

REVIEW PLAN

St. Tammany Parish, Louisiana Feasibility Study

**U.S. Army Corps of Engineers
New Orleans District**

MSC Approval Date: April 26, 2020

REVIEW PLAN

July 2021

Project Name: St. Tammany Parish, Louisiana Feasibility Study

P2 Number: 477554

Decision Document Type: Feasibility Report and Environmental Impact Statement

Project Type: Flood Risk Management and Coastal Storm Damage Risk Reduction

District: New Orleans District

District Contact: Senior Project Manager 504-862-1723; Senior Plan Formulator 504-862-1071;
Lead Plan Formulator 504-862-1374

Major Subordinate Command (MSC): Mississippi Valley Division, (MVD), Vicksburg,
Mississippi

MSC Contact: Planning Specialist: 601-634-5869

Review Management Organization (RMO): Flood Risk Management Planning Center of
Expertise

RMO Contact: Regional Manager, (314-331-8404); Deputy Director (415-503-6852)

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: 03/23/2020

Date of MSC Approval of Review Plan: 4/27/2020

Date of IEPR Exclusion Approval: N/A

Has the Review Plan changed since PCX Endorsement? No

Date of Last Review Plan Revision: 07/06/2021

Date of Review Plan Web Posting: Pending

Date of Congressional Notifications: Pending

Milestone Schedule

	<u>Scheduled</u>	<u>Actual</u>	<u>Complete</u>
<u>Feasibility Cost Share Agreement</u>		Jan 14, 2020	Yes
<u>Alternatives Milestone:</u>	April 13, 2020	April 13, 2020	No
<u>Tentatively Selected Plan:</u>	Jan 13, 2020	Jan 13, 2020	No
<u>Release Draft Report to Public:</u>	March 12, 2021*	June 11, 2021	Yes
<u>Agency Decision Milestone:</u>	July 8, 2021*	TBD	No
<u>Final Report Transmittal:</u>	Jun 1, 2022*	TBD	No
<u>Chief's Report:</u>	Nov 29, 2022*	TBD	No

*These dates reflect the PDT team deadlines, not the headquarters locked schedule.

Project Fact Sheet

February 12, 2020

Project Name: St. Tammany Parish, Louisiana Feasibility Study

Location: St. Tammany Parish, Louisiana. (Figure 1).

Authority: Section 1201 of the Water Infrastructure Improvements Act of 2016 authorized 16 feasibility studies for water resource development and conservation and other purposes identified in the annual reports submitted to the Congress in 2015 and 2016 pursuant to section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d). Section 1207 directed the Secretary to conduct studies to determine the feasibility of implementing projects for flood risk management, ecosystem restoration, navigation, water supply, recreation, and other water resource related purposes authorized, feasibility studies for water resources development, conservation, and other purposes as identified in the reports titled “Report to Congress on Future Water Resources Development” submitted to Congress on January 29, 2015, and January 29, 2016, respectively, pursuant to Section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d) or otherwise reviewed by Congress.

The Bipartisan Budget Act of 2018 (Public Law 115-123), Division B, Subdivision 1, Title IV, (“BBA 2018”) appropriated supplemental funds in the Supplemental Investigations Funds for Long Term Disaster Recovery Investment Plans (LDRIPs) related to the completion, or initiation and completion, of authorized flood and storm damage reduction studies, including shore protection. Feasibility studies that are predominately for flood and storm damage reduction, as well as comprehensive and watershed studies that are predominately for flood and storm damage reduction (even if there are ancillary purposes) are eligible for supplemental funding consideration. The St. Tammany Parish Louisiana Feasibility Study was authorized for inclusion as a Bipartisan Budget Act of 2018 Study in September 2019. The 5 September 2019 Memorandum for the Deputy Commanding General for Civil and Emergency Operations; Subject: Supplemental Appropriations Bipartisan Budget Act (BBA) of 2018 - Long Term Disaster Recovery Investment Plan (LDRIP) - Investigations Account provided that after evaluation of the BBA 2018 Investigations Account Long-term Disaster Recovery Investment Plans (LDRIP) study portfolio, the Office of the Deputy Commanding General for Civil and Emergency Operations has determined that the feasibility study for St. Tammany Parish, Louisiana should be included as a BBA 2018 funded study in the Investigations Account LDRIP. The Memorandum further stated that since St. Tammany Parish has been impacted by prior storms, this Feasibility Study is intended to address flood and storm damage reduction but plan formulation will be limited to Coastal Storm Risk Management and Flood Risk Management in accordance with the Bipartisan Budget Act of 2018 funding authority.

Section 105(a) of the Water Resources Development Act of 1986 (33 U.S.C. 2215(a)), specifies the cost-sharing requirements generally applicable to feasibility studies but BBA 2018 authorizes the Government to conduct the Study at full Federal expense to the extent that appropriations provided under the Investigations heading of the BBA 2018 are available and used for such purpose.

This Review Plan shall comply with the current peer review requirements contained in EC 1165-2-217, entitled “Review Policy For Civil Works” and is subject to review by the National Planning Center of Expertise for Flood Risk Management (PCX-FRM) and approval by the Commander, Mississippi Valley Division. After the Review Plan is approved, the Review Plan (minus the team roster attachments) shall be posted on the MVN or MVD website. This review plan is an appendix to the overall Project Management Plan for the project.

Non- Federal Sponsor: The State of Louisiana, acting by and through, the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) is the Non-Federal Sponsor (NFS) pursuant to the Feasibility Cost Share Agreement (FCSA) executed on January 14, 2020.

Type of Study: Flood Risk Management (FRM) and Coastal Storm Risk Management (CSRM) Feasibility Study

SMART Planning Status: This Study will comply with the 3x3x3 requirements of WRRDA 2014 and the USACE DCW Memorandum dated 3 May 2018 to improve delivery of feasibility studies. As part of Civil Works Program transformation feasibility studies are required to follow a 3x3x3 rule: be completed in no more than three years; cost not greater than \$3M; and require three levels of vertical coordination. District, MSC and HQUSACE.

Study Area: St. Tammany Parish, Louisiana project is located in southeast Louisiana, north of Lake Pontchartrain. The Study Area extends from the eastern border of Louisiana to just west of where the Tchefuncte River empties into Lake Pontchartrain. St. Tammany Parish, Louisiana includes the towns of Abita Springs, Covington, Eden Isle, Lacombe, Madisonville, Mandeville, Pearl River and Slidell (Figure 1).

