role(s) / brief description of responsibilities	**HYDROLOGY AND HYDRAULIC ENGINEER.** Mr. Baral is a Water Resources Engineer with a background and a strong passion for hydrologic and hydraulic (H&H) modeling. His proficiency extends to hydrodynamic modeling software, including HEC-RAS, HEC-HMS, and ArcGIS. In addition, he possesses skills in programming languages such as MATLAB and Python, enabling him to conduct thorough data analysis, create complex models, and develop innovative algorithms to address real-world H&H challenges. Mr. Baral's dedication to solving water resources problems using cutting-edge technology and analytical expertise has been a driving force throughout his career.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
05/23 - Ongoing	**Louisiana Watershed Initiative Modeling Contract** - *Region 6, Louisiana. LADOTD. Modeler.* Michael Baker is providing engineering and modeling services to the LADOTD for Region 6 for the LWI. The LWI project was launched in 2018 and introduced a watershed-based approach to reducing flood risk. It is organized by seven modeling regions, each encompassing multiple HUC-8 watersheds. For the contract, Michael Baker is providing hydrologic and hydraulic modeling, data collection and analysis, stakeholder engagement, and surveying
05/23 / 12/24	**Louisiana Watershed Initiative (LWI) Region 1 IDIQ,** *Louisiana. LADOTD. Civil Associate.* Addressed issues related to hydrological and hydraulic analysis of the watershed, including 1D/2D H&H modeling, and provided technical guidance to the team. Performed statistical analysis of the model results to identify parameter sensitivity to improve overall model results. Performed validation of the model utilizing multiple historical events.
05/23 - Ongoing	**IIJA Off System Bridge Replacement**, *District 07 DOTD. Hydraulic Engineer.* Performed hydraulic analysis of existing bridges and compared results to multiple bridge replacement alternative structures. Hydraulic analysis has been performed under LaDOTD hydraulic guidelines utilizing HEC-RAS as well as LADOTD Hydrwin software. This project program requires Michael Baker to deliver 12 bridge replacements within the 30.3 million dollars allocated for District 07. LADOTD issued NTP for additional services in May 2023.
01/22- 05/23	**Comprehensive H&H RAS 2D Modeling Project**, *Calcasieu Parish, Louisiana. Engineer In Training (EIT).* The project's objective is to enhance and safeguard the drainage infrastructure within the Parish and ultimately ensure the protection of human life and private property. Part of the water resources team that developed an H&H model and provided drainage solutions to the Calcasieu Parish government. Analyzed the field survey data and created the cross-sections for the major channel within the Parish. Additionally, generated spatial value of the SCS curve number based on the land-use and soil type dataset. Also modified the natural channel to capture bathymetry using field survey data of the Vinton Region within a Parish. Lastly, performed H&H modeling and floodplain analysis of the Vinton Region and presented the Stormwater Master Plan to the Parish government.

16. Staff Experience:

Firm employed by	Michael Baker International, Inc.		
Name	**Tanveer Ahmed, EI**	*Years of relevant experience with this employer*	1.5
Title	Civil Associate	*Years of relevant experience with other employer(s)*	3
Degree(s) / Years / Specialization	B.S.E., 2015, Water Resource Engineering, Bangladesh University of Engineering and Technology (BUET) M.S., 2022, Civil Engineering, University of Louisiana at Lafayette		
Discipline	Civil	*Certifications*	Engineer Intern Louisiana
Contract role(s) / brief description of responsibilities	**DATA ANALYST.** Mr. Ahmed is a Water Resources Engineer with an extensive background in hydrologic and hydraulic (H&H) modeling and a strong passion for data analytics. He is proficient in hydrodynamic modeling software, including HEC-RAS, HEC-HMS, and ArcGIS. In addition, he possesses skills in programming languages such as MATLAB and Python, enabling him to conduct thorough data analysis to assist in large watershed-level modeling challenges.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
05/23- Ongoing	**Louisiana Watershed Initiative Modeling Contract - Region 6, Louisiana.** *LADOTD. Modeler.* Michael Baker is providing engineering and modeling services to the LADOTD for Region 6 for the LWI. The LWI project was launched in 2018 and introduced a watershed-based approach to reducing flood risk. It is organized by seven modeling regions, each encompassing multiple HUC-8 watersheds. For the contract, Michael Baker is providing hydrologic and hydraulic modeling, data collection and analysis, stakeholder engagement, and surveying.
11/21 - Ongoing	**Parish Comprehensive Drainage Plan, St. Tammany Parish, Louisiana.** *Hydraulic Modeling/Calculations.* Responsible for helping with community and public outreach presentations. Assisted with data acquisition and processing to determine areas of high flood risk and reports. Michael Baker conducted a comprehensive drainage plan for the Saint Tammany Parish located on the north shore of Lake Pontchartrain. The plan evaluated the existing state of drainage in the parish, including flood risk, water quality, and development guidelines, recommended capital projects, and potential policy changes that would lead to reduced flood damage and increased safety. The Michael Baker team provided data gathering efforts, ranked a list of problem areas, and provided four in-person public and stakeholder outreach throughout Phase I of this project. Mr. Ahmed prepared breakout H&H models for several watersheds in the parish.
11/22 – Ongoing	**Little Bogue Falaya Detention Project.** *St. Tammany Parish Dept. of Engineering. St. Tammany Parish.* Michael Baker is providing hydraulic and hydrologic modeling for the proposed 70-acre regional detention pond located near Covington, Louisiana, in St. Tammany Parish. The project consisted of evaluating several pond locations, sizes, and outfall configurations to ensure the most benefit in reducing water surface elevations in the Little Bogue Falaya Watershed. Mr. Ahmed assisted in troubleshooting H&H modeling issues.

16. Staff Experience:

Firm employed by	Michael Baker International, Inc.		
Name	**Megan C. Meeks, CFM**	*Years of relevant experience with this employer*	3
Title	Department Manager – Water Resources	*Years of relevant experience with other employer(s)*	5
Degree(s) / Years / Specialization	B.A., 2019, Government, George Mason University Minor, Geography/Geographic Information Systems, George Mason University		
Discipline	N/A	*Certifications*	Certified Floodplain Manager
Contract role(s) / brief description of responsibilities	**GIS ANALYST.** Ms. Meeks is a geographic information systems (GIS) associate with work experience in a variety of GIS disciplines, including data analytics, configuring web-based GIS products, LiDAR-derived DEM production, large-scale database management, and serving as a data compliance lead within the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program. She has worked with Michael Baker for a year, supporting the Production and Technical Services (PTS) Zone 1 contract Risk MAP GIS-related requests, and map production work. In addition to addressing client GIS requests, she has participated in business development initiatives by developing GIS automation tools and engaging in strategic planning efforts that supported proposal development and project growth.		

