LOUISIANA WATERSHED INITIATIVE

APPENDIX B: EVALUATION AND SCORING CRITERIA

WATERSHED PROJECTS GRANT PROGRAM: LOCAL AND REGIONAL - ROUND 1

Projects submitted for the Watershed Projects Grant Program: Local and Regional - Round 1 funding can earn up to 100 points in scoring criteria. Each project will be scored and then ranked according to the following criteria:

PROJECT APPLICATION EVALUATION CRITERIA – ROUND 1 - 100 point maximum -		
Criteria		**Maximum Score**
Effectiveness in Minimizing Risk		**44**
	Risk reduction value	20
	Future flood risk considerations	2
	Upstream and downstream flood effects	2
	Passivity and reliability	2
	Multi-jurisdictional risk reduction benefits	4
	Enhanced protection of critical lifelines	3
	Avoided damages/losses	2
	Adaptability to higher flood levels	2
	Replicability	2
	Project design life	3
	Historical/archeological/geological impacts	2
Project Costs & Project Implementation		**13**
	Fund match	1
	Annual costs	2
	Implementation timeframe	2
	Project stage of development	3
	Operations and maintenance	1
	Consistency with other projects or plans	1
	Applicant capacity/previous experience in managing federal grant funding	3

PROJECT APPLICATION EVALUATION CRITERIA – ROUND 1 *(CONT.)* - 100 point maximum -		
Criteria		**Maximum Score**
Social Benefits		**12**
	Benefit to low and moderate income populations	7
	Economic opportunity	3
	Outdoor recreational resources	2
Enhancement of Natural Functions		**15**
	Natural hydrology improvements	5
	Water quality improvements	5
	Improvement to aquatic/floodplain habitat	5
Benefit to Most Impacted and Distressed Parishes		**16**
Total		**100**

EFFECTIVENESS IN MINIMIZING RISK - 44 point maximum -		
Criteria Description	**Criteria Value**	**Points**
Risk-reduction value	Details on analysis/calculation of risk are provided in Attachment 1	0-20: _____
Consideration of future flood risk	Uses best-available science, incorporating scenarios or probabilities of climate change, future development/land use change, and other factors relevant to the type of flood risk (e.g., sea level rise)	☐ 2
	Uses historical averages to project future conditions	☐ 1
Upstream and downstream flood effects	Application provides documentation showing project reduces flood risk up and/or downstream of the project's primary benefitting area	☐ 2
	Application provides documentation showing no flood risk impact up or downstream of the project's primary benefitting area	☐ 1
Passivity and reliability	Completely passive project that will require no regular operations and/or maintenance	☐ 2
	Automated (mechanical) response during a flood event	☐ 1
Multi-jurisdictional flood risk reduction benefits	Project is the result of agreed collaboration between two or more parishes	☐ 4
	Project is the result of agreed collaboration between two or more municipal districts	☐ 3
	Project benefits are realized by two or more parishes	☐ 2

EFFECTIVENESS IN MINIMIZING RISK (CONT.) - 44 point maximum -		
Criteria Description	**Criteria Value**	**Points**
Enhanced protection of critical facilities (e.g., hospitals, evacuation routes, emergency response facilities, power generation stations, etc.) and/or stabilization of essential community lifelines (e.g. transportation, communication, health, shelter, hazardous material, water, power)	Project will mitigate loss of service from one or more ASCE Category IV facilities[1]	☐ 3
	Project will mitigate loss of service from one or more ASCE Category III facilities[2]	☐ 2
	Project demonstrates a mitigation of risk to one or several community lifelines	☐ 1
Avoided damages/losses *(Avoided direct physical damage to built assets and agriculture - based on existing or approved permits for the built environment)*	Expected losses avoided are greater than project capital and maintenance costs over the life of the project by a factor greater than two (Benefit cost ratio >2)	☐ 2
	Expected losses avoided are greater than project capital and maintenance costs over the life of the project by a factor greater than one (Benefit cost ratio >1)	☐ 1
Adaptability/flexibility	Method/installation can be modified to adapt to higher flood levels	☐ 2
	Not adaptable, but does not impede future more protective solutions to higher flood levels	☐ 1
Project design life *(in accordance with FEMA standards or supporting documentation)*	> 50 years	☐ 3
	30-49 years	☐ 2
	15-29 years	☐ 1
Replicability	Design that can be replicated/may facilitate initiation of other projects	☐ 2
	Specialized for the site but provides lessons learned for other areas	☐ 1
Historical/archeological/ geological impacts	Application documents that the project will have a positive impact on special historical, archeological, geological or environmental sensitive areas	☐ 2