Problem Statement: St. Tammany Parish has experienced repeated widespread flooding from rainfall and riverine bank overtopping, high tides, waves, and storm surge including historic impacts during the flood of August of 2016 and Hurricane Katrina in August of 2005. These flood events cause major disruptions and economic impacts to St. Tammany Parish. The NFS, Parish, local governments, residents and businesses are fully supportive of investigations to determine alternatives to reduce flood damages in the Study Area.

Federal Interest: The purpose of this Feasibility Study is to determine whether FRM and CSRM techniques can be implemented within the Study Area to provide sufficient benefits to demonstrate a Federal interest. The Federal interest is determined by comparing the overall cost of applying alternatives within the Study Area as compared to the overall public benefits.

Risk Identification: The Study Area consists of approximately 100,000 structures valued at \$26 billion and a population of 258,000. Residential and non-residential structures are raised on average 1-3 feet above the adjacent ground. Locally heavy rainfall, river bank overtopping, hurricanes, tropical storm events pose a significant economic and life safety risk to the communities, ecosystems, and industries of St. Tammany Parish. The Study Area is impacted by flooding within the upper part of the Parish from headwater flooding and the lower parts of the Parish by a combination of headwater, backwater and storm surge flooding. Sea level rise and subsidence are expected to increase in the future, causing more frequent storm surge inundation and flood events.

The Future With-out Project Conditions include increased flood risk due to continued storms and rainfall events, changes in floodplain hydrology from development activities, and changes in riverine geomorphology caused by stream bank erosion and channel degradation. This will result in higher and more frequent storm damages and higher average annual damages. These impacts would be exacerbated due to heavy rainfall coupled with increases in relative sea level change.

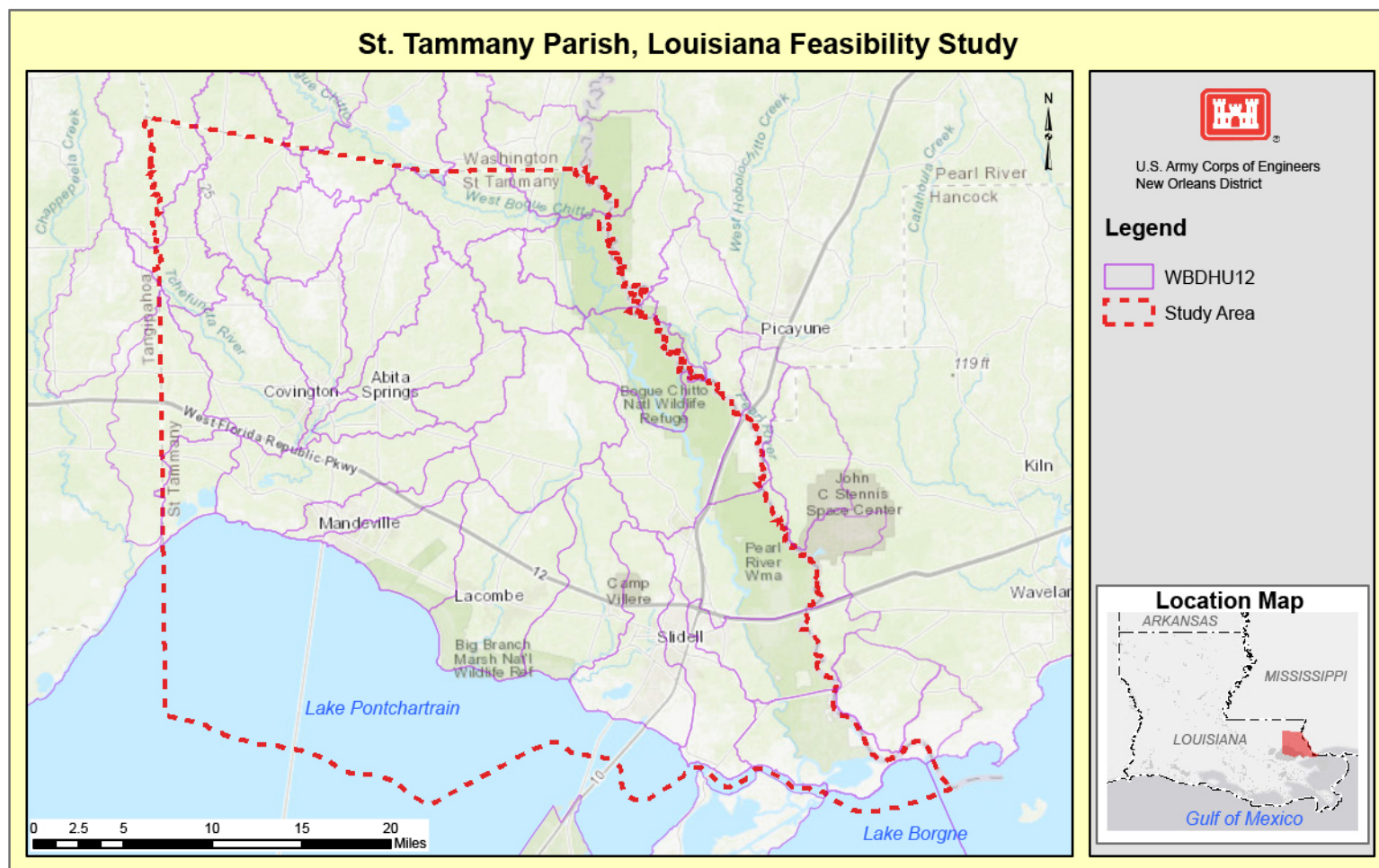


Figure 1: St. Tammany Parish, LA Feasibility Study Area Map. The U.S. Geological Survey Watershed Boundary Dataset (WBDHU12) is included to delineate the hydrologic sub basins in the Study Area.

1. FACTORS AFFECTING THE LEVELS OF REVIEW

Scope of Review.

- Will the study likely be challenging?

Yes. The Study Area encompasses the entire Parish which is large in size (approximately 1,100 square miles) and becoming increasingly heavily populated. The Study Area has a complex hydraulics and experiences repeated damages from various types of flood events, including but not limited to, rainfall, riverine, storm surge, and wave action. Some areas within St. Tammany Parish such as Slidell are at high risk from coastal storm flooding and rainfall runoff flooding. St. Tammany also has flood risk from upstream river basins (Pearl and Bogue Chitto) which adds to the complexity.

- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks.

