REVIEW PLAN

July 2019

Project Name: Brazos River, Fort Bend County, TX. Flood Risk Management Study (Fort Bend County, TX) **P2 Number:** 459222

Decision Document Type: Feasibility Report

Project Type: Flood Risk Management

District: Galveston **District Contact:** Plan Formulator – (501) 324-5602

Major Subordinate Command (MSC): Southwestern Division MSC Contact: Galveston Point of Contact - (469) 487-7063

Review Management Organization (RMO): Flood Risk Management – Planning Center of Expertise **RMO Contact:** FRM-PCX SWD Regional Manager – (916) 557-7368

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: 10 July 2019 Date of MSC Approval of Review Plan: 28 July 2019 Date of IEPR Exclusion Approval: N/A Has the Review Plan changed since PCX Endorsement? No Date of Last Review Plan Revision: None Date of Review Plan Web Posting: 30 August 2019 Date of Congressional Notifications: 30 August 2019

| wilestone Schedule | | | | | | |
|-------------------------------------|-------------|------------|---------|--|--|--|
| Milestone | Scheduled | Actual | Compete | | | |
| Alternatives Milestone | 31 Jan 2019 | 7 Feb 2019 | Yes | | | |
| Tentatively Selected Plan | 10 Oct 2019 | | No | | | |
| Release Draft Report to Public | 9 Dec 2019 | | No | | | |
| Agency Decision Milestone | 1 May 2020 | | No | | | |
| Final Report Transmittal | 8 Apr 2021 | | No | | | |
| Senior Leaders Briefing | 19 Jul 2021 | | No | | | |
| Chief's Report or Director's Report | 8 Oct 2021 | | No | | | |

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Project Fact Sheet January 2019

Project Name: Brazos River, Fort Bend County, TX. Flood Risk Management Study.

Location: Fort Bend County, Texas

Authority: Water Infrastructure Improvements for the Nation Act 2016, WRDA 2016 dated 16 Dec 2016

Sponsor: Fort Bend County, TX

Type of Study: Feasibility Study and Environmental Assessment

SMART Planning Status: 3x3x3 Compliant Civil Works Feasibility Study

Project Area: Fort Bend County encompasses approximately 82 miles of the Brazos River within its bounds. From the watershed level perspective, the Brazos River is 1,280 miles long and has a 45,000 square mile drainage basin. The area has approximately 5,000 structures unprotected by existing levees valued at \$1.2 Billion within the 1% Annual Chance Exceedance (ACE) floodplain. Approximately 140,000 people reside within the current effective FEMA 1% ACE floodplain of the Lower Brazos River. The county seat, Richmond, is located within the Houston–The Woodlands–Sugar Land metropolitan area along the Brazos River; and it is 64 miles northwest of Galveston Bay.

Problem Statement: The Brazos River has routine flooding that causes damages to structures and infrastructure. Recent flood events in 2015, 2016, and 2017 highlighted the ongoing erosion and flood risk management issues in the county. Further, the Brazos River has migrated during these events putting in jeopardy Flood Risk Management infrastructure.

Federal Interest: Brazos River is a navigable waterway. It is in the interest of the Federal Government under the Flood Control Act of 1936, as amended, to provide flood risk management in the interest of the general public welfare to the Brazos River and its tributaries. The Act provides for the Federal Government in cooperation with Ft Bend County to improve the Brazos River and its tributaries by participating in improvements "for flood control purposes, if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected".

The plans included structural and non-structural solutions to manage the flood risk and solutions to riverbank erosion. Structural solutions include building new levees, and increasing existing levee height; while non-structural solutions include buyouts and structure elevation. The erosion solutions include armoring and other typical

stabilization measures. The likely solutions will be a combination of riverbank stabilization, structural and non-structural flood risk solutions.

Risk Identification: Frequent and severe flooding pose a threat to human life and safety. Bank erosion and bank collapse can occur quickly, risking the lives of those who rely on the transportation route crossing the river. Flooding can also block evacuation routes threating the safety of those who cannot leave before the floodwaters rise. Levees are at risk from bank collapse which could then suddenly breach the levee with its accompanying risk to human life.