[1] ASCE Category IV: highest risk category, includes buildings and structures that if severely damaged, would reduce availability of essential community services necessary to cope with an emergency. Includes buildings such as hospitals, police and fire stations, emergency communication centers and facilities, and facilities containing hazardous materials. includes public utility facilities required for emergency backup as Risk IV facilities, i.e. power generating stations, aviation control centers, water storage facilities and pump stations for fire suppression.

[2] ASCE Category III: buildings and structures that house a large number of people in one place, or house people with limited mobility or ability to escape to a safe haven. Includes buildings such as schools, prisons, small healthcare facilities, universities. Can include utilities not considered Category IV.

EFFECTIVENESS IN MINIMIZING RISK (CONT.) - 44 point maximum -		
Criteria Description	**Criteria Value**	**Points**
	Application documents that the project will have no impact on special historical, archeological, geological, or environmental sensitive areas	☐ 1

PROJECT COSTS & PROJECT IMPLEMENTATION - 13 point maximum -		
Criteria Description	**Criteria Value**	**Points**
Fund match	Documented commitment of 10% additional match funds for project	☐ 1
Annual costs	Project annual maintenance cost is less than 0.5 percent of capital cost	☐ 2
	Project annual maintenance cost is 0.5 to 1.5 percent of capital costs	☐ 1
Implementation timeframe	Scheduled completion within two years of funding	☐ 2
	Scheduled completion within three years of funding	☐ 1
Project stage of development	Project is fully designed and permitted	☐ 3
	Project is designed, but not yet permitted	☐ 2
	Project is designed to a sufficient level of detail for regulatory review, with initial consultations complete, and provides clear direction for detailed project engineering and specifications	☐ 1
Operations and maintenance plan	Submittal of operations and maintenance plan with identified long-term funding source, action steps, and responsibilities outlined in order to operate and maintain improvements	☐ 1
Consistency with other plans or projects	Project is consistent with local capital improvement plan or is aligned with other federal, state, or local mitigation projects	☐ 1
Applicant capacity	Applicant has previous experience in managing federal grant funding. Applicant has no outstanding monitoring or audit findings on performance.	☐ 3

SOCIAL BENEFITS - 12 point maximum -		
Criteria Description	**Criteria Value**	**Points**
Benefit to Low- and Moderate-Income Population	Project demonstrates a direct positive benefit (in terms of risk reduction) to persons of low and moderate income. Applicant provides documentation that the project will benefit the residents of a primarily residential area where at least 51 percent of the residents are low- and moderate-income persons per HUD's Updated LMISD or meets other LMI-benefit determination criteria.	☐ 7
Economic Opportunity	Project can document expected job creation and/or increased economic activity as a result of project benefits (not just through construction and maintenance) creates or retains jobs for low-and moderate-income persons	☐ 3
	Reduced risk of job loss expected as a result of the project	☐ 2

SOCIAL BENEFITS - 12 point maximum -		
Criteria Description	**Criteria Value**	**Points**
Outdoor Recreational Resources	Adds new and equitable recreational assets, greenways or trails, or recreational fields or programmed open space and nature preserves	☐ 2
	Enhances existing recreational space	☐ 1