There is medium risk and uncertainty involving assumptions made regarding 1) existing, proposed and authorized U.S. Army Corps of Engineers (USACE), State, Parish, and Municipal projects in the Study Area 2) riverine flood modeling, 3), hurricane storm surge modeling; and 4) structure- information used for economic analysis (National Inventory will be used.).

- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues?

Potentially. This FRM and CSRM study will evaluate alternatives that can reduce damages to structures and alleviate rainfall and storm-related flood risks in the Study Area therefore reducing life safety concerns.

The project will incorporate life safety into the planning study in accordance with Planning Bulletin 2019-04 to determine the potential life safety risks and consequences. Life safety risk will be qualitatively evaluated during measure and alternative development to better ensure that a full range of alternatives are identified to address risk drivers, incremental risk of existing structures (including overtopping) and the residual risk that might remain after we put alternatives in place. Potential risk drivers identified to date include, water velocity and depths during flood events, combination of coastal storm, riverine and rainfall flooding in some areas, incremental risk associated with existing flood risk reduction structures, short warning time, limited availability of stream gage data that inform warning systems and evacuations, and vulnerable populations. The list of measures that are being considered under the project to reduce flood risk include flood gates, levees, flood walls and or seawalls, pump stations, detention ponds, channel improvements, diversion channels, marsh restoration, breakwaters and shoreline protection. A Type I IEPR that includes a Safety Assurance review may be determined to be required if alternatives with significant life safety issues are selected.

- The team conducted preliminary model runs for a 500 year rainfall event to look at conservative floodplain depth and velocities in the Study Area.
 - The City of Slidell had an average depth of 2.36ft and a velocity of 1.22ft/s at Bayou Bonfouca
 - The City of Mandeville had an average depth of 2.18ft with a velocity of 1.98ft/s at Bayou Castine
 - The City of Madisonville had an average depth of 4.7ft with a velocity of 4.38ft/s on the Tchefuncte River
 - The City of Covington had an average depth of 2.85ft and a velocity of 4.29 ft/s on Bogue Falaya River
- The team is investigating previous life loss due to flooding in the area. The team has found documentation for deaths related to flooding due to Hurricanes Katrina and Betsy.
- The Study Area includes existing ring levees and levee segments in south Slidell, and a seawall in Mandeville. Only one of the ring levees in Slidell are federally certified. The information on these existing levees and seawall are not included in the USACE Levee Screening Tool; additional investigations are underway to acquire additional data on these existing features to assess the incremental risks. This study is likely to propose alternatives that build upon these existing features and will need to assess the risk for these already existing features.
- St. Tammany Parish follows the Louisiana State Police Contra Flow Plan for evacuation with identified trigger points at H-Hour minus 50-40-30 hour marks where H-Hour is the arrival of Gale Force Winds. Since 2004 evacuations have occurred in 2005 for Hurricane Katrina, 2008 for Hurricane Gustav and 2012 for Hurricane Issac. No known evacuations have been conducted for riverine flood events.

Social justice and underserved communities may exist within the project area as well. Features layout and design will consider environmental, social well-being, and public safety.

- Has the Governor of an affected state requested a peer review by independent experts?

No

- Will it likely involve significant public dispute as to the project's size, nature, or effects?

The NFS, Parish, local governments and residents and businesses are supportive of investigations to determine alternatives to reduce flood damages in the Study Area. Due to the large size of the Study Area covering approximately 1,100 square miles there is a chance for the stakeholders to have differing priorities depending on the location and composition of the proposed alternatives.

- Is the project/study likely to involve significant public dispute as to the economic or environmental cost or benefit of the project?

The Study Area has important environmental resources that could be impacted by proposed alternatives. The Study Area includes the large Lake Pontchartrain estuary and The Southeast Louisiana National Wildlife Refuge Complex that provides aquatic and vegetative habitats for a wide variety of aquatic and plant life, as well as protected species. In addition, the Study Area includes numerous state parks, and historic places listed on the National Register of Historic Places. There are also several waterways that have been designated as natural and scenic rivers by the state of Louisiana pursuant to the Louisiana Scenic Rivers Act. In addition, the implementation of certain proposed alternatives could impact several parishes in Louisiana and counties in the state of Mississippi. The projects may have interagency interest due to the varying types of resources involved.

The PDT will be conducting NEPA scoping meetings and public reviews of draft documents through the planning process. In accordance with EC-1165-2-217, section 7.e.(4) and section 7.e.(13), reviewers will have access to public comments received whenever feasible and appropriate and will be made aware of public participation activities as they relate to the review schedule.

- Is the information in the decision document or anticipated project design likely to be based on novel methods, involve innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices?

No. The PDT anticipates using approved planning, hydrology and hydraulics, cost engineering, climate change and environmental models. All project designs, measures, and features are anticipated to be common and routine techniques. The project is not expected to contain highly influential scientific information.

- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule?

Given the proximity of the Study Area to Lake Pontchartrain and the Gulf of Mexico, there will be a need for resiliency and robustness in the design of the Project features. The levee features are proposed to be designed using the Hurricane and Storm Damage Risk Reduction (HSDRR) design guidelines standard features which will include redundancy, resiliency, and/or robustness. Construction sequencing and scheduling are not expected to be out of the ordinary at this time.

- Is the estimated total cost of the project greater than \$200 million?

Yes. Note: Coordination with Cost Engineering DX and Congressional authorization would be required for construction funding.

- Will an Environmental Impact Statement be prepared as part of the study?

Yes, an Environmental Impact Statement will be prepared in part due to the cumulative effects of USACE projects and other local efforts within the Study Area.

- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources?

Potentially, however this determination will depend on the outcome of the Study and the plan that is recommended for implementation in the Final Feasibility Report and final NEPA document. St. Tammany Parish was once populated by many numerous Indian peoples, including but not limited to the Colapissas, Chickasaw, Biloxi Choctaw, Bayou Goulas and Pensacola nations. If necessary, the PDT will implement a programmatic agreement with all interested parties to avoid, minimize, or mitigate any scarce or unique tribal, cultural, or historic resources.

- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures?

Possibly. Lake Pontchartrain is one of the largest estuaries in the country, and home to a wide variety of protected species. The Southeast Louisiana National Wildlife Refuge Complex headquarters is based in Lacombe, and there are state parks adjoining the national wildlife refuge that provide habitat to numerous species, terrestrial and aquatic. Lake Pontchartrain as an estuary is an important site for many aquatic species lifecycles, and any alternative that disrupts this could be significant.

- Is the project expected to have, before mitigation measures, more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat?