Figure 1: Study Area Map

1. FACTORS AFFECTING THE LEVELS OF REVIEW

Scope of Review. This section discusses factors affecting the risk informed decisions on the appropriate levels of review.

- <u>Will the study likely be challenging?</u> There are no anticipated challenges that will arise from this study. The study is using past erosion studies, that included geomorphologicanalysis, to determine the areas of erosion concern and to bracket the erosion rates. Those past studies combined with observation since those studies were completed reduce the challenges posed by erosion prediction.
- <u>Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks.</u> Project should not include new failure modes or lead to progression of existing failure modes that would lead to loss of life. Additional failures from continued erosion will make the future without project condition less certain, but is being mitigated with updated surveys to help determine erosion rates.
- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? With no action the continued erosion would likely increase the likelihood of the current FRM infrastructure failing during a flood event. The anticipated depths during a 1% Annual Exceedence Probability flood event range from 3 to 10 feet increased depth at the USGS stream gauge in Richmond, Texas. Further, a structural flooding solution would reduce risk unless it fails increasing the risk to life safety. Erosion threatens evacuation routes and increases the risk of levees failing. The failure would increase the area subject to flooding. There is no identified critical infrastructure at risk of flooding.
- <u>Has the Governor of an affected state requested a peer review by independent experts?</u> The Texas Governor has not requested a peer review by independent experts.
- <u>Will the project likely involve significant public dispute as to the project's size,</u> <u>nature, or effects?</u> The project is not likely to involve significant public dispute on size, nature, or effects. This is based on the teams experience with projects in the general area and that similar solutions to the proposed alternatives have been implemented with no significant public dispute.
- <u>Is the project/study likely to involve significant public dispute as to the economic or</u> <u>environmental cost or benefit of the project?</u> The study will not likely involve significant public dispute as to the economic or environmental cost or benefit of the project.
- <u>Is the information in the decision document or anticipated project design likely to</u> <u>be based on novel methods, involve innovative materials or techniques, present</u> <u>complex challenges for interpretation, contain precedent-setting methods or</u>

models, or present conclusions that are likely to change prevailing practices? The information in the decision document is not anticipated to be based on novel methods or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices.

- <u>Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule?</u> The project does not require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule.
- <u>Is the estimated total cost of the project greater than \$200 million?</u> The anticipated total cost of the project could be more than \$200 million.
- <u>Will an Environmental Impact Statement be prepared as part of the study?</u> It is anticipated that there will not be significant environmental impacts and that an Environmental Assessment will be prepared.
- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? The project is not anticipated to have significant adverse impacts on scarce or unique tribal, cultural, or historic resources. The project team is working to avoid and minimize impact to cultural resources through background research and on going consultation with the Texas Historical Commission. Futher, six federally recognized tribes have been invited to participate in the development of an anticipated programmatic agreement.
- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures? The project is not expected to have substantial adverse impacts on fish and wildlife species and their habitat.
- 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? The project is not expected to have more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat.

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:

<u>District Quality Control</u>. All decision documents (including data, analyses, environmental compliance documents, etc.) undergo DQC. This internal review process

covers basic science and engineering work products. It fulfils the project quality requirements of the Project Management Plan.

Agency Technical Review. ATR is 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. If significant life safety issues are involved in a study or project a safety assurance review should be conducted during ATR.

Independent External Peer Review. Type I IEPR <u>may be required</u> 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.

<u>Cost Engineering Review</u>. All decision documents shall be coordinated with the Cost Engineering Mandatory of Expertise (MCX). The MCX will assist in determining the expertise needed on the ATR and IEPR teams. 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.

<u>Model Review and Approval/Certification</u>. EC 1105-2-412 mandates the use of certified or approved models for all planning work to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions.