Experience dates (mm/yy–mm/yy)	*Experience and qualifications relevant to the proposed contract; i.e., "designed drainage", "designed girders", "designed intersection", etc. Experience dates should cover the years of experience specified in the applicable MPR(s).*
11/23 – 9/24; 11/24 – 01/25	**ARM JV/603-R6 SD Comm Profiles.** *FEMA. GIT Associate.* Developed a GIS process to manage data in FEMA's community profiles that identify block-level hotspots in communities with flood risk and social vulnerability data. Responsible for automating the processes developed in the pilot project.
11/24 – 01/25	**FEMA PTS BKR R2 FY23.** *FEMA. GIT Associate.* Developed a terrain DEM model of Rensselaer County, NY used for hydrology and hydraulic modeling tasks. Developed a terrain DEM model of Schuyler County, NY used for 2D BLE hydrology and hydraulic modeling tasks.
11/24 – 12/24	**WO-MBI-248.** *Montana Department of Natural Resources and Conservation.* GIT Associate. Performed a topographic data review on raw terrain tile files for the Montana Department of Natural Resources in 3 counties of the Upper Yellowstone watershed.
11/24 – present	**Mississippi Coastal Flood Study, Gulfport, Mississippi.** *Southern Mississippi Planning and Development District. GIT Associate.* Responsible for organizing and cleaning coastal floodplain mapping data in Hancock County, MS in a GIS database. Michael Baker is performing a coastal flood risk study for the entire Mississippi coastline, including coastal analysis, mapping, DFIRM production, preliminary and post-preliminary process support, and community engagement and public outreach. The Mississippi Coastal Map Revision Project is a grassroots movement, where the state is bearing the responsibility for the preparation of the Physical Map Revision, in accordance with guidelines established by FEMA. Michael Baker is leading the team of coastal engineering experts and community engagement specialists to produce updated coastal flood hazard analyses and mapping and help the communities become more resilient.
07/23 – 02/24	**ARM JV/511-NFIP Violation Mgt OP.** *FEMA. GIT Associate.* Led an urgent, large-scale database management of FEMA's National Violation Tracker that serves as a repository for all properties across the U.S. with floodplain management violations. Diagnosed issues and prescribed ways to triage and correct errors in the database. Developed a batch geocoder that can geocode 50,000 addresses in a matter of hours. Michael Baker provided technical assistance to incorporate NFIP floodplain management compliance violations into FEMA's systems and addressed any discrepancies, maintained and updated standard operating procedures, provided subject matter expert support, and led information exchanges on the use of FEMA systems.
07/23 – present	**FEMA Region 3 Regional Production Task Order, FEMA Region 3.** *FEMA. GIT Associate.* Serve in a client-facing role supporting FEMA Region 3 as the post-preliminary processing lead for flood risk projects in the Region. This includes providing subject matter expertise to flood risk project teams on FEMA project standards and the legal parameters governing flood risk projects released by FEMA. Guide teams through compliance and technical requirements, ensuring accuracy, consistency, and adherence to federal regulations across multiple flood risk projects.
08/22 – present	**PTS, Zone 1 Standard Operations Task Order Base Year, FEMA, Zone 1 (Regions 1, 2, 3, 5 and HQ), Washington, D.C.** *FEMA. GIT Associate.* Designed and implemented GIS automation tools using Python, R, and JavaScript to optimize workflows and enhance efficiency across multiple flood risk assessment projects under the PTS Zone 1 contract. Contributed to business development initiatives by actively participating in strategic working sessions, supporting proposal development, and identifying opportunities for process improvement.

SECTION 17
FIRM EXPERIENCE

17. Firm Experience:

Firm name	Michael Baker International, Inc.	*Discipline(s)**	Other – Water Resources
Project name	**Louisiana Watershed Initiative H&H Modeling Contract - Region 6**	*Firm responsibility (prime or sub?)*	Prime
Project number	4400017092	*Owner's Name*	Louisiana Department of Transportation and Development
Project location	Statewide, Louisiana	*Owner's Project Manager*	Jie Gu, PE
Owner's address, phone, email	1201 Capitol Access Road Baton Rouge, Louisiana 70802 | 225-379-1338 | kurt.brauner@LA.GOV		
Services commenced by this firm (mm/yy)	11/20	*Total consultant contract cost ($1,000's)*	$9,000 (Est.)
Services completed by this firm (mm/yy)	Ongoing	*Cost of consultant services provided by this firm ($1,000's)*	$7,000 (Est.)

Michael Baker is providing engineering and modeling services for the Louisiana Watershed Initiative. The project was launched in 2018 and introduced a watershed-based approach to reducing flood risk in Louisiana. It is organized by seven modeling regions, each of which encompasses multiple HUC-8 watersheds.

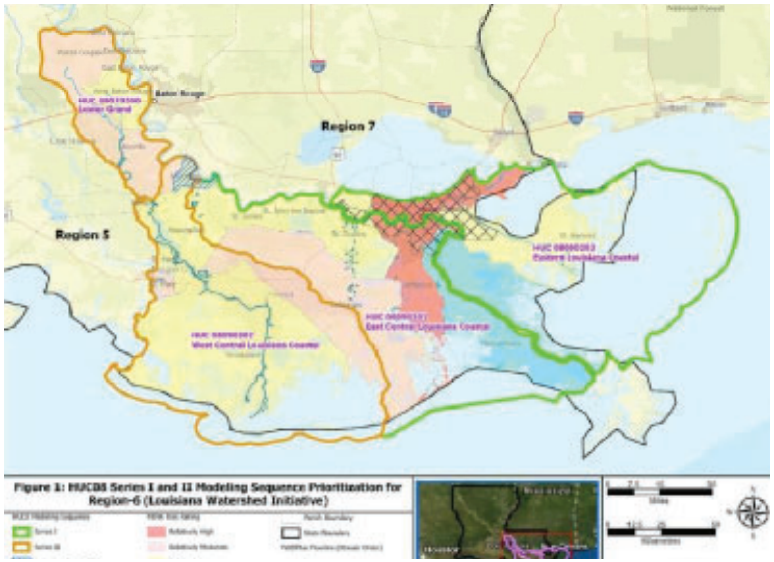


Figure 1: MACBS Series I and II Modeling Sequence Prioritization for Region-6 (Louisiana Watershed Initiative)

Task Order 1: For the first task-order of the contract, Michael Baker collected existing watershed datasets, models, and studies for 4 HUC-8 watersheds in southeast Louisiana, developed and proposed a detailed modeling design approach with schedules and cost estimates, and prepared a data gap analysis and collection report. Michael Baker developed the methodology for modeling flood risks in the transition zone (where both coastal and riverine flood risk exist.) Michael Baker also developed a HUC-8 modeling design approach for H&H studies in the 4 HUC-8 watersheds based on historical information and prepared a data management plan for organizing and reporting the data it collected.

Task Order 2&3: Michael Baker performed HUC-8 hydrologic and hydraulic modeling for the Eastern Louisiana Coastal (ELC), East Central Louisiana Coastal (ECLC), Western Central Louisiana Coastal (WCLC), and Lower Grand (LG) watersheds. For these tasks, Michael Baker supplemented the data collection and data gap analysis completed in Task Order 1, provided quality control and assurance, continued stakeholder engagement efforts including holding any necessary public meetings, continue reviewing historic storm events to adjust data collection and analysis, and perform topographic, bathymetric, and channel surveys. The Western Central Louisiana Coastal, Eastern Louisiana Coastal and East-Central Louisiana Coastal watersheds include transition and coastal zones. Michael Baker developed a tiered modeling design plan for H&H studies for these zones and developed internal and external boundary conditions. The tiered modeling structure recommended detailed studies in areas of higher need (greater losses, unconfined flooding and areas prone to development.) Michael Baker developed rain-on-grid analyses using HEC-RAS 6.0 and calibrated the models using large and recent storm events. Deliverables included a technical report, a quick-training guide to support future modeling, and an update to the data management plan.