Possibly. This is yet to be determined due to the broad scope and size of the Study Area. Due to the presence of the national wildlife refuge and multiple state parks, it should be anticipated. Lake Pontchartrain as an estuary is an important site for many aquatic species lifecycles, and any alternative that disrupts this could be significant.

2. REVIEW EXECUTION PLAN

This Section describes each level of review to be conducted. Based upon the factors discussed in Section 1, this study will undergo the following types of reviews:

District Quality Control. All decision documents will (including data, analyses, environmental compliance documents, etc.) undergo DQC. This internal review process covers basic science and engineering work products. It fulfills the project quality requirements of the Project Management Plan.

Agency Technical Review. ATR will be performed by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. These teams will be comprised of certified USACE personnel. The ATR team lead will be from outside the home MSC.

Independent External Peer Review. A Type I IEPR may be required for decision documents under certain circumstances. This is the most independent level of review, and is applied in cases that meet criteria where the risk and magnitude of the project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision is made as to whether Type I IEPR is

appropriate. If significant life safety issues are involved in a study or project a Safety Assurance Review (SAR) shall be conducted during IEPR. An IEPR will be conducted for the study since it is an EIS and the project is expected to be over \$200M.

Cost Engineering Review. All decision documents shall be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX). The MCX will provide the Cost Engineering certification. The RMO is responsible for coordinating with the MCX for the reviews. These reviews typically occur as part of ATR.

Policy and Legal Review. All decision documents will be reviewed for compliance with law and policy. ER 1105-2-100, Appendix H provides guidance on policy and legal compliance reviews. These reviews culminate in determinations that report recommendations and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. These reviews are not described in detail in this the Review Plan.

Table 1 provides the schedules and costs for reviews. The specific expertise required for the teams are identified in later subsections covering each review. These subsections also identify requirements, special reporting provisions, and sources of more information.

Table 1: Levels of Review*

Table listed below outlines project products, type of review, schedule and cost. This table will be updated at each IPR and SMART Planning Milestone meeting and presented to the Vertical Team. A new review plan will be created following feasibility completion for future phases of the project to include design, construction, and operation and maintenance.

Product(s) to undergo Review	Review Level	Start Date	End Date	Cost	Complete
Existing Conditions	District Quality Control	03/16/2020	4/10/2020	\$5,000	Yes
Focused Array Document	District Quality Control	04/1/2020	04/30/2020	\$5,000	Yes
Draft Feasibility Report and EIS	District Quality Control	02/02/2021	02/16/2021	\$50,000	No
Draft Feasibility Report and EIS	Legal Sufficiency Review	02/16/2021	06/06/2021	n/a	Yes
Draft Feasibility Report and EIS	Policy and Legal Review (One Policy Review Team)	06/21/2021	07/22/2021	n/a	Yes
Draft Feasibility Report and EIS	Agency Technical Review	07/01/2021	08/24/2021	\$60,000	No
Draft Feasibility Report and EIS	Type I IEPR	06/11/2021	07/26/2021	\$125,000	No
Final Feasibility Report and EIS	District Quality Control	02/23/2022	03/23/2022	\$36,000	No
Final Feasibility Report and EIS	Agency Technical Review	03/23/2022	05/04/2022	\$60,000	No
Final Feasibility Report and EIS	Legal Sufficiency Review (MVN)	05/04/2022	05/25/2022	n/a	No
Final Feasibility Report and EIS	Policy and Legal Review (MSC)	06/01/2022	07/13/2022	n/a	No

*These dates reflect the PDT team deadlines, not the headquarters locked schedule.

a. DISTRICT QUALITY CONTROL

The home district shall manage and document DQC and will appoint a qualified senior staff member who has no production role in the Study as the DQC Lead. The DQC Lead will ensure that a formal DQC review is performed by all members who have been assigned to the DQC Review Team in accordance with the District Quality Management Plan. The DQC Review Lead ensures coordination and interaction of team members, completeness of reviews, quality of review comments, and comment closeout and DQC Certification. The DQC of products and reports will also cover any necessary National Environmental Policy Act (NEPA) documents and other environmental compliance products (see EC 1165-2-217, sections 8.1 and 8.1.1). DQC efforts will include the necessary expertise to address compliance with current USACE policy and procedures. Documentation of the completed DQC review (i.e., all comments, responses, issue resolution, and DQC certification) will be provided to the MSC, RMO, and ATR Team leader prior to initiating an ATR. The ATR team will assess the quality of the DQC performed and provide a summary of that assessment in the ATR report. Missing or inadequate DQC documentation can result in the start of subsequent reviews being delayed (EC 1165-2-217, Section 9). Table 2 identifies the required expertise for the DQC Review Team.

Table 2: Required DQC Expertise

DQC Team Disciplines	Expertise Required
DQC Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting DQC. The lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc.).
Planning	A senior water resources planner with experience in large FRM and CSRM projects.
Economics	The Economics reviewer should have significant USACE economics experience or a combination of education and experience. The Economics reviewer should have a background in developing economic simulation models and analysis for large, complex regional investigations. Should have extensive experience in analyzing flood risk management projects in accordance with ER 1105-2-100, the Planning Guidance Notebook. Preferred experience includes performing analysis on non-structural alternatives, and a background in both riverine and coastal economics.
Environmental Resources	Senior Environmental Specialist with experience in FRM and CSRM projects. This includes experience in coastal zone management, essential fish habitat and endangered species compliance.
Cultural Resources	Senior Cultural Resource Specialist with experience in Federal lands and programmatic agreements.
Hydrology/Hydraulic Engineering	Senior H&H Engineer experienced with 2-dimensional models and experience with climate change analysis. This includes experience with both coastal flooding and river flooding studies.
Civil Engineering	Senior Engineer with experience in flood risk management and coastal storm management features including detention ponds, diversions, and levees.
Cost Engineering	The Cost Engineering panel member should have demonstrated experience or combined equivalent of education and experience assessing FRM and CSRM projects. Member should have at least a Bachelor's degree. Professional certification, such as DoD Tri-Service Cost Certification, or other cost certification is required.
Structural Engineering	Senior Structural Engineer with experience in FRM and CSRM projects.
Geotechnical Engineering	Senior Geotechnical Engineer with experience in levee foundation analysis, channel stability analysis and have experience with designs in coastal settings.
Life Safety/Levee Safety	The life safety/levee safety reviewer (or reviewers) should have experience in assessing life safety risk. At minimum, the District Levee Safety Officer will be part of the DQC team.
Real Estate	The Real Estate Plan reviewer should have 5-10 years real estate experience or equivalent education. Should have direct real estate