ENHANCEMENT OF NATURAL FUNCTIONS - 15 point maximum -		
Criteria Description	**Criteria Value**	**Points**
Natural Hydrology Improvements *(A project may provide flood storage and conveyance, reduce flood velocities, reduced peak flows, promote infiltration and aquifer recharge or reduce frequency and duration of low surface flows)*	Application indicates that the project, once built/implemented, will alter quantity, frequency and duration of water flows in a manner that IMPROVES, ENHANCES or RESTORES floodplain, riverine and coastal ecosystem services and the human livelihood and well-being that depend on these services.	☐ 5
	Proposal indicates that the project, once built/implemented will alter quantity, frequency and duration of water flows in a manner that SUSTAINS floodplain, riverine and coastal ecosystem services and the human livelihood and well-being that depend on these services.	☐ 1
Water Quality (*A project may reduce sedimentation, reduced nutrients and impurities from runoff, process organic wastes, or moderate temperature fluctuations)*	Application indicates that the project, once built/implemented will IMPROVE, ENHANCE, or RESTORE water quality parameters critical for maintaining a healthy floodplain, riverine, and coastal environment.	☐ 5
	Application indicates that the project, once built/implemented WILL NOT IMPACT water quality parameters critical for maintaining a healthy floodplain, riverine, and coastal environment.	☐ 3
Aquatic/floodplain habitat value *(A project may add rich alluvial soils to promote vegetative growth, maintain biodiversity, maintain integrity of ecosystems, provide breeding and feeding grounds, create enhanced waterfowl habitat or protect habitats for rare and endangered species)*	Application indicates that the project, once built/implemented will restore/enhance and protect floodplain, riverine and coastal habitats suitable for ecologically, commercially and recreationally important species.	☐ 5
	Application indicates that the project, once built/implemented will have no impact on riverine and coastal habitats suitable for ecologically, commercially and recreationally important species.	☐ 1

BENEFIT TO MOST IMPACTED AND DISTRESSED PARISHES - 16 point maximum -		
Criteria Description	**Criteria Value**	**Points**
Benefit to three or more state or HUD-Identified MIDs	Yes	☐ 16
Benefit to two state or HUD-Identified MIDs	Yes	☐ 10

ATTACHMENT 1: COST EFFECTIVENESS TEST

This attachment describes the methodology applicants must use to demonstrate the effectiveness of their proposed projects, as defined by its risk reduction impact to structures, households, and public infrastructure compared to the cost. Applicants must complete the table below, which will be used in a calculation that will provide a simplified way to represent annualized risk reduction.

Enter information into the **Step 1 Table** identifying structures benefitting from the proposed project by recurrence interval. Temporary buildings, outbuildings, garages, and sheds **must not** be included in this analysis.

Applicants are encouraged to provide additional information regarding project risk reduction benefits that may not be captured in the **Risk Reduction Proxy** calculation. Additional guidance on this is provided in **Step 2** below.

STEP 1 INSTRUCTIONS

Not all structures are created equal. If flooded, a backyard shed, for example, would not yield as high a risk to life safety and the functioning of a community as a multi-family apartment complex. As such, in **Step 1**, applicants will identify structures based on use type and the structures will be assigned a risk adjustment factor (see **Table 1** below). To begin this step, applicants should complete the table listing each of the structures that will experience flood risk reduction as a result of the proposed project. The American Society of Civil Engineers provides an industry standard approach for ranking the risk inherent to each structure use type. Using **Table 1** and **Table 5**, the application software will assign each structure experiencing risk mitigation under a "with project" scenario for each recurrence interval storm a risk category and weight.[3] This table will be used in the calculations below to generate an **Effectiveness Score**.

Important Note on structures, units, and critical infrastructure assets:

- Each residential unit may be counted as an individual structure and assigned to Risk Category II for the purposes of this analysis. If number of units is unclear for multi-family structures, residential buildings should be assigned as Risk Category III. For example, a multi-family structure or apartment complex with 10 units could be categorized as a risk category II, and the raw count of structures could be 10, however if the number of units is unclear, that structure would be categorized as a risk category III, and the raw count of structures would be 1.
- Structures present at a critical facility should be assigned a risk category based on function. Critical outdoor assets, such as substations and pump stations may count as structures.

The system will automatically calculate the structure weight.