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 further detailed in this section of 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.

| Product(s) to undergo Review | Review Level | Start Date | End Date | Cost | Complete |
|-------------------------------------|-----------------------------|------------|----------|-----------|----------|
| Draft Feasibility Report and EIS | District Quality Control | 11/6/19 | 11/18/19 | \$35,000 | No |
| Draft Feasibility Report and EIS | Agency Technical Review | 12/9/19 | 1/24/20 | \$55,000 | No |
| Draft Feasibility Report and EIS | Type I IEPR | 12/9/19 | 3/20/20 | \$120,000 | No |
| Draft Feasibility Report and EIS | Policy and Legal Review | 12/9/19 | 2/9/20 | n/a | No |
| Final Feasibility Report and EIS | District Quality Control | 1/25/21 | 2/26/21 | \$30,000 | No |
| Final Feasibility Report and EIS | Agency Technical Review | 3/2/21 | 4/2/21 | \$35,000 | No |
| Final Feasibility Report and EIS | Policy and Legal Review | 4/16/21 | 7/19/21 | n/a | No |

Table 1: Levels of Review

a. DISTRICT QUALITY CONTROL

The home district shall manage DQC and will appoint a DQC Lead to manage the local review (see EC 1165-2-217, section 8.a.1). The DQC Lead should prepare a DQC Plan and provide it to the RMO and MSC prior to starting DQC reviews. Table 2 identifies the required expertise for the DQC team.

| 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 |
| <u>Feenerice</u> | riverine flood risk management. |
| Economics | A senior economist with experience in analysis of |
| | demographics, land use, and llood damage assessments |
| | using HEC-FDA, use of RECONS model to address |
| | preject: discussion of other appiel offects (OSE) associated |
| | with flood risk; and economic justification of EPM projects |
| | in accordance with current USACE policy |
| Environmental | A senior environmental resources specialist with |
| Resources | experience with environmental evaluation and compliance |
| | requirements pursuant to the "Procedures for |
| | Implementing NEPA" (FR 200-2-2) national environmental |
| | laws and statutes applicable Executive Orders and other |
| | federal planning requirements for Civil Works projects. |
| | including mitigation planning. |
| Cultural Resources | A senior cultural resource specialist with experience with |
| | cultural resource survey methodology, area of potential |
| | effects, Section 106 of the National Historic Preservation |
| | Act, and state and federal laws/executive orders pertaining |
| | to American Indian Tribes. |
| Hydrology | A hydrologist with experience in urban hydrology, HEC- |
| | HMS and associated one and/or two-dimensional models, |
| | floodplain delineation, risk and uncertainty analysis, and a |
| | number of other closely associated technical subjects. |
| | The hydrologic reviewer could also serve as the hydraulic |
| | |
| Hydraulic Engineering | A hydraulic engineer with experience with river hydraulics, |
| | HEC-GeoRAS, HEC-RAS and associated one and/or two- |
| | umensional models, nyarologic statistics, sediment |
| | dimensional models, hydrologic statistics, sediment transport analysis, channel stability analysis, risk and |

| Table 2: | Required | DQC | Expertise |
|----------|----------|-----|-----------|
|----------|----------|-----|-----------|

| | uncertainty analysis, and a number of other closely associated technical subjects. The hydraulic reviewer could also serve as the hydrology reviewer. |
|-------------------------------|---|
| Engineering – Geotechnical | A geotechnical engineer with experience with levee and streambank stabilization design, construction, and maintenance. |
| Engineering – Structural | A structural engineer with experience in levee and bridge design, construction, and maintenance. |
| Cost Engineering | A cost engineer with experience using required cost estimation software; working knowledge of construction and FRM; capable of making professional determinations based on experience. |
| Engineering – Civil | A civil engineer with experience in feasibility-level design of FRM projects including but not limited to site selection and evaluation of alternative layouts and alignments; engineering requirements relating to lands, easements, right-of-ways, and borrow and disposal sites necessary for the construction, operation, and maintenance of the project; and determination of facility/utility relocations required for projects. |
| Real Estate | A real estate specialist with experience in development of SMART Planning Real Estate Plans and have experience in real estate fee/easement acquisition and residential/business relocations for Federal and/or Federally-Assisted Programs as needed for implementation of Civil Works projects. |

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. 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 completed DQC should be provided to the MSC, RMO and ATR Team leader 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).