	experience on design or construction teams with knowledge of policies, guidance and procedures with ER 405-1-12, Real Estate Handbook.
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Documentation of DQC. Quality Control should be performed continuously throughout the Study. A specific certification of DQC completion is required at the Draft and Final Report stages. The DQC certification will be signed by the lead author of the product, the product reviewer(s), the DQC Review Lead, the supervisor of the author, and the PM. Documentation of DQC should follow the District Quality Manual and the MSC Quality Management Plan. An example DQC Certification statement is provided in EC 1165-2-217, on page 19 (see Figure F). Documentation of St. Tammany Parish Feasibility Study DQC and interim Quality Control Checks will be completed in accordance with the RPEDS SOP for DQC. Quality Control Checks will be performed by senior level staff, such as supervisors and team leaders, but not individuals who have produced the original work or who managed or reviewed documents produced by outside contractors. Quality Checks evaluate assumptions, loadings, design parameters, constraints, equations, model inputs, quantities, and references used to complete the design and/or analysis. They will be guided by a checklist that identifies appropriate considerations. Thorough annotation, conclusions should be provided in an accompanying narrative to allow the reviewer/checker to assure their validity. Documentation of interim Quality Control Checks and resolution will occur via a Memorandum for Record (MFR) development and circulation with vertical team. Interim Quality Control Checks will include the following team members: Formulation Environmental, Economics, and Engineering Division members. Interim Quality Control Checks will occur on the St. Tammany Parish FS study at the following check points:

1. Existing Conditions DQC. The purpose of this DQC is to review historic, existing, and future without project conditions, and problems, opportunities, goals and objectives. The review will cover scoping and preliminary analysis. The plan formulation reviewer will compare the risks and consequences identified in the RP, PMP, and risk register to ensure that risks and consequences are being considered, and if they need to be, revised appropriately and are being addressed.
2. Focused Array DQC. The review will consider measures, screening criteria, and the initial and focused array of alternatives. It will also review model selections and incorporation of risk and uncertainty details among other actions identified. The reviewers will compare the risks and consequences identified in the RP, PMP, and risk register.
3. Draft Report/TSP DQC. The review will cover all plan formulation issues being presented in the draft report, including risk informed approaches as documented in the respective checklist. It will be conducted and stored in the DQC folders on the RPEDS SharePoint, and in Dr. Checks and the MFR produced will be in the form of a Review Report, complete with documentation and resolution of DQC comments for use by an ATR Team, as applicable, and a DQC certification form accompanied by the complete set of checklists. The plan formulation reviewer will compare the risks and consequences identified in the RP, PMP, and risk register to ensure that risks and consequences are being considered, and if they need to be, revised appropriately and are being addressed. If a TSP risk assessment is identified in the RP and PMP, or if a risk buy-down plan is identified in the planning process,

the plan formulation reviewer will assure it was conducted, addressed and documented correctly in the Draft Integrated Feasibility Report.

4. Final Report DQC. Similar to the Draft Report DQC, the full gamut of considerations ranging from PDT and OC review to formal DrChecks comments made by the entire DQC Team. A Review Report will be prepared as the MFR for use by subsequent ATR review, in conjunction with a completed set of checklists.
5. Documentation of completed DQC should be provided to the MSC, RMO and ATR Team lead prior to initiating an ATR. The ATR team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort. Missing or inadequate DQC documentation can result in delays to the start of other reviews (see EC 1165-2-217, section 9).

b. AGENCY TECHNICAL REVIEW

The ATR will assess whether the analyses are technically correct and comply with guidance, and that documents explain the analyses and results in a clear manner. The lead RMO manages ATR. The review is conducted by an ATR Team whose members are certified to perform reviews. Lists of certified reviewers are maintained by the various technical Communities of Practice (see EC 1165-2-217, section 9(h) (1)). Table 3 identifies the disciplines and required expertise for this ATR Team.

Table 3: Required ATR Team Expertise

ATR Team Disciplines	Expertise Required
ATR Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting ATR. The lead should have the skills to manage a virtual team through an ATR. The lead may serve as a reviewer for a specific discipline (such as planning), but will be from outside MSC.
Planning	A senior water resources planner with experience in FRM and CSRM projects.
Economics	The Economics reviewer should have significant USACE economics experience or a combination of education and experience. The Economics reviewer should have a background in developing economic simulation models and analysis for large and complex regional investigations. Should have extensive experience in analyzing flood risk management, coastal storm risk reduction and nonstructural projects in accordance with ER 1105-2-100, the Planning Guidance Notebook. Preferred experience includes performing analysis on non-structural alternatives, and a background in both riverine and coastal economics.
Life Safety/Levee Safety	The life safety/levee safety reviewer (or reviewers) should have experience in assessing life safety risk, including life loss estimation using LifeSim for both riverine and coastal projects.
Environmental Resources	Senior Environmental Specialist with experience in FRM and CSRM projects. This includes experience in NEPA, coastal zone management, essential fish habitat and endangered species compliance.
Cultural Resources	Senior Cultural Resource Specialist with experience in programmatic agreements.
Hydraulic and Hydrology	Senior H&H Engineer experienced with 2-dimensional models and experience with climate change analysis. This includes experience with both coastal flooding and river flooding studies.
Civil Engineering	Senior Engineer with 5 -10 years of experience in flood risk management and coastal storm management features including detention ponds, diversions, and levees.
Cost Engineering	The Cost Engineering panel member should have demonstrated experience or combined equivalent of education and 5-10 years experience assessing FRM and

	CSRM projects. Should have direct cost engineering design or construction management experience centered on FRM and CSRM. Active participation in related professional societies is encouraged.
Structural Engineering	Structural Engineer with 5-10 years experience in FRM and CSRM projects.
Geotechnical Engineering	Senior Geotechnical Engineer with 5-10 experience in FRM and CSRM projects, levee foundation analysis, and channel stability analysis.
Real Estate	The Real Estate Plan reviewer should have 5-10 years real estate experience or equivalent education. Should have direct real estate experience on design or construction teams with knowledge of policies, guidance and procedures with ER 405-1-12, Real Estate Handbook.
Climate Preparedness and Resilience CoP Reviewer	Climate Preparedness and Resiliency Community of Practice certified member will participate in the ATR review.
Risk and Uncertainty	Reviewer with experience in multi-discipline flood risk analysis to ensure consistent and appropriate identification, analysis, and written communication of risk and uncertainty in accordance with ER 1105-2-101. The reviewer may serve as a reviewer for a specific discipline.