Task Order 4: Michael Baker was contracted to determine AEP design storms for all 4 HUC 08's in Region 6 using two separate Methodologies, applying Atlas 14 precipitation data across the watershed, and a Bivariate-Stochastic Storm Transposition, (BV-SST) approached where storm surge is accounted for during tropical events. Consequence Analysis, Proof of Concept project evaluations, and stakeholder engagement and training were also performed under this task.

Firm members involved include:

Eric Erikson, PE, CFM | Daniel Thornhill, PE | Manoj KC, PhD, PE, CFM | Justin West, PE, CFM | Afaq Durrani, EI, CFM | Achutam Baral, PE, CFM | Tanveer Ahmed, EI

17. Firm Experience:

Firm name	Michael Baker International, Inc.	*Discipline(s)**	Other- Water Resources
Project name	**St. Tammany Comprehensive Drainage Project**	*Firm responsibility (prime or sub?)*	Prime
Project number	N/A	*Owner's Name*	St. Tammany Parish Government
Project location	St. Tammany Parish, LA	*Owner's Project Manager*	Daniel Hill, PE
Owner's address, phone, email	21415 Koop Drive, Mandeville, Louisiana 70471; (225)-379-1483, dphill@stpgov.org		
Services commenced by this firm (mm/yy)	01/22	*Total consultant contract cost ($1,000's)*	$900
Services completed by this firm (mm/yy)	12/23	*Cost of consultant services provided by this firm ($1,000's)*	$500

Michael Baker was contracted by St. Tammany Parish (the Parish) to develop a comprehensive drainage plan that will evaluate the existing state of drainage in the Parish, including flood risk, water quality, and development guidelines, and recommend capital projects and potential policy changes leading to reduced flood damage and increased safety. The plan is intended to be a living document, consistent with the Louisiana Watershed Initiative, and subject to continuous revisions and updates. It will identify strategies to mitigate existing flooding problems and identify improvements in drainage infrastructure required to address future development.

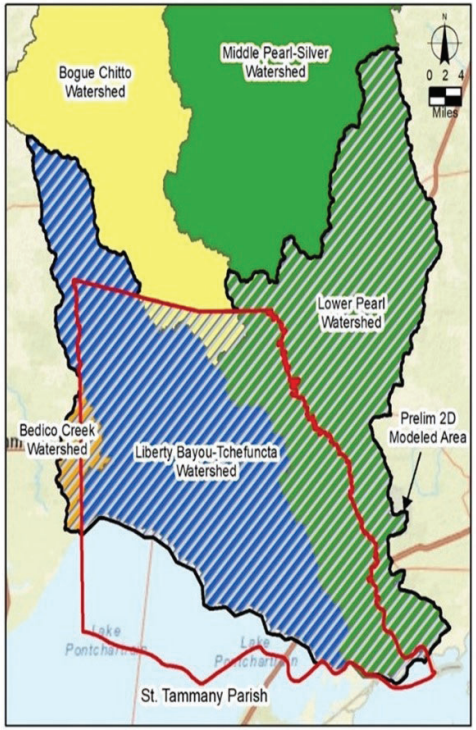
Michael Baker analyzed existing and future flood conditions in the Parish, categorized the flooding problems by severity, and evaluate potential solutions using pre-defined criteria developed in consultation with the Parish. The plan identifies opportunities and constraints for the proposed solutions and develop a strategy for their implementation through coordination with the Parish and public outreach activities.

Phase 1 A: For the first task order of the contract, Michael Baker collected existing watershed datasets, models, studies and identified high-level clusters of drainage issues. A GIS portal was created so that residents may provide input on historical problem areas within the parish. Compiling this information in GIS and preparing a cluster map will identify the specific areas within the parish in which improvements are most warranted. Public outreach in the form of public meetings with representatives from the team in attendance was conducted in different areas of the parish.

Phase 1B: Building on the data acquired in Phase 1 A, Phase 1 B identifies opportunities and constraints for the proposed drainage improvements and develop a strategy for their implementation through coordinating with the Parish and public outreach activities. In order to achieve these objectives, Michael Baker will vet the proposed project through hydrological and hydraulic modeling to determine the best projects that will result in tangible improvements to the Parish's flooding issues. Then MBI will develop a Capital Improvement Plan that identifies the critical improvement projects, prioritizes them through a matrix of multiple variables, and establishes an implementation schedule considering available funding streams and grants. This task will also provide project cost estimates and benefit/cost analyses, often required for project grant applications. Funding sources that will be vetted for each project include LWI, HMGP, CDBG/HUD, BRIC, and others.

Project Cost: $890,550 (Fee)

Team Members: L.R. "Eric" Erikson, PE | Mujahid Chandoo, PE | Justin West, PE | Achutam Baral, PE | Afaq Durrani, EI



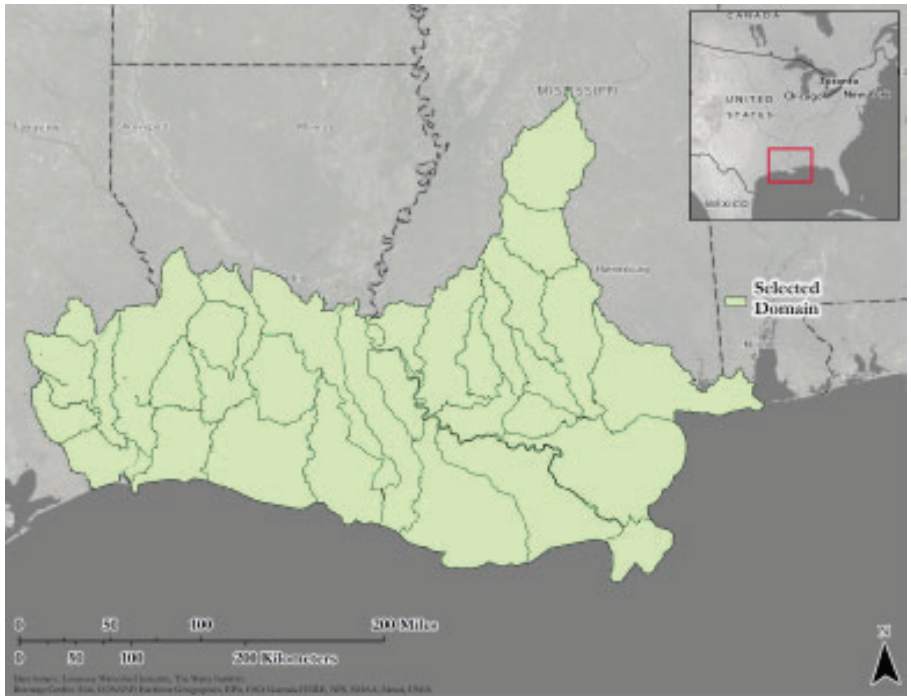
17. Firm Experience:

Firm name	Michael Baker International, Inc.	*Discipline(s)**	Techincal Review
Project name	**Coastwide Transition Zone Model Technical Review**	*Firm responsibility (prime or sub?)*	Prime
Project number	N/A	*Owner's Name*	The Water Institute
Project location	Texas, Louisiana, & Mississippi	*Owner's Project Manager*	Brett McMann, PE
Owner's address, phone, email	1110 River Road S., Suite 200 Baton Rouge, LA 70802, (504) 810 – 6271, bmcmann@thewaterinstitute.org		
Services commenced by this firm (mm/yy)	12/24	*Total consultant contract cost ($1,000's)*	$50
Services completed by this firm (mm/yy)	N/A	*Cost of consultant services provided by this firm ($1,000's)*	$50

Michael Baker is providing an independent quality assurance/quality control involving detailed reviews of the HEC-RAS 2D computer model developed by The Water Institute (TWI), working closely with Muthukumar Narayanaswamy, PhD, PE, Brett Mcmann, PE, and Mark Bartlett for the Louisiana coastwide transition zone. For this project, Michael Baker, as a subject matter expert, is providing quality control of the 50,000-square-mile model that covers the entire coastline of Louisiana. Michael Baker is providing expert guidance on the development of the HEC-RAS 2D model, including seamless digital elevation models, model extents, mesh and breaklines, model antecedent conditions, validation and calibration, incorporation of structures, and placement of the downstream boundary. Michael Baker is also providing QAQC of the probabilistic framework to quantify compounding flood risk due to tropical and non-tropical events, including reviews of the extended joint probability method, optimal sampling approach, probabilistic rainfall fields, hydrology, antecedent conditions, bias and uncertainty quantification, and development of joint exceedance curves of flood elevations.

Firm members involved include:

Manoj KC, PhD, PE, CFM



17. Firm Experience:

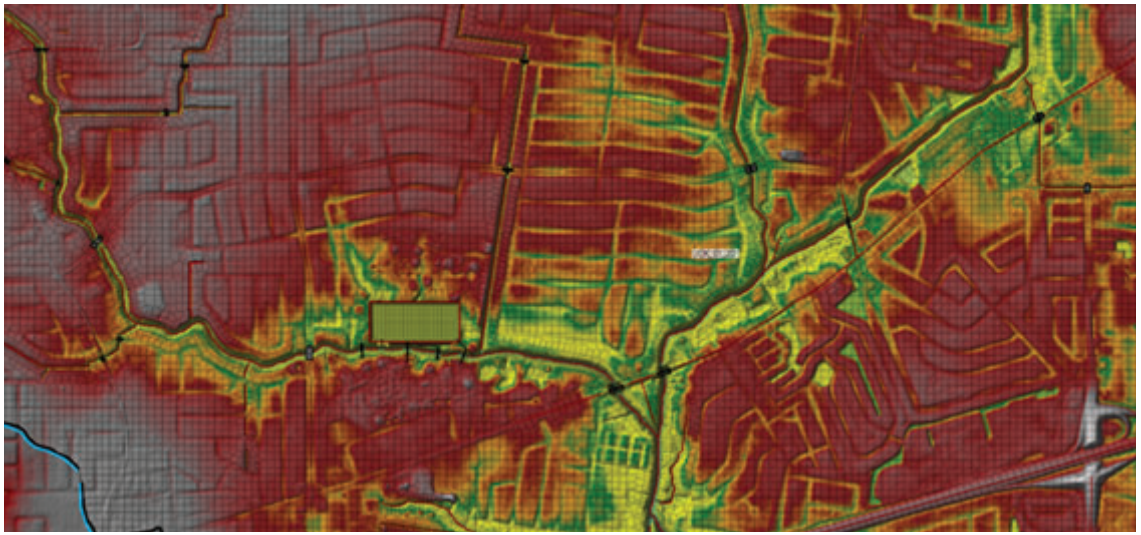
Firm name	Michael Baker International, Inc.	*Discipline(s)**	Hydrology, Hydraulics, Concept Design
Project name	**Jones Creek Regional Detention Project**	*Firm responsibility (prime or sub?)*	Prime
Project number	N/A	*Owner's Name*	Baton Rouge DPW
Project location	Baton Rouge, LA	*Owner's Project Manager*	Tom Stevens, PE
Owner's address, phone, email	3055 Valley Street , Baton Rouge, LA 70808, 225-389-3090		
Services commenced by this firm (mm/yy)	2024	*Total consultant contract cost ($1,000's)*	$198
Services completed by this firm (mm/yy)	Ongoing	*Cost of consultant services provided by this firm ($1,000's)*	

Workingwiththeirprimeconsultant,MichaelBakerisprovidingpreliminaryengineeringservicesforthedevelopmentofaregionaldetentionbasinforJonesCreekinBatonRouge.Theseservices include hydrologic and hydraulic modeling of the Jones Creek Watershed.

Utilizingthemodeltoanalyzebenefitsofmultipledetentionbasindesignsandprovidingrastermapsthatidentifyareductioninfloodlevelsforthewatershed.Theconceptualstudywillconsist ofpreparingahydrologicandhydraulicmodeloftheJonesCreekWatershed.UtilizingtherecentlycompletedDHEC-RASmodelusedfortheBatonRougeMasterDrainagePlanasthebase model.TheRASmodelwillthenberefinedwithgroundtopographyfieldsurveyoftheprojectsiteandCreekcross-sections.Severalproposedpondconfigurationswereanalyzedthroughtheuse ofmultiplemodelsrunsandchangesinmodelgeometry.Throughthisiterativeprocess,thedetentionpondlocation,dimensions,andoutfalldesignhavebeenoptimizedtoprovidethemostflood reduction benefit to the watershed.

DeliverableswillincludeallmodelfilesaConceptualDesignReport,andwatersurfaceelevationcomparisonrastermapsandshapefiles.Thesemapswilllaterbeusedtoconducta FEMA Benefit Cost Analysis to be used in final grant funding of the project.

Project Cost: $198,885 (fee)



17. Firm Experience:

Firm name	Michael Baker International, Inc.	*Discipline(s)**	Flood Frequency Analysis, Independaent QC, FIRM
Project name	**Upper San Antonio River Watershed Sara CTP - MAS19**	*Firm responsibility (prime or sub?)*	Prime
Project number	N/A	*Owner's Name*	San Antonio RIver Authority (SARA)
Project location	San Antonio, TX	*Owner's Project Manager*	Erin Cavazos, PE
Owner's address, phone, email	100 E. Guenther, San Antonio, TX 78204, 866-345-7272		
Services commenced by this firm (mm/yy)	2022	*Total consultant contract cost ($1,000's)*	$181,996
Services completed by this firm (mm/yy)	2024	*Cost of consultant services provided by this firm ($1,000's)*	

Under a Cooperating Technical Partner Professional Services contract with the San Antonio River authority, Michael Baker developed updated hydraulic modeling for 171 miles of streams in a heavily urbanized watershed. The updated modeling and mapping is driven by the availability of new LiDAR from TNRIS. The San Antonio River Basin Regional Modeling Standards were used to develop the modeling and reflects changes in landuse, terrain and NOAA Atlas 14 rainfall depths and intensities. The hydraulic models incorporated updated discharges generated using updated HEC-HMS modeling developed by SARA based on Atlas 14 rainfall and Green & Ampt loss methodology resulting in revised discharges.

