



DEPARTMENT OF THE ARMY
U. S. ARMY CORPS OF ENGINEERS, GREAT LAKES AND OHIO RIVER DIVISION
550 MAIN STREET
CINCINNATI, OH 45202-3222

CELRD-PD-S

19 April 2019

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Chicago District, ATTN:
CELRC-DE / [REDACTED], 231 South LaSalle Street, Chicago, IL 60604

SUBJECT: LRD Approval of Review Plan for Rio Guayanilla, Guayanilla, Puerto Rico
(P2#476231)

1. Reference: Memorandum, CELRC-DE, 19 October 2018, SUBJECT: Rio Guayanilla, PR Flood Risk Management, Supplemental Review Plan.
2. Chicago District requested MSC approval of the subject Review Plan which presents the approved documentation of accountability and the steps to investigate overbank flooding and erosion threatening infrastructure along the Rio Guayanilla, focusing on prioritizing high risk areas and developing a range of possible structural and non-structural alternatives to reduce flood risk. An IEPR will not be performed.
3. The MSC Review Team has completed its policy compliance and quality assurance review of this Review Plan and found that it is technically correct and policy compliant. I approve the enclosed Review Plan. The District is requested to post the Review Plan to its website. Prior to posting, the names of all individuals identified in the Review Plan and the dollar values of all project costs should be removed.
4. The LRD POC for this action is [REDACTED], CELRD-PD-S, at [REDACTED] or [REDACTED].

BUILDING STRONG and Taking Care of People!

Stephen G. Durrett

Encls

STEPHEN G. DURRETT, PE, SES
Division Program Director

REVIEW PLAN

27 March 2019

Project Name: Rio Guayanilla, Guayanilla, Puerto Rico

P2 Number: 476231

Decision Document Type: Feasibility Report

Project Type: Single-Purpose Flood Risk Management

District: Chicago District (CELRC)

District Contact: [REDACTED]

Major Subordinate Command (MSC): Great Lakes and Ohio River Division (CELRD)

MSC Contact: [REDACTED]

Review Management Organization (RMO): FRM-PCX

RMO Contact: [REDACTED]

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: *Pending*

Date of MSC Approval of Review Plan: *Pending*

Date of IEPR Exclusion Approval: *Pending MSC Approval*

Has the Review Plan changed since PCX Endorsement? No

Date of Last Review Plan Revision: 18 January 2018

Date of Review Plan Web Posting: *(enter date the Review Plan was posted on the district web page)*

Date of Congressional Notifications: *(enter date the RIT notified Congress of IEPR decisions)*

Milestone Schedule

	<u>Scheduled</u>	<u>Actual</u>	<u>Complete</u>
<u>Alternatives Milestone:</u>	19 Dec 18	18 Dec 19	Yes
<u>Tentatively Selected Plan:</u>	24 Sep 19	(enter date)	No
<u>Release Draft Report to Public:</u>	30 Oct 19	(enter date)	No
<u>Agency Decision Milestone:</u>	24 Mar 20	(enter date)	No
<u>Final Report Transmittal:</u>	24 Mar 21	(enter date)	No
<u>Senior Leaders Briefing:</u>	24 Jun 21	(enter date)	No
<u>Chief's Report or Director's Report:</u>	23 Sep 21	(enter date)	No

Project Fact Sheet
27 March 2019

Project Name: Rio Guayanilla, Guayanilla, Puerto Rico

Location: Guayanilla, Puerto Rico

Authority: Section 722 of WRDA 1986

Sponsor: Puerto Rico Department of Natural and Environmental Resources

Type of Study: Single-Purpose Flood Risk Management

SMART Planning Status: 3x3x3 compliant

Study Area: The Rio Guayanilla basin is located within the Municipality of Guayanilla on the southwestern coast of Puerto Rico. The Rio Guayanilla basin is bordered on the west by the Rio Yauco basin on the east by the Rio Tallaboa basin, on the northwest by the Rio Grande de Anasco basin, on the northeast by the upper Rio Grande de Arcibo basin, and on the south by the Caribbean Sea.

The Rio Guayanilla originates at a point near the central mountain range at an elevation of about 1,000 meters (3,280 feet) above mean sea level. The river flows in a southerly direction through steep slopes in the upper part of the basin producing fast runoff velocities and allowing minimal infiltration. The total length of the river channel is approximately 23 kilometers (13.9 miles). The total drainage area of the Rio Guayanilla basin is approximately 96 square kilometers (37 square miles). There are two major rivers, Rio Guayanilla and Rio Macana, which flow through the basin (see Figure 1 on the following page).

Problem Statement: There are significant risks to life and property under the existing and future without project conditions as a result of flooding on Rio Guayanilla. The characteristics of the watershed result in flashy, high-velocity flows carrying significant debris loadings, which make the system especially hazardous. Previous flooding has severely hampered transportation and emergency services, including utilities and designated shelters.

Federal Interest: As established by the Flood Control Act of 1936, flood risk management projects are in the Federal interest if the benefits over the period of analysis are in excess of estimated costs and if the lives and security of people would otherwise be adversely affected. The Rio Guayanilla at Guayanilla, Puerto Rico Reconnaissance Study (USACE 1990) presented that Federal Interest was warranted.