Documentation of ATR. DrChecks will be used to document all ATR comments, responses and resolutions. Comments should be limited to those needed to ensure product adequacy. If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team for resolution using the EC 1165-2-217 issue resolution process. Concerns can be closed in DrChecks by noting the concern has been elevated for resolution. The ATR Lead will prepare a Statement of Technical Review (see EC 1165-2-217, Section 9), for the draft and final reports, certifying that review issues have been resolved or elevated. ATR may be certified when all concerns are resolved or referred to the vertical team and the ATR documentation is complete.

Recommended Best Planning Practice: All members of the ATR team should use the four part comment structure (see EC 1165-2-217, Section 9(k)(1)).

c. INDEPENDENT EXTERNAL PEER REVIEW

(i) Type I IEPR.

Type I IEPR is managed outside of the USACE and conducted on studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the Study.

Decision on Type I IEPR. Based on a risk-informed decision process, Type I IEPR will be required for this decision document. If the Recommended Plan contained in the final approved Integrated Feasibility Report is implemented, the Project is estimated to cost over \$200M.

Products to Undergo Type I IEPR. The full draft Feasibility Report and NEPA document will undergo IEPR.

Required Type I IEPR Panel Expertise. Panels will consist of independent, recognized experts from outside of the USACE in disciplines representing a balance of areas of expertise suitable for the review being conducted. Table 4 lists the required panel expertise.

Table 4: Required Type I IEPR Panel Expertise

IEPR Panel Member Disciplines	Expertise Required
Economics	The economics reviewer should be experienced in economic evaluation of flood risk management projects. Experience with modeling flood damages and potential for life loss using tools such as HEC-FDA, HEC-FIA and LIFE-SIM is required.
Environmental	Senior Environmental Specialist with experience in FRM and CSRM projects. This includes experience in NEPA, coastal zone management, essential fish habitat and endangered species compliance.
Hydrology and Hydraulic Engineer	The panel member should be a registered professional engineer with experience in hydrology and hydraulic engineering with an emphasis on large public works projects, FRM and CSRM features, designs and structures. This individual should be familiar with standard Corps hydrologic and hydraulic computer models and have experience with both computer simulation and physical modeling of large river systems.
Civil Engineer	The panel member should be a registered professional engineer in civil engineering and

	have demonstrated experience in performing cost engineering/construction management for all phases of FRM and CSRM or related projects. Team member should be familiar with similar projects across the U.S. Panel member should be familiar with construction industry and practices used in FRM and CSRM and standard hurricane structure design.
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Documentation of Type I IEPR. The Outside Eligible Organization (OEO) will submit a final Review Report no later than 60 days after the end of the draft report public comment period. USACE shall consider all recommendations in the Review Report and prepare a written response for all recommendations. The Final Feasibility Report will summarize the OEO Review Report and the USACE response to the OEO Review Report and those documents will be posted on the internet when developed.

(ii) Type II IEPR.

(SAR) are managed outside of the USACE and are conducted on design and construction (Pre-Construction Engineering and Design) for hurricane, storm and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. A Type II IEPR Panel will be convened to review the design and construction PED (Pre-Construction Engineering and Design) activities before construction begins, and until construction activities are completed, and periodically thereafter on a regular schedule.

Decision on Type II IEPR. A decision on performing a Type II IEPR will be made once a Recommended Plan is identified.

Products to Undergo Type II IEPR. TBD

Required Type II IEPR Panel Expertise. TBD

d. MODEL CERTIFICATION OR APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models are any models and analytical tools used to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of a planning product. The selection and application of the model and the input and output data is the responsibility of the users and is subject to DQC, ATR, and IEPR.

Table 5: Planning Models. The following models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
IWR-Plan	The IWR-Plan was developed by the Institute of Water Resources as accounting software to compare habitat benefits among alternatives. Since this is a flood risk reduction study this model may be used for any potential mitigation to determine best buy alternatives and incremental cost analysis of alternatives. It may also be used to combine justified flood risk reduction measures across the parish into alternatives.	Certified
Wetland Value Assessment (WVA)	The Wetlands Value Assessment (WVA) Marsh Models (Fresh/Intermediate Marsh, Brackish Marsh, and Saline Marsh) were initially developed as the primary means of measuring the wetland benefits of candidate projects proposed for funding under the Coastal Wetlands Planning, Protection and Restoration Act. This PDT will use the WVA for determining potential impacts under USACE civil works projects and mitigation. The model was approved for Regional use in the Gulf Coast of Louisiana and Texas via a CECW-P memo, dated 7 November 2017. The WVA models for all non-marsh models (such as swamps) were approved on 12/6/18 and expire in 7	Approved for Use

	years (2025). This model may be used for any proposed mitigation.	
HEC-FDA	To estimate damages, HEC-FDA 1.4.2 uses a point-based structure inventory. Hydraulic stage data are used to determine the flood depths at each structure, and structure depth-damage curves are used to estimate damages.	Certified
LIFE-SIM 1.0	HEC-LifeSim is an agent based simulation system for estimating life loss with the fundamental intent to simulate population redistribution during an evacuation. Life loss is then determined by the hazard (e.g. flooding).	Certified for Life Safety Analysis

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue. The professional practice of documenting the application of the software and modeling results will be followed. The USACE Scientific and Engineering Technology Initiative has identified many engineering models as preferred or acceptable for use in studies. These models should be used when appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR.

Table 6: Engineering Models. These models may be used to develop the decision document:

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Approval Status
Micro-Computer Aided Cost Engineering System (MCACES) MII Version 3.0	MCACES is a cost estimation model. This model will be used to estimate costs for the feasibility study.	Certified
HEC-RAS-1 and 2D	Developed and maintained by the Hydrologic Engineering Center (HEC). Project may use 1-D Steady Flow and 1-D Unsteady Flow. HEC-RAS 1-D is commonly used for: Water surface profiles over long reaches; Depth averaged velocities; Rainfall impact; Sediment transport. HEC-RAS 2D is commonly used for 2-D flow simulation over large domains such as: Rivers, Canals, Flood Plains, Estuaries, Rainfall Catchment Areas; large scale simulations with long durations. Both models have been used extensively in the project area.	CoP Preferred
HEC-HMS	HEC-HMS stimulates rainfall-runoff process in a watershed. The software includes many traditional hydrologic analysis procedures such as even infiltration, unit hydrographs and hydrologic routing. Advanced capabilities are also provided for	CoP Preferred

	gridded runoff simulation using the ModClark methodology. The model has been used extensively in the study area.	
AdCIRC	Model simulates winds, storm surge, waves, tides, riverine inflows. Previously approved AdCIRC runs are planned to be used.	CoP Preferred

e. POLICY AND LEGAL REVIEW

Policy and legal compliance reviews for draft and final planning decision documents are delegated to the MSC (see Director's Policy Memorandum 2018-05, paragraph 9).