For the Terrain Task, we obtained the Texas Natural Resource Information Service (TNRIS) aerial LiDAR data flown in 2017. The tiled data was processed into a watershed-wide dataset, summarized, projected, and stored as a DEM in the format detailed in the FEMA Data Capture Technical Reference (Feb. 2019) with associated metadata. This dataset was used as the basis for the creation of a hydro-corrected digital elevation model (HDEM). Both datasets created were used in subsequent flood data update tasks.

The new LiDAR data was used to redelineate stream centerlines for the hydraulic models, and to update cross-section alignments, bank station locations, and geometry when compared to the effective model geometry. For XP-SWMM reaches, the LiDAR data was used to identify updated inlet elevations where applicable. Recent aerial imagery was used to reevaluate Manning's 'n' values for the channels and overbanks. The Team incorporated survey data for multiple structures (bridges and culvert crossings) into the hydraulic models. Other crossings for which survey was not collected was obtained from as-built plans.

Hydraulics analysis activities include updating the models with updated flows, and revising the geometry to reflect new channel and overbank terrain, updated manning's 'n' values and 272 stream crossing structures (culvert and bridge crossings), and establishing and reviewing water surface elevations for the 10%, 4%, 2%, 1%, "1% plus", and 0.2% annual chance events. Models were developed for 171 miles of stream, broken down as shown below.

- **18 miles of streams modeled with XP-SWMM 1D-2D models**
- **11 miles of streams modeled with HEC-RAS 1D unsteady and 1D- 2D coupled models.**
- **141 miles of streams modeled with 1D steady HEC-RAS models**

Upon completion of the hydraulic modeling, Michael Baker developed floodplain mapping for the 10 percent, 1 percent, and 0.2 percent annual chance floodplain boundaries and other applicable elements using the new LiDAR. We also developed non-regulatory Flood Risk Products, including:

- **Flood Risk Report**
- **Flood Risk Database containing Flood Depth and water surface elevation grids**
- **Composite HAZUS output under the Risk MAP program**

To support outreach and stakeholder engagement, Michael Baker prepared a complete set of digital work maps for use at the Flood Engineering Review meetings. The work maps depicted effective and revised flooding, cross sections, streams, and roads on an aerial base map.

Team Members: Manoj Kc, Mohamed Bagha, Kushal

17. Firm Experience:

Firm name	Michael Baker International, Inc.	*Discipline(s)**	Hydrology and Hydraulics Modeling, Conceptual Design, BCA
Project name	**Vince Bayou Watershed Plan**	*Firm responsibility (prime or sub?)*	Prime
Project number	N/A	*Owner's Name*	Harris County Flood Control District
Project location	Houston, TX	*Owner's Project Manager*	Gary Bezemek, PE
Owner's address, phone, email	9900 Northwest Fwy, Houston, TX 77092, 346-286-3758, gary.bezemek@hcfcd.hctx.net		
Services commenced by this firm (mm/yy)	2020	*Total consultant contract cost ($1,000's)*	$430,343
Services completed by this firm (mm/yy)	N/A	*Cost of consultant services provided by this firm ($1,000's)*	

Michael Baker provided engineering and design services for the development of a high-level watershed master plan for the Vince Bayou. The master plan identified mitigation alternatives to alleviate flooding and improve drainage infrastructure for future redevelopment in the area. To identify problems in the watershed, Michael Baker studied nine streams and seven tributaries, totaling approximately 21.3 miles. Based on its analysis, our team developed and prioritized potential projects for addressing flooding issues, preparing conceptual-level design details and corresponding cost estimates.

As part of the 2017 Hurricane Harvey Texas CDBG-DR initiative, the HCFCD sought to identify projects that would reduce riverine flooding within the Vince Bayou watershed. To attain this goal, Michael Baker studied the baseline conditions of the primary drainage infrastructure owned by HCFCD and conducted H&H modeling using current data and applying innovative techniques involving 2D analysis with rain-on-grid simulations to assess overland sheet flow patterns. The storm sewer capacity (data received from the City of Pasadena) was burned in LiDAR using width/height dimension & invert elevation available in the dataset. This approach was simple, approximated storage & directed (routed) flows in the direction of storm sewers, and also captured the flood losses well in the watershed. Using the observed data and baseline modeling results, Michael Baker delineated problem areas and ranked them by severity to develop a three-tier prioritized list of flooding problem areas that the project will aim to mitigate.

Leveraging the analysis and prioritization of problem areas, Michael Baker developed five potential near-term solutions. It reviewed and evaluated previous engineering reports on recommended projects to determine if they were still viable and then considered various combinations of alternatives, prioritizing projects according to HCFCD's methodology. Using the agreed modeling methodology, Michael Baker computed the flood profile reductions for the NOAA Atlas 14 100-year storm event and the resulting reduction in flood damages for each problem area. For each proposed solution, Michael Baker developed conceptual-level design details and prepared a written summary of environmental constraints and plans for mitigating environmental impacts, and preliminary engineering cost estimates. To enhance cost estimates, Michael Baker performed field reconnaissance and refined the desktop geomorphological assessments.

Michael Baker developed a level of service (LoS) analysis to determine infrastructure enhancement costs required to eliminate 1% AEP flood risk to all structures in the entire Vince Bayou watershed.

Additionally, Michael Baker assisted HCFCD in public and stakeholder engagement. We assisted in four stakeholder meetings to review the watershed plan strategy and recommended projects. All suitable data and material from the watershed plan was prepared for posting on the HCFCD public website. This included interactive maps showing project locations and PowerPoint presentations from stakeholder meetings.

Project Costs: $430,343 (Fee)
Firm members involved include: Mohamed Bagha, Manoj KC

SECTION 18
WORKLOAD

18. WORKLOAD

Firm name	*Project Name*	*Client / Contracting Entity*	*Remaining Unpaid Balance*	*Estimated Time to Completion*
Michael Baker International, Inc.	LWI Modeling Region 6 Task Order 5	Louisiana Department of Transportation (LADOTD)	$25,000	4 months
	FY24 Puerto Rico 2D BLE Support	Federal Emergency Management Agency (FEMA)	$350,000	12 months
	Multiple Bridge Hydraulics for SC DOT	SC DOT	$50,000	2 months
	Bundick Lake Dam	Louisiana Department of Transportation (LADOTD)	$40,000	10 months
	Anacoco Vernon Dam	Louisiana Department of Transportation (LADOTD)	$30,000	10 months
	Three Mile Lake Dam	Louisiana Department of Transportation (LADOTD)	$45,000	9 months

SECTION 19
STAFFING CAPACITY

19. STAFFING CAPACITY

Production team members, such as Engineers, Modelers, and GIS Analysts, are assigned up to 50% utilization on other projects. Those projects involve long model run times (up to several days), which leave the team members open to perform other tasks while the model is processing. During these times, team members will be assigned this project as their priority.

Our team's Project Manager is also assigned multiple projects, as this project is estimated to comprise approximately 30%-time utilization. This is often the case, and our assigned Project Manager is very experienced in executing multiple projects concurrently.