[3] Risk categories are derived from the American Society of Civil Engineers (ASCE) 24 and 7

Table 1 Weighting per structure by risk category (see Table 5 for guidance on assigning risk categories)

Risk Category	Risk Weight
II	1.0
III	4.0
IV	7.0

Table 2 Example risk adjustment weighting by structure type

Structure/Parcel ID	Structure Type/Use	Risk Category	Raw Count	Risk Adjusted Count
00324	Multifamily Residential (unknown units)[4]	III	1	4
00330	Multifamily Residential (10 units)	II	10	10
00025	Single Family Residential	II	1	1
00036	Fire Station	IV	1	7
00567	Public Library	IV	1	7

Due to project type variations, the applicant may choose up to six design storm intervals (for example, 25-percent, 10-percent, 2-percent, 1-percent, 0.2-percent). All projects except non-structural projects are expected to have basic H&H modeling completed. Please see Attachment 2: Hydrologic and Hydraulic Report Checklist for further guidance on preparation of these materials. For non-structural projects, the applicant may rely on historical storms. A historical storm would replace the closest design storm. For example, a 28-year storm would replace the 25-year design storm, with a corresponding annual probability of 0.0357. Projects should cap at the highest level of protection (for example, a 0.2 percent or 500-year for a given riverine flood protection project, or 25-year for a given drainage project).

As shown in the example **Table 4 Risk Adjusted Structure Count (Delta Table)** below, the application software will then calculate the annualized number of weighted structures benefitting from the project to produce a **Risk Reduction Proxy** for the project. This calculation provides a simplified measure for assessing the benefits of individual projects across a range of flood scenarios without requiring a detailed benefit cost analysis, and favors projects with lower cost and greater reach.

[4] If the exact number of residential units in a multifamily structure is known, each residential unit should be counted as a separate structure and assigned a risk adjustment factor of 1.0 for the purposes of this analysis. In this example, if the structure has 10 units, its Risk Adjusted Count would be 10.0. If the exact number of units cannot be determined but the structure has four or more units, its Risk Adjusted Count would be 4.

Table 3 Example Step 1 Risk Calculation Table

Parcel ID	Structure Type/Use	Risk Category	Raw Count (structures or households)	Structures flooded in a "without project" scenario						Structures flooded in a "with project" scenario						Risk Adjustment Factor
				Event likelihood (recurrence interval) Ex: 100 year storm						Event likelihood (recurrence interval)						
				5 year event	10 year	25 year	50 year	100 year	500 year	5 year event	10 year	25 year	50 year	100 year	500 year	
				0.2	0.1	0.04	0.02	0.01	0.002	0.2	0.1	0.04	0.02	0.01	0.002	
1	Hospital	IV	1	0	0	1	1	1	1	0	0	0	0	0	1	7
2	Single family dwelling	II	1	0	0	1	1	1	1	0	0	0	0	0	1	1
3	School	III	1	0	0	1	1	1	1	0	0	0	0	0	1	4

Table 4 Risk Adjusted Structure Count (Delta Table) **Note: This will be calculated by the software, applicant does not need to populate this table**

	Risk Adjusted # of Structures protected[5] by project in prescribed recurrence interval event						Risk Reduction Proxy
	5 year event	10 year	25 year	50 year	100 year	500 year	
Total difference in weighted number of structures	0	0	12	12	12	0	0.77

[5] Recognizing that no structure can have risk eliminated, "protected" for the purpose of this exercise means the structure is not expected to receive flood damage in the subject event. A reduction in flood levels that still results in structure damage under a given event scenario is not considered "protection" of the structure. For example, if a structure is expected to receive 4 ft. of inundation above the first floor in the "without project" scenario but it would receive 2 ft. of inundation above the first floor in the "with project" scenario, the structure would be considered "flooded" in both scenarios.