(i) Policy Review.

The policy review team is identified through the collaboration of the MSC Chief of Planning and Policy and the HQUSACE Chief of the Office of Water Project Review. The team is identified in Attachment 1 of this Review Plan. The makeup of the Policy Review team will be drawn from Headquarters (HQUSACE), the MSC, the Planning Centers of Expertise, and other review resources as needed.

- The Policy Review Team will be invited to participate in key meetings during the development of decision documents as well as SMART Planning Milestone meetings. These engagements may include In-Progress Reviews, Issue Resolution Conferences or other vertical team meetings plus the milestone events.
- The input from the Policy Review team should be documented in a Memorandum for the Record (MFR) produced for each engagement with the team. The MFR should be distributed to all meeting participants.
- In addition, teams may choose to capture some of the policy review input in a risk register if appropriate. These items should be highlighted at future meetings until the issues are resolved. Any key decisions on how to address risk or other considerations should be documented in an MFR.

(ii) Legal Review.

Representatives from the Office of Counsel will be assigned to participate in the PDT and conduct legal sufficiency reviews of the draft and final Integrated Feasibility Report, as well as other Study and NEPA documents and deliverables. Members of the Office of Counsel may participate from the District, MSC and HQUSACE levels. The MSC Chief of Planning and Policy will coordinate membership and participation with the Office of Counsel Chiefs. The home district Office of Counsel is responsible for the assessment by District Counsel on the scope of legal reviews. The home district Office of Counsel is responsible for the legal review of each decision document and signing a certification of legal sufficiency.

- In some cases legal review input may be captured in the MFR for the particular meeting or milestone. In other cases, a separate legal memorandum, opinion, certification or other similar document may be used to document the input from the Office of Counsel.
- Each participating Office of Counsel will determine how to document legal review input.

ATTACHMENT 1: TEAM ROSTERS

PROJECT DELIVERY TEAM

Name	Office	Position	Phone Number
Sarah Bradley	CEMVN-PM-BC	Senior Project Manager	504-862-1723
Amy Dixon	CEMVN-PM-B	Project Manager	504-862-1193
Travis Creel	CEMVN-PD-PFR	Senior Plan Formulator	504-862-1071
Michelle Meyers	CEMVN-PD-PFR	Lead Plan Formulator	504-862-1374
Elizabeth Manuel	CEMVN-PDP-W	Plan Formulator	504-862-2156
Ben Logan	CEMVN-PDE	Economics	504-862-1915
Everard Baker	CEMVN-PDS-C	Environmental	504-862-1514
Jason Binet	CEMVN-EDC	Technical Lead	504-862-2127
Lourdes Hanemann	CEMVN-EDD	Studies	504-862-2909
Jeffrey Sklencar	CEMVN-EDD	Cost Engineering	504-862-1201
Michele Aurand	CEMVN-EDD	Geographer	504-862-2341
Karen Vance Orange	CEMVN-REE	Real-estate	504-862-1083
Karen Roselli	CEMVN-OC	Office of Counsel	504-862-2137
Clyde Barre	CEMVN-EDH	H&H	504-862-2429
Matt Dirksen	CEMVN-EDH	H&H	504-862-1245
Matt Roe	CEMVN-PA	Public Affairs	504-862-1606
Jill Enersen	CEMVN-PDS-N	Archaeologist	504-862-1741
Jill Enersen	CEMVN-PDN-NCR	Tribal Liaison	504-862-1741
Kim Tessitore	CEMVN-EDC	Civil Engineering	504-862-2768
Mark Middleton	CEMVN-EDG	Geotech Engineer	504-862-1771
Stephen Borengasser	CEMVN-EDS	Structural Engineer	504-862-2723
Jennifer Stephens	CEMVN-ED	Levee Safety	504-862-2972

DISTRICT QUALITY CONTROL TEAM

Name	Office	Position	Phone Number
Brandon Davis	CEMVN-PDE-FRR	DQC Lead	601-631-5961
Lesley Prochaska	CEMVP-PDP-W	Planner	504-862-2732
Laura Lee Wilkinson	CESAS-PDN-UDP	NEPA Specialist	504-862-1212
Max Agnew	CEMVN-ED-H	H&H	504-862-1503
John Underwood	CEMVN-PDC	Supervisory Archeologist	601-631-5017
Ben Salamone	CEMVN-EDD	Cost Engineering	504-862-2732
Erin Rowan	CEMVN-REE	Real Estate Specialist	504-862-2183

Michael Tolivar	CEMVN-EDC	Civil Engineer	504-862-2746
Brian Maestri	CEMVN-PDP	Economist	504-862-1915
Mark Gayheart	CEMVN-ED-L	Structural Engineering	504-862-1262
April Falcon-Villa	CEMVN-EDG	Geotechnical Engineering	504-862-2657
Jean Vossen	CEMVN-ED	Levee Safety Officer	504-862-2404

St. Tammany DQC Team Qualifications

Brandon Davis, DQC Lead- 11 with Regional Planning. Reviewed numerous Plan Formulation, Environmental, and Economic documents. Bachelors and Masters of Science degrees in Agriculture Economics. Helped establish the QA/QC program for the national Economics branch of the Modeling, Mapping, and Consequence Production Center (MMC).

John Underwood, Archeologist- Listed on the Register of Professional Archaeologists since 2004 with 25 years' experience in archaeology (B.A. in History, B.A. in Anthropology, M.A. in Anthropology). Have extensive experience conducting field work in the Southeastern and Mid-Atlantic regions and coordinating Section 106 consultation.

Erin Rowan, Real Estate- Louisiana State Certified General Appraiser and has been working in the field of Real Estate for the past 13 years including Real Estate Appraisal and Planning. For the past 13 years, assignments with the Corps have included Planning and Appraisal work on many high priority projects including Louisiana Coastal Authority (LCA) Projects and Hurricane and Storm Damage Risk Reduction System (HSDRRS) Projects. Has performed multiple Agency Technical Reviews (ATR's) for projects for other Corps Districts. In September 2016, was delegated Review Authority for Real Estate Appraisal Reports.