2025 ENR RANKINGS

THE TOP 500 DESIGN FIRMS

27	Top 500 Design Firms
18	Top 100 Pure Designers
7	Bridges
7	Dams & Reservoirs
9	Construction Management
13	Transportation
15	Water Supply
17	Airports
17	Highways
22	Mass Transit & Rail

SECTION 20
SUB CONSULTANT INFORMATION

20. SUBCONSULTANT INFORMATION

Firm name	*Address*	*Point of Contact and Email Address*	*Phone Number*
The Water Institute 	1110 River Road S., Suite 200 Baton Rouge, LA 70802	Muthu Narayanaswamy, PhD, PE mnarayanaswamy@thewaterinstitute.org	225-251-4703

SECTION 21
ADDITIONAL INFORMATION

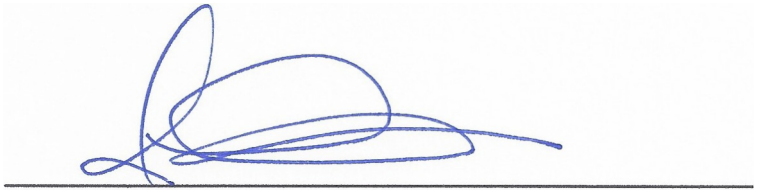
Michael Baker
INTERNATIONAL

We Make a Difference

CERTIFICATE OF SECRETARY
OF
MICHAEL BAKER INTERNATIONAL, **INC.**

The undersigned, John M. Tedder, Secretary of Michael Baker International, Inc., a Pennsylvania corporation (the "Company"), DOES HEREBY CERTIFY that Daniel Thornhill is an Associate Vice President & Office Executive of the Company, and that he is individually authorized and empowered to sign proposals, forms and other documents and to otherwise bind the Company contractually.

I have hereunto subscribed my name this 14th day of October 2021.



John M. Tedder
Executive Vice President & Chief Legal Officer & Secretary
Michael Baker International, Inc.

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Office of Management & Finance
Audit & Quality Control
PO Box 94245 | Baton Rouge, LA 70804-9245
ph: 225-379-1434 | fx: 225-379-1731

Jeff Landry, Governor
Glenn Ledet, Jr., Secretary

October 6, 2025

Audit Advisory Memorandum No. 26-9014

Michael Baker International, LLC.
500 Grant St., Suite 5400
Pittsburgh, PA. 15219

Attn: Michelle Cruz Thompson
Project Accountant Manager

Re: Audited Overhead Rate for Year Ended December 31, 2024
Prepared By: Yount, Hyde & Barfour, and P.C.

We have reviewed the above referenced audit of overhead and the Pennsylvania Department of Transportation's cognizant letter of acceptance. Based on their acceptance, we find the following audited rates acceptable for use by the Louisiana Department of Transportation and Development:

	RATE
Home Office	148.79%
Field Office	115.45%

In accordance with the Government Auditing Standards, Yount, Hyde, & Barfour P.C., issued a report dated May 13, 2025, on their consideration of the Company's internal controls and compliance certain provisions of laws, regulations, contracts, and grant agreements. No material weaknesses or instances of noncompliance are reported.

Mark W. St. Cyr
Audit Director

MWS/AM/ch

c: Paulette Territo

SECTION 22
SUBCONSULTANT FORMS

The Water Institute

1. Contract title as shown in the advertisement	Flood Risk Assessment: Geospatial Dataset Development
2. Contract number(s) as shown in the advertisement	RPC Task: LWICB
3. Prime consultant name (as registered with the Louisiana Secretary of State where such registration is required by law)	The Water Institute of the Gulf
4. Prime consultant? (Y/N)	N
5. Consultant mailing address	1110 River Road S., Suite 200 Baton Rouge, LA 70802-8047
6. Consultant physical address (existing or to be established, if location is used as an evaluation criteria)	1110 River Road S., Suite 200 Baton Rouge, LA 70802-8047
7. Name, title, phone number, and email address of consultant's contract point of contact	Danielle Johnson, Director of Grants & Contracts Phone: 225-300-6715 Email: djohnson@thewaterinstitute.org
8. Name, title, phone number, and email address of the official with signing authority for this proposal	Danielle Johnson, Director of Grants & Contracts Phone: 225-300-6715 Email: djohnson@thewaterinstitute.org
9. This is to certify that all information contained herein is accurate and true, and that the team presently has sufficient staff to perform these services within the designated time frame. By submitting this proposal, proposer certifies that it is not engaged in a boycott of Israel and it will, for the duration of its contract obligations, refrain from a boycott of Israel. Proposer also certifies and agrees that the following information is correct: In	

preparing its response, the proposer has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not, in the solicitation, selection, or commercial treatment of any subcontractor or supplier, refused to transact or terminated business activities, or taken other actions intended to limit commercial relations, with a person or entity that is engaging in commercial transactions in Israel or Israeli-controlled territories, with the specific intent to accomplish a boycott or divestment of Israel. The proposer also has not retaliated against any person or other entity for reporting such refusal, termination, or commercially limiting actions. RPC reserves the right to reject the response of the bidder or proposer if this certification is subsequently determined to be false, and to terminate any contract awarded based on such a false response.	Signature (shall be the same person as #9): Danielle Johnson Date: 12/9/2025

16. Staff Experience:

Firm employed by The Water Institute				
Name	Muthu Narayanaswamy		Years of relevant experience with this employer	2
Title	Director of Coastal and Compound Flood Risk		Years of relevant experience with other employer(s)	14
Degree(s) / Years / Specialization			Ph.D., PE / 17 / Civil (Coastal) Engineering	
Discipline	Computational Modeling	Certifications	Professional Engineering: LA, TX, FL	
Contract role(s) / brief description of responsibilities			Co-Principal Investigator. Scientific and technical lead, project management, and execution.	
07/23–Present	Director of Coastal and Compound Flood Risk, The Water Institute • Texas Combined River Basin Flood Studies, Texas GLO: Principal Investigator leading the development of baseline flood models that incorporate impacts of compound flooding in watersheds in the Central and East Regions. • NYC Future Flood Risk Maps, NYC Mayor's Office of Climate and Environmental Justice: Project Manager for the first initiative across the nation to develop future flood risk maps for New York City through dynamic coupled ADCIRC-SWAN modeling followed by overland wave modeling. • Citywide Probabilistic Compound Flood Model and Real Time Forecasting System, City of Jacksonville: Principal Investigator leading the development of a probabilistic compound flood modeling framework using HEC-RAS 2D driven by an optimized set of synthetic storms.			
07/16–05/23	Senior Coastal Engineer, Associate Vice President Michael Baker International • Flood Resilience Study, Jekyll Island, Carolina Holdings Group: Project Manager. Led a team to evaluate the impacts of storm surge coupled with sea level rise on the proposed developments on site specific current and future flood risk for nuisance and extreme flood events. The quantified flood risk was then used to evaluate risk to assets in the proposed development and provide recommendation on mitigation actions.			

	• Cambridge Flood Mitigation Project, City of Cambridge, MD: Project manager and technical lead quantifying current and future flood risk. Led a team responsible for developing a risk-based strategy to mitigate the impacts of sea level rise and high frequency storms on the city along the Choptank River, the city's highest flood risk area.
10/12–03/16	Senior Consultant, ABS Consulting
04/10–10/12	Senior Coastal Engineer, Atkins Global
01/09-1/10	Coastal Engineer, Halcrow, Inc.