FOLLOWING CALCULATIONS

The application software will then determine the cumulative project cost by multiplying the annual maintenance cost by the project's useful life and adding it to the total project cost as shown below.

$$\left(\textbf{Annual project maintenance cost } (\$) * \textbf{Project Useful Life } (\textbf{years})\right) + \textbf{Total Project Cost } (\$) = \textbf{Cumulative Project Cost (\$)}$$

Following this step, the software will use the **Risk Reduction Proxy** from Step 1 to determine project effectiveness compared to the cumulative project cost. This calculation will multiply the results of the Risk Reduction Proxy by the project's useful life, and then divide this by the cumulative project cost to determine a total benefit per dollar amount or Effectiveness Score. **Note: The application software will complete the calculation for the applicant based on their input in Step 1**

$$\frac{\textbf{Risk Reduction Proxy} * \textbf{Project Useful Life } (\textbf{Years})}{\textbf{Cumulative project cost } (\$)} = \textbf{Effectiveness Score}$$

After all Round 1 applications have been submitted and assigned an effectiveness score, the State will plot the effectiveness scores among projects submitted, and allocate 0-20 points per project according to how they rank compared to one another.

STEP 2 INSTRUCTIONS: ADDITIONAL CONSIDERATIONS

In the event of a tie, and in conjunction with the above calculation, the State reserves the right to assign scores for project effectiveness based on additional factors, including but not limited to:

- Role of protected assets as critical supply chain components (structures, infrastructure, utilities, or land) or sites that serve a function of protecting or advancing community lifelines in a disaster event
- Economic impact and/or sociocultural significance or value of structures protected
- Socio-economic impacts, including risk reduction to vulnerable populations based on poverty, age, race, limited English proficiency, disability, or other factors, concentrated areas of poverty
- Past flood inundation or damage
- Extent and magnitude of flooding reduction (i.e., depth reduction or flooded area reduction)

Applicants should attach documentation for and/or reference the application location of any of the above information to be considered in scoring for the effectiveness criterion.

Table 5 Facilities by Type and Category[6] - Always review project details

Structure Type	Facility/Building/Structure	Risk Category
Aviation	Critical aviation facility such as control tower, air traffic control center, or hangar for aircraft used in emergency response	IV
Emergency Response	Designated emergency shelter	IV
	Designated emergency preparedness, communication, operation center or other facility required for emergency response	IV
Emergency Services	Fire, rescue, ambulance, or police station or emergency vehicle garage	IV
Hazardous Substances	Building or other structure (including, but not limited to, facilities that manufacture, process, handle store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, or hazardous waste) containing significant quantities of highly toxic substances	IV
Health/Hospital	Hospital or health care facility having surgery or emergency treatment facility	IV
Miscellaneous critical assets	Structure such as communication tower, electrical substation, fuel or water storage tank, or other structure necessary to allow continued functioning of a Category IV facility during and after an emergency	IV
Public Services	Library	IV
	Town hall or courthouse	IV
Public utility required in emergencies	Power generating station, water treatment facility, telecommunications or other public utility facility required in emergencies	IV
Critical commercial assets	Grocery store / pharmacy	III
	Hardware stores / home improvement retailer	III
	Gas stations	III
Community and recreation	Athletic facility with seating for spectators	III
	Building or structure in which a large number of persons may assemble in one place, such as theaters, lecture halls, concert halls, and religious institutions with large areas used for worship	III

[6] Note: Classification of the structures types in this table are derived from ASCE classifications, with minor interpretations and adjustments to address resilience considerations and critical lifelines.