Michael Tolivar, Civil Engineering- Engineering intern (EI) in the State of Louisiana with a bachelor's degree in Ocean Engineering from Texas A&M University. Experience includes 14 years of dredge contracting as a field engineer, assistant project engineer, and QC manager prior to COE employment.

Leslie Prochaska, Plan Formulation- Registered Professional Geoscientist with 20 years of experience in geologic and hydrogeology investigations as well as construction management. Two years of USACE feasibility study experience (i.e. BBA-18) with a B.S. and M.S. in Geology.

Mark Gayheart, Structural Engineering- a Professional Civil (Structural) Engineer and Chief of Structures Branch with over 35 years of experience.

Laura Lee Wilkinson, Biologist- Biologist with the New Orleans District Environmental Planning Branch, Environmental Studies Section for 18 years. B.S and M.S. in Biology with graduate field work on conservation biology and estuarine ecology, specifically plant animal interactions. Detailed knowledge of National Environmental Policy Act (NEPA) compliance, planning and environmental compliance, public involvement with controversial projects such as Hurricane Storm Damage Risk Reduction, wetlands and water quality assessments, and endangered species Section 7 consultation, and agency coordination. Reviewed many NEPA documents for District

Quality Control and completed six Agency Technical Reviews for ecosystem restoration, hydraulic analysis, section 408, and section 1135 civil works projects.

April Villa-Falcon, Geo-Technical Engineering - Registered Professional Engineer with 21 years civil engineering experience. 6 years of Structural Engineering, 4 years of Project/Construction Management and 11 years of Geotechnical/Levee Safety experience with a B.S. and M.S. in Civil Engineering.

Brian Maestri, Economics-Regional Economist at MVN and currently a Flood Risk Management Regional Technical Specialist for the Mississippi Valley Division. Has a Master's and undergraduate degree in Economics from the University of New Orleans (UNO). He taught economics at Xavier University in New Orleans from 1982 to 1985. He was a member of the Interagency Performance Evaluation Task Force (IPET) Interior Flood Control Team in the wake of Hurricane Katrina from 2005 to 2008. He has served as an interdisciplinary team member on several large-scale flood risk management studies including the Morganza to the Gulf of Mexico, La. Feasibility and PAC and the Louisiana Coastal Protection and Restoration (LACPR) evaluation. He is a certified Agency Technical Review (ATR) representative for flood risk management evaluations and has performed model certification for Version 1.4.1 of the Hydrologic Engineering Center-Flood Damage Analysis model. He instructs Flood Risk Management and Expert Elicitation Methods modules for the Corps training classes and has made presentations at numerous Corps conferences. He is currently working on the economic analysis for the Coastal Texas Storm and Norfolk Coastal Storm Risk Reduction evaluations. He is a member of the New Orleans Dam and Levee Safety Cadre and has developed consequences for the Monongahela Lock and Dam Number 3 and the General Edgar Jadwin Dam in Pennsylvania. He has also developed the consequences for numerous levee systems in the New Orleans Metropolitan area using the Levee Screening Tool.

Max Agnew, H&H Engineering- PE Louisiana MS Civil Engineering

Ben Salamone, Cost Engineering- EIT, BS Civil Engineering with 26 years of experience in cost engineering.

Jean Vossen, Levee Safety Officer-

AGENCY TECHNICAL REVIEW TEAM

Name	Office	Position	Phone Number	Qualifications
Danielle Tommaso	CENAN-PL-FC	ATR Lead/ Plan Formulation	917-790-8527	TBD
Patrick Nowak	CENWO-PM-AB	Economics, Risk, Life Safety	402-995-2696	TBD
Kimberly Rightler	CENAN-PL-E	Environmental Resources	917-790-8722	TBD

Carissa Scarpa	CENAN-PL- EW	Cultural Resources	917-790-8612	TBD
(Mohammad) Shahidul Islam	CESWG-EC- HB	H&H	409-766-3084	TBD
Jeremy Ruffell	CEMVM-EC-D	Civil Engineering	901-544-0084	TBD
Joe Ellsworth	NWW	Cost Engineering	TBD	TBD
(Xiaoming) Michael Chen	CENAN-EN- DE	Structural Engineering	917-790-8749	TBD
Heather Sibley	CEMVK-EC- GA	Geotechnical Engineering, Levee Safety	601-631-5917	TBD
Mary (Cathy) Keith	CELRN-RET	Real Estate	615-736-5997	TBD
Keith Duffy	CENWP-ENC- HY	CPR CoP	503-808-4969	TBD

VERTICAL TEAM			
Name	Office	Position	Phone Number
TBD	CECW-PC	Planning	TBD
TBD	CEMVD-PD-L	Deputy, Planning	TBD
TBD	CEMVD-PD-L	Chief, FRM PCX	TBD
TBD	CEMVD-PD-L	Project Manager	TBD
TBD	CEMVD-PD-L	Supervisory Civil Engineer	TBD
TBD	CEMVD-PD-L	Chief - Program Support Division	TBD
TBD	CEMVD-PD-C	Chief Civil Works Integrating/Programs Deputy	TBD
TBD	CEMVD-RB-W	Deputy, Watershed	TBD
TBD	CEMVD-PD-OD	TBD	TBD
TBD	CEMVD-PDC	Supplemental Program Manager	TBD
Scott Stewart	CEMVD-RB-T	Project Manager	TBD

POLICY REVIEW TEAM			
Name	Office	Position	Phone Number
Jennifer Ryan	CEMVD-PDP	Review Manager	601-634-7633
Matt Mallard	CECW-PDP	Plan Formulation	601-634-5869
Brian Maestri	CECW-PC	Economics	202-734-1861
Sean Mickal	CECW-PDP	Environmental	601-634-5152
Jennifer Ryan	CEMVD-PDP	Cultural Resources	601-634-7633
Frankie Griggs	CEMVD-RB-W	Hydraulics & Hydrology	601-634-5915

Melissa Mullen	CEMVD-RB-T	Geotechnical	901-544-0716
Jennifer Chambers	CEMVD-RB-T	Structural	601-634-7162
Melissa Mullen	CEMVD-RB-T	Levee Safety	901-544-0716
Patrick O'Brien	CESPN-ET-EW	Climate Change	
James Briggs	CEMVD-PD-SP	Real Estate	601-634-5860
Megan Ross	CEMVD-OC	Office of Council	601-634-5769