Recommended Best Planning Practice: Use DrChecks software to document DQC. Attach a DrChecks report to the DQC Certification to help illustrate the thoroughness of the DQC.

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. An 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.

| 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). |
| Planning | A senior water resources planner with experience in riverine flood risk management. |
| Economics | A senior economist with experience in analysis of demographics, land use, and flood damage assessments using HEC-FDA; use of RECONS model to address RED associated with a project; discussion of OSE associated with flood risk; and economic justification of FRM projects in accordance with current USACE policy. |
| Environmental Resources | A senior environmental resources specialist with experience with environmental evaluation and compliance requirements pursuant to the "Procedures for Implementing NEPA" (ER 200-2-2), national environmental laws and statutes, applicable Executive Orders, and other federal planning requirements for Civil Works projects, including mitigation planning. |
| Cultural Resources | A senior cultural resource specialist with experience with cultural resource survey methodology, area of potential effects, Section 106 of the National Historic Preservation Act, and state and federal laws/executive orders pertaining to American Indian Tribes. |
| Hydrology | A hydrologist with experience in urban hydrology, HEC- HMS and associated one and/or two-dimensional models, floodplain delineation, risk and uncertainty analysis, and a number of other closely associated technical subjects. The hydrologic reviewer could also serve as the hydraulic reviewer. |
| Hydraulic Engineering | A hydraulic engineer with experience with river hydraulics, HEC-GeoRAS, HEC-RAS and associated one and/or two- dimensional models, hydrologic statistics, sediment transport analysis, channel stability analysis, risk and |

 Table 3: Required ATR Team Expertise

| | uncertainty analysis, and a number of other closely associated technical subjects. The hydraulic reviewer could also serve as the hydrology reviewer. |
|--|---|
| Engineering - Geotechnical | A geotechnical engineer with experience with levee and streambank stabilization design, construction, and maintenance. |
| Engineering – Structural | A structural engineer with experience in levee and bridge design, construction, and maintenance. |
| Engineering – Civil | A civil engineer with experience in feasibility-level design of FRM projects including but not limited to site selection and evaluation of alternative layouts and alignments; engineering requirements relating to lands, easements, right-of-ways, and borrow and disposal sites necessary for the construction, operation, and maintenance of the project; and determination of facility/utility relocations required for projects. |
| Cost Engineering | A cost engineer with experience using required cost estimation software; working knowledge of construction and FRM; capable of making professional determinations based on experience. |
| Real Estate | A real estate specialist with experience in development of SMART Planning Real Estate Plans and have experience in real estate fee/easement acquisition and residential/business relocations for Federal and/or Federally-Assisted Programs as needed for implementation of Civil Works projects. |
| Climate Preparedness and Resilience CoP Reviewer | A member of the Climate Preparedness and Resiliency Community of Practice (CoP) will participate in the ATR review. The reviewer should have knowledge of inland climate change assessment policy and practice. This role can be filled by another discipline. |
| Risk and Uncertainty | A subject matter expert in multi-discipline flood risk analysis to ensure consistent and appropriate identification, analysis, and written communication of risk and uncertainty. This role can be filled by another 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 project study.

Decision on Type I IEPR. As shown in Section 1, the mandatory trigger outlined in CECW-CE Memorandum dated 5 April 2019, subject: Interim Guidance on Streamlining Independent External Peer Review (IEPR) for Improved Civil Works Project Delivery, that is met is the potential for a project exceeding \$200M. Additionally, potential structural solutions have the potential to increase the life safety risk, and if structural solutions are included as part of the selected plan, the IEPR would also include a Safety Assurance Review per EC 1165-2-217.