Structure Type	Facility/Building/Structure	Risk Category
	Community center or other recreational facility	III
	Museum	III
Other hazardous materials	Building or structure not included in Category IV containing toxic or explosive substances	III
Health/Hospital/ Public care	Care facility where residents have limited mobility or ability, including nursing homes but not including care facilities for 5 or fewer persons	III
	Healthcare facility not having surgery or emergency treatment capabilities	III
	Jail, correctional facility, or detention facility	III
	Veterinary facility	III
Public Utility	Building or structure associated with a sewage treatment plant or other utility which, if its operations were interrupted by a flood, would cause significant disruption in day-to-day life or significant economic losses in a community, but would not be required for emergency operations	III
4+ Residence	Structures that have 4+ residential units where the number of units are not available	III
School/Child Care	Elementary school, secondary school, or buildings with college or adult education classrooms	III
	Preschool and childcare facility not located in one- and two-family dwelling	III
Transportation	Major transportation facility	III
<4 Residence	Structures that have 1 – 3 residential units	II
Miscellaneous	Other building or structure that poses a moderate risk to the public or moderate disruption to the community should it be damaged or fail due to flooding, including most commercial (including those commercial structures that are temporarily vacant), and industrial buildings not included in Category I, III, or IV. Examples include commercial storage facilities, most businesses, auto repair, and low occupancy office buildings	II
Unoccupied, minimal risk structures (not to be included in the calculation)	Buildings and structures that normally are unoccupied (not regularly occupied as a dwelling unit or commercial unit) and pose minimal risk to the public or minimal disruption to the community should they be damaged or fail due to flooding, including temporary structures that are in place for less than 180 days, accessory storage buildings and minor storage	I

Structure Type	Facility/Building/Structure	Risk Category
	facilities, small structures used for parking of vehicles, and certain agricultural structures	

ATTACHMENT 2: HYDROLOGIC AND HYDRAULIC REPORT CHECKLIST

The Hydraulic Report shall provide an analysis of the proposed project compared to the existing conditions, on the floodplain and/or floodway for a range of discharges; 5-year, 10-year, 25-year, 50-year, 100-year, and an optional 500-year discharge. The report should contain the following information.

Disclaimer: The checklist guidance provided herein does not represent regulatory methodology or standards nor do they modify or supersede any official regulations, requirements, ordinances, policies, or flood hazard boundaries currently in force under the National Flood Insurance Program (NFIP) or state and local flood damage prevention ordinances in their respective jurisdictions.

Introduction

- ☐ Preparers name, company name, telephone number, and email.
- ☐ Provide basic information such as the location and description of the watershed and study area.
- ☐ Name and type of project.
- ☐ Describe and define study limits.
- ☐ Locate and describe where flood discharges were estimated.
- ☐ Name all associated USGS gaging stations.
- ☐ Describe the climatic data, hydrologic features, and any other information that supports the hydrologic analyses.
- ☐ Describe the watercourse and location of investigation.
- ☐ Name for whom the report is being prepared.
- ☐ Date of report and topographic data used in model.
- ☐ Describe the scope of investigation including the alternatives analyzed and evaluated.
- ☐ Describe the scope of the analysis.
- ☐ Identify any existing studies or any history of work on the watercourse in the vicinity of the project including past flooding events.

Method of Analysis

- ☐ A description of ALL modeling runs submitted must be included in the report.
- ☐ Explain why the modeling method was chosen and why it is appropriate for the project evaluation.
- ☐ Explain any assumptions made in the application of the chosen method.
- ☐ Include references and provide a description and source of any computer programs used.
- ☐ Explain all utilized discharges in the analysis.
- ☐ Explain any modeling iterations including the use of previous data (i.e., FEMA study), the addition of updated/corrected geometry, etc.

Upstream and Downstream Modeling Limits

- ☐ Show the location of the modeling limits on the site development plan. The certifying engineer shall describe the methodology for depicting upstream and downstream limits.
- ☐ The model needs to start sufficiently downstream of the project in accordance with normal depth boundary conditions.

- ☐ The analysis must extend upstream to the point where any increase caused by the proposed project is dissipated, for all flood profiles.
- ☐ The location of all cross-sections should be shown on the plans. Cross-sections should all be labeled.
- ☐ Explain why the location was selected and the method used to determine the starting water surface elevation. Include an analysis of calibration of the model(s) to existing FEMA FIS profiles if they exist or other methods used to develop stable boundary downstream water surface conditions if no FIS is available.
- ☐ Describe all modeling boundary conditions.