16. Staff Experience:

<table>
<tr><td colspan="5">Firm employed by The Water Institute</td></tr>
<tr><td>Name</td><td colspan="2">Mark Bartlett</td><td colspan="2">Years of relevant experience with this employer</td><td>3</td></tr>
<tr><td>Title</td><td colspan="2">Data Science and ML Practice Lead</td><td colspan="2">Years of relevant experience with other employer(s)</td><td>17</td></tr>
<tr><td colspan="3">Degree(s) / Years / Specialization</td><td colspan="3">Ph.D. / 20 / Civil and Environmental Engineering</td></tr>
<tr><td>Discipline</td><td>Hydrology and Data Science and Machine Learning</td><td>Certifications</td><td colspan="3">Professional Engineer, CA, MA, and NY</td></tr>
<tr><td colspan="3">Contract role(s) / brief description of responsibilities</td><td colspan="3">Co-Principal Investigator. Scientific and technical lead, project management and execution.</td></tr>
<tr><td>11/22–Present</td><td colspan="5">Data Science and ML Practice Lead, The Water Institute
Louisiana Coastwide Compound Flooding: Principal investigator leading the development of a probabilistic compound flood modeling framework and hydrology methods.
Citywide Probabilistic Compound Flood Model and Real Time Forecasting System, City of Jacksonville: co-Principal Investigator leading the development of a probabilistic compound flood modeling framework and hydrology methods.
Lower Mississippi River SmartPort & Resilience Center, U.S. Department of Commerce Economic Development Administration: Technical Lead. Through the development of a decision support tool to forecast shoaling at port facilities along the Mississippi River, SmartPort will improve port operations and benefit a variety of stakeholders who need to understand how sediment builds up in the Mississippi River.
Louisiana Watershed Initiative, Louisiana Coastal Protection and Restoration Authority: Providing programmatic and technical support across a range of LWI activities, including the data and modeling program.</td></tr>
<tr><td>02/19–11/22</td><td colspan="5">Lead Data Scientist and ML Engineer, Stantec</td></tr>
<tr><td>02/17–02/19</td><td colspan="5">National Institute of Food and Agriculture Fellow, USDA</td></tr>
</table>

09/17–02/19	Visiting Postdoctoral Associate, Department of Civil and Environmental Engineering, Princeton University
12/16–02/19	Postdoctoral Associate, Department of Civil and Environmental Engineering, Duke Engineering
07/11–12/16	Research Assistant, Department of Civil and Environmental Engineering, Duke University
05/08–07/11	Professional Civil Engineer, Carollo Engineers
11/05–05/08	Engineer/Scientist, Carollo Engineers

16. Staff Experience:

Firm employed by The Water Institute				
Name	Colleen McHugh		Years of relevant experience with this employer	7
Title	Senior Planner		Years of relevant experience with other employer(s)	9
Degree(s) / Years / Specialization			Master's in City Planning / 15 / Urban Design	
Discipline	Planning	Certifications	Urban Design	
Contract role(s) / brief description of responsibilities			Planning lead supporting scenario-based planning for flood mitigation, infrastructure investment, and climate adaptation.	
06/18–Present	Senior Planner, The Water Institute • Resilient Jacksonville, City of Jacksonville: Project lead, developed a roadmap for adapting to changing climate, accommodating a growing population, guiding new urban development, and planning for uncertain shocks and stressors. • Virginia Flood Protection Master Plan, Virginia Department of Conservation & Recreation: Planner, co-leading the development of a decision framework and supporting policy and program development on an interdisciplinary team tasked with drafting the 2025 Virginia Flood Protection Master Plan. • Resilient Mobile, City of Mobile: Project lead, developed a citywide Resilience Assessment and Plan in collaboration with local stakeholders to set a baseline understanding of the city's resilience and develop an actionable plan to ensure that all members of the community are poised to thrive in the face of increasing challenges. • Louisiana Climate Action Plan, Louisiana's Governor's Office of Coastal Activities: Lead Planner and Project Manager, advised the Governor's Office throughout a one-year planning process to support the Climate Initiatives Task Force in developing a roadmap and specific actions to meet the state's ambitious goal of net zero greenhouse gas emissions by 2050. • Evaluating and Communicating Stormwater Risk in New Orleans: Planner, supported from a planning and policy application lens a Robust Decision-Making modeling study that examined			

	stormwater flooding in New Orleans to help decision makers and residents understand how to better manage stormwater under stressors. • Resilient Houston, City of Houston: Project Manager, managed a multidisciplinary team of experts and directly advised the Chief Resilience Officer throughout an 18-month planning process to develop a comprehensive resilience strategy that includes actions to build resilience at the individual, neighborhood, bayou, citywide, and regional scales. • Civil Works Strategic Plan, U.S. Army Corps of Engineers, Southwestern Division: Lead Planner, developed a 15-year strategic plan for the USACE Southwestern Division's Civil Works program, guiding a safe, sustainable, and resilient water future in the face of evolving risks for communities in Texas, Arkansas, and Oklahoma. • Research & Development Strategy, U.S. Army Corps of Engineers: Planner, supported USACE in developing an R&D Strategy designed to catapult USACE into a new bold era of innovative solutions to the nation's toughest challenges.
01/23–Present	Adjunct Instructor, University of New Orleans Department of Planning and Urban Studies
10/16–05/18	Resilience Design Manager, City of New Orleans
10/13–09/16	Resilience Planner, New Orleans Redevelopment Authority
09/11–08/13	Research Assistant, Massachusetts Institute of Technology
08/09–07/11	Editorial Assistant, San Francisco Planning and Urban Research

17. Firm Experience:

Project name	**Citywide Probabilistic and Compound Flood Model and Real Time Forecasting System - City of Jacksonville, FL**			Firm responsibility (prime or sub?)	Prime
Project number	P-00860	Owner's name	City of Jacksonville		
Project location	Jacksonville, Florida	Owner's Project Manager	Anne Coglianese, Chief Resilience Officer		
Owner's address, phone, email	ph# 904 255 7939, acoglianese@coj.net, 117 W. Duval Street, Suite 100, Jacksonville, FL 32202				
Services commenced by this firm (mm/yy)	08/23	Total consultant contract cost ($1,000's)	$4,600		
Services completed by this firm (mm/yy)	present	Cost of consultant services provided by this firm ($1,000's)	$2,300		

Describe the project including the firm's role and members involved. (Highlight staff to be used in this proposal.):

Jacksonville's location along the Atlantic Ocean, near the Saint John's River and tributaries, and the Intracoastal Waterway makes the city vulnerable to impacts of coastal surge, high tides, sea level rise, rainfall and riverine flooding. Jacksonville's flood challenges become even more difficult when one or more of these flooding types happen simultaneously. Climate change is causing these flooding events to occur more frequently and with more interaction between flood types. In order for the City of Jacksonville to adequately prepare for current and future flood challenges, the city needs a model that incorporates the compounding impacts of the individual flood drivers to produce best available and actionable data for use towards mitigation planning, flood forecasting and associated decision making.

The Institute is developing a probabilistic compound flood hazard framework which is a combination of a physics-based model and an efficient probabilistic framework that is an extension of the JPM-OS framework used in the USACE SACS study. This framework will produce state-of-the-art flood hazard data for current conditions and for the year 2070. This dataset will then be used to quantify flood consequences and integrate the impacts into resilience planning and zoning efforts. The Institute is also providing a real-time forecasting and decision-support system - FloodID®, to provide the best available site-specific flood information in advance of storm events. For daily forecasts and each potentially landfalling hurricane, the system automates forecasts for multiple possible weather forecast scenarios concurrently and publishes the data to web-interfaces and decision support dashboards to support operational decision making related to evacuation planning, infrastructure, search and rescue, and other Emergency Support Functions. The Institute has been working with the city to implement an instance of EnDMC - a web-based platform specifically designed to store models, model input, and output files. Each model stored and shared via EnDMC comes with detailed metadata which makes the model discoverable, trustworthy, and reusable in the future.