Products to Undergo Type I IEPR. The full draft report and appendices 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.

| IEPR Panel Member Disciplines | Expertise Required |
|-------------------------------|---|
| Economics | Experience in analysis of demographics, |
| | land use, and flood damage assessments |
| | discussion of other social effects (OSE) |
| | associated with flood risk; and economic |
| | justification of FRM projects in |
| | accordance with current USACE policy. |
| Environmental | Inland environmental resources specialist |
| | with experience with environmental |
| | evaluation and compliance requirements |
| | pursuant to national environmental laws |
| | and statutes, applicable Executive |
| | Orders, and other federal planning |

Table 4: Required Type I IEPR Panel Expertise

| | requirements for Civil Works projects, including mitigation planning. |
|----------------------------|--|
| Engineering – Geotechnical | Extensive experience in geotechnical evaluation of flood risk management structures such as slope stability. This discipline can be covered by another engineering discipline. |
| Engineering – Geomorphic | Extensive experience in geomorphic evaluation of erosion prevention structures. This discipline can be covered by another engineering discipline. |
| Engineering – Hydraulic | Extensive experience in hydraulic evaluation of flood risk management and erosion solutions. |
| Cultural Resources | Experience with cultural resource survey methodology, area of potential effects, Section 106 of the National Historic Preservation Act, and state and federal laws/executive orders pertaining to American Indian Tribes. This discipline can be covered by the environmental panel member. |

Documentation of Type I IEPR. The 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 decision document will summarize the Review Report and USACE response and will be posted on the internet.

Recommended Best Planning Practice: Begin coordination with the RMO very early in the study to allow adequate time for scoping and contracting for the Type I IEPR.

Recommended Best Planning Practice: Follow the Type I IEPR SOP, Appendix C, for step-by-step guidance on how to seek an IEPR exclusion. A copy of the SOP is available on the Planning Community Toolbox at https://planning.erdc.dren.mil/toolbox/library/Misc/Type%20I%20IEPR%20SOP%20Final-2016.pdf

(ii) Type II IEPR.

The second kind of IEPR is Type II IEPR. These Safety Assurance Reviews are managed outside of the USACE and are conducted on design and construction 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 activities before construction begins, and until construction activities are completed, and periodically thereafter on a regular schedule.

Decision on Type II IEPR. A Type II IEPR will be needed during the PED phase on the final design as existing hazards provide a threat to human life.

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 o | decision |
|----------|----------|---------|---------------|--------|--------|---------|---------|-------|----------|
| documen | t: | | | | | | | | |

| Model Name and Version | Brief Model Description and How It Will Be Used in the Study | Certification / Approval |
|--------------------------------|--|------------------------------------|
| HEC-FDA 1.4.2 | The program integrates hydrologic engineering and economic analysis to formulate and evaluate plans using risk-based analysis methods. It will be used to evaluate/compare plans to aid in selecting a recommended plan. | Certified |
| RECONS | The model incorporates impact area data, as well as multipliers, direct ratios (jobs to sales, income to sales, etc.), and geographic capture rates. RECONS will be used to determine the RED benefits of the alternatives. | Certified |
| HSI Models (Species TBD) | Habitat Suitability Index models will be used to quantify habitat quality in determining potential mitigation needs. The specific species required will be determined once potential impacts and mitigation needs have been identified. Selected models will be Approved for use. | Approved |
| LifeSim 1.0.1 | Model estimates life loss with the fundamental intent to simulate population redistribution during an evacuation. Life loss and economic damages are then | Enterprise Life Safety Model |

| determined by the hazard. May be | e used if alternatives | |
|----------------------------------|------------------------|--|
| affect life safety. | | |

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.

These models may be used to develop the decision document:

| Table 6: Engineering Models. | | |
|------------------------------|--|-----------|
| Model Name | Brief Model Description and | Approval |
| and Version | How It Will Be Used in the Study | Status |
| HEC-RAS 5.0 | The software performs 1-D steady and unsteady flow | HH&C |
| (River | river hydraulics calculations and has capability for 2-D | CoP |
| Analysis | (and combined 1-D/2-D) unsteady flow calculations. It | Preferred |
| System) | will be used for steady flow analysis to evaluate the | Model |
| | future without-project and future with-project conditions. | |

Recommended Best Planning Practice: Hold an early coordination call (prior to the Alternatives Milestone) with the appropriate Planning Center(s) of Expertise to discuss model applications and any review needs for approval or certification of the planning models to be employed.

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 reviews. Members may participate from the District, MSC and HQUSACE. The MSC Chief of Planning and Policy will coordinate membership and participation with the office chiefs.

- 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 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.