Variables, Coefficients, and Modeling Strategies

- ☐ Discuss all modeling variables and coefficients. Indicate references and explain all assumptions for the variables used in the model.
- ☐ Ineffective Flow Areas – should be included when appropriate – up and downstream of crossings, encroachments, and ponding areas.
- ☐ Culvert modeling approaches should not show flow below the stream bottom.
- ☐ Provide descriptions for existing and future value selections of expansion and contraction, orifice, weir discharge, friction, and time of concentration variables.
- ☐ Use graphical maps for describing watershed boundaries by linework and shading and time of concentration by directional arrows. Include existing and proposed conditions.
- ☐ Provide photographs of present conditions and any other supporting information to justify modeling variable values selected for existing and/or proposed conditions.
- ☐ The routing methods used, including the values of input parameters, the derivation of those parameters, and methods of measurements and sources of data. The approach used for channel infiltration and the basis for any diversions from the watershed. The effect of encroachment on the computation of channel losses and storage, and the relation between storage and the extent of the floodplain.
- ☐ The source and derivation of any inflow hydrographs that are estimated independent of the modeling process.
- ☐ The methods or data used for estimating diversions from the watershed.

Discussion

- ☐ Discuss and evaluate the computations and analysis.
- ☐ Provide a description of the present channel and floodway, the nature and distribution of flow, and the proposed alterations and their resultant effect.
- ☐ Explain any unusual conditions that occur, and all assumptions not previously addressed that were part of the analysis.
- ☐ The differences between the proposed flood discharges, obtained from the rainfall-runoff model and regression equations, and effective base flood discharges and an explanation as to why they are different.
- ☐ Address all model error reports.

Conclusion

- ☐ The conclusion must include the definition of "harmful interference." Harmful interference is defined as "causing an increase stage or change in the direction of flow that causes or is likely to cause: damage to property; a threat to life; pollution, impairment, or destruction of water or other natural resources."
- ☐ The conclusion must include the engineer's opinion as to whether or not the project will cause harmful interference, based on the model results.
- ☐ Evaluate the effects of the proposed conditions on the watercourse, floodplain, floodway and potentially affected properties (including upstream and, where appropriate, downstream effects) for the range of discharges up to and including the 100-year discharge. The 500-year discharge is optional.

SUPPORTING DOCUMENTS TO INCLUDE WITH REPORT

- ☐ A site plan for existing and proposed conditions.
- ☐ Scaled plan view drawing(s) at sufficient scale and detail to show proposed work and elevations.
- ☐ Location of all cross-sections used in the analysis. Cross-sections and stations should be labeled to match cross-sections in the digital model.
- ☐ Flood Insurance Rate Map and flood profile (if available).
- ☐ Existing and proposed topography.
- ☐ Property boundaries.
- ☐ Floodway delineation.
- ☐ Floodway alterations.
- ☐ Proposed floodway obstruction.
- ☐ River channel.
- ☐ Fill, excavation and grading.
- ☐ Existing and proposed bridges and culverts. Include the profiles of the road grade along its highest points. (The information provided should be sufficient to analyze the crossings.)
- ☐ Utilize the North American Vertical Datum 1988 (NAVD 88) GEOID12B and State Plane Coordinates (horizontal) for all elevation deliverables.
- ☐ The elevation datum used. Plans and the model should be in the same datum.
- ☐ Cross-sections showing existing conditions and the proposed alterations. Cross-sections should include the following information.
    - Channel limits (the channel limits can be defined by the ordinary high-water mark of the watercourse).
    - Floodway limits, if mapped or modeled.
    - Floodplain boundary limits.
    - Roughness coefficients.
- ☐ Shapefiles for existing and proposed conditions for each design storm shall be included with the report.
- ☐ Statement to certify that the increase does not interfere harmfully with the discharge or stage characteristics of the stream. The certifying Louisiana Professional Engineer shall prepare a written certification stating "This is to certify that I am a duly qualified Professional Engineer licensed to practice in the State of Louisiana. I further certify this Hydrology and Hydraulic Report supports the fact that the proposed improvements would not result in any increase in flood levels within the community during the occurrence of a base flood event."

- A harmful interference is defined as an increased stage or change in the discharge or direction of flow that causes or is likely to cause any of the following: damage to property; a threat to life; a threat to personal injury; pollution, impairment, or destruction of water or other natural resources.