The Institute staff involved with this project and their roles are Muthu Narayanaswamy -Principal Investigator, Mark Bartlett – Software Engineer, and Colleen McHugh – Planner.

Project name	**Louisiana Coastwide Compound Flood Modeling - Louisiana Office of Community Development (LA OCD)**			Firm responsibility (prime or sub?)	Prime
Project number	P-00832	Owner's name	Louisiana Office of Community Development		
Project location	Louisiana		Owner's Project Manager	Gina Campo, Executive Director	
Owner's address, phone, email	gina.campo@la.gov. 225.342.1717, 617 N. Third St., Baton Rouge, LA 70802				
Services commenced by this firm (mm/yy)	01/21	Total consultant contract cost ($1,000's)		$8,000	
Services completed by this firm (mm/yy)	present	Cost of consultant services provided by this firm ($1,000's)		$6,000	

Describe the project including the firm's role and members involved. (Highlight staff to be used in this proposal.):

While Louisiana is no stranger to coastal flood risk, over the past two decades every parish in the state – most of which are inland and upland – has had a federal flood disaster declaration. In 2016, after inland floods led to major disaster declarations across 56 parishes, Louisiana's government fundamentally changed its approach to addressing flood risk - using new watershed-based planning. This new approach, embedded in the $1.2 billion Louisiana Watershed Initiative (LWI), will substantially improve the way residents and government agencies understand, address, and respond to flood risk within watersheds and across political boundaries. The LWI, managed by the Office of Community Development (OCD), funds watershed projects and programs at multiple scales.

The LWI is procuring updated hydrologic and hydraulic (H&H) modeling for the entire state, including in areas that have never been modeled or mapped. These models, and their underlying data sets, will improve the state's understanding of, and planning for, current and future flood risk from different types of flooding events. The models will be informed by new coastwide compound flood modeling and research led by The Water Institute in areas where flood drivers may transition from coastal to inland fluvial and pluvial. Compound flooding is difficult to simulate in a model, but many people in Louisiana experience its impacts on a regular basis. When extreme rainfall coincides with a coastal surge, after a period where rain has soaked the soils and reduced their infiltration capacity, compound flooding results and can impact wide swaths of the state. The Water Institute, partnered with researchers from Louisiana State University, the University of Iowa, and the University of North Florida, leads the LWI project to develop the modeling methodology and guidance for these "flood transition zones" than ultimately will enable such analyses in areas beyond Louisiana.

The Louisiana Watershed Initiative (LWI) program is generating vast amounts of data, including model inputs and outputs, that will be stored using FAIR data principles to create efficiencies in downstream flood risk assessment use cases statewide. To standardize and organize data such that it is easily discoverable and understandable for future efforts, the Institute is leading the generation of a data and modeling repository referred to as the Environmental Data and Modeling Catalog or EnDMC.

The Institute staff involved with this project and their roles are Muthu Narayanaswamy – Principal Investigator, Mark Bartlett – Co-Principal Investigator, and Colleen McHugh – Planner.

Project name	**Texas General Land Office (GLO) Combined River Basin Flood Studies**			Firm responsibility (prime or sub?)	Sub
Project number	P-00982	Owner's name	Texas General Land Office (GLO)		
Project location	Texas		Owner's Project Manager	Chris Sallese, Division Manager	
Owner's address, phone, email	Ph (713) 527-6324, Email: Chris.Sallese@decorp.com, 3100 West Alabama St. Houston, Texas 77098				
Services commenced by this firm (mm/yy)		09/20	Total consultant contract cost ($1,000's)		$ 2,900
Services completed by this firm (mm/yy)		present	Cost of consultant services provided by this firm ($1,000's)		$ 2,300

Describe the project including the firm's role and members involved. (Highlight staff to be used in this proposal.):

In 2020, the Texas General Land Office (GLO) launched a multi-year Combined River Basin Flood Study (consisting of four regionalized studies based on Texas' major river basins,) as part of the Community Development and Revitalization (CDR) program for communities impacted by Hurricane Harvey in 2017. The Study aims to collect, analyze, and communicate flood risk information to help decision makers protect Texans from future floods, and is intended to assist counties and municipalities in determining cost-effective mitigation and abatement strategies that reduce the impact of flooding disasters and increase flood resilience.

The Water Institute is partnering with national and Texas-based engineering firms and has a lead role in the development of compound flood methods for this program. The Water Institute plays leading roles in data collection, stakeholder engagement, flood model development, the development of an open-source data repository for the GLO and developing methodologies for assessing compound flooding due to rainfall and storm surge.

During Phase 3 of the project, high-resolution hydrologic and hydraulic models were created for the prioritized areas and refined using validated data. These models have provided critical insights into flood risks, and thus the output from this phase serves as the basis for evaluating potential mitigation strategies in the next phase. It also included a Hot Spot Analysis to evaluate flood exposure to structures, roadways, and agricultural areas using geospatial data, flood modeling outputs, and social vulnerability indices. This GIS-based approach used flood modeling outputs to assess exposure and aggregate results into spatially defined hot spots. The current phase aims at conducting alternatives analysis and benefit-cost analysis to evaluate potential flood mitigation projects. By analyzing the effectiveness and cost-efficiency of various strategies, this phase will help prioritize projects for funding and implementation.

The Institute staff involved with this project and their roles are Muthu Narayanaswamy - Principal Investigator.

18. Workload:

Project name	Client/Contracting Entity	Remaining Unpaid Balance	Estimated Time to Completion
Louisiana Coastwide Transition Zone Compound Flooding Implementation	Louisiana Office of Community Development	$1,200,000	5 months
TX GLO Flood Study – Combined River Basins	Texas General Land Office (GLO)	$666,000	6 months
Citywide Probabilistic and Compound Flood Model and Real Time Forecasting System in Jacksonville, Florida	City of Jacksonville	$400,000	8 months
North Carolina DMS River Basin Action Studies 2025	AtkinsRealis	$110,000	2 months
Enhancing the United Houma Nation's Short-, Mid-, and Long-Term Coastal Resilience	United Houma Nation	$1,550,000	4 years
GCECR FY 2025 NOAA Earmark	NOAA	$628,000	7 months

19. Staffing Capacity:

The Water Institute conducts an average of 30 projects per year, involving approximately 80 staff members across multiple disciplines. Many current projects are multi-year and multidisciplinary, with collaborative teams working together to achieve project goals and schedules. The Institute maintains strict project management workflows that ensure all committed work is performed as agreed. While three of the key personnel proposed for this work are also engaged in other ongoing studies, their workload capacity is carefully managed by Institute leadership to ensure they can continue to pursue new opportunities while maintaining high-quality outputs. There is no anticipated conflict between this project and the Institute's existing commitments.

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MICHAEL BAKER INTERNATIONAL
2600 Citiplace Drive
Suite 450
Baton Rouge, LA 70808