Risk Identification: This study will assess the risk to life safety, property damage, other direct and indirect economic impacts, and potential environmental resource opportunities. It is anticipated that any proposed alternatives from this study would reduce or transform the existing risk, improving the resilience of Guayanilla and the surrounding communities.

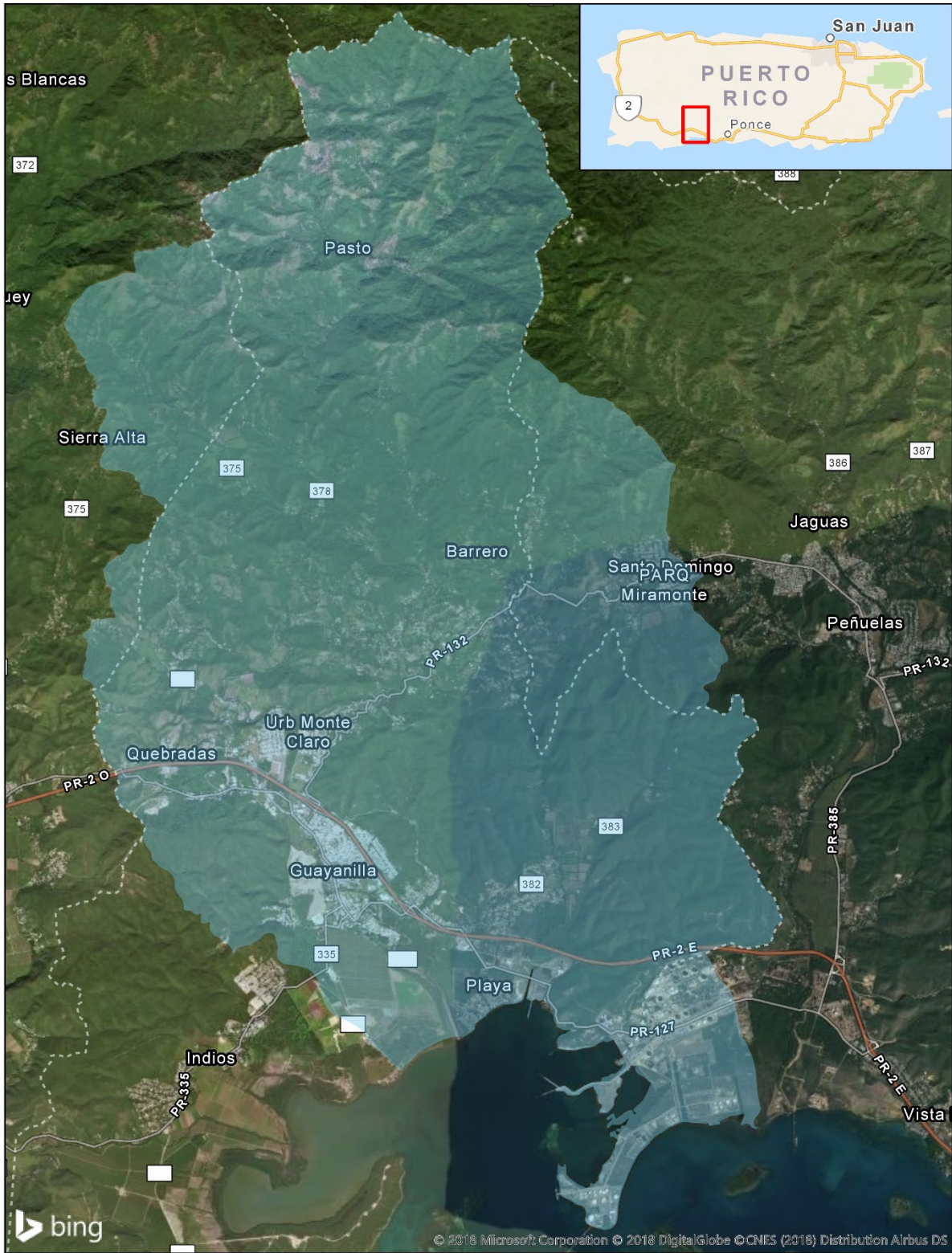


Figure 1: Study Area

1. FACTORS AFFECTING THE LEVELS OF REVIEW

Scope of Review.

- Will the study likely be challenging?

This study will investigate measures to address the impacts of overbank flooding to residential and commercial structures as well as infrastructure such as roadways, bridges and key public facilities in the watershed. It is expected that alternative plans will use established and proven measures for addressing flood risks. Therefore, it is not expected that there will be any significant technical, institutional, or social challenges to the design of the recommended plan.

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

There are primarily three areas of high risk to the study. The first is the availability of engineering and economic baseline data. It is going to take some time to get surveyed data for use in these models, but the team has chosen to mitigate the risk by utilizing high quality and readily available LIDAR data. Survey data will be utilized as it becomes available to check results derived from the early cut using available data. Second, we have concerns about the complexity and availability of the real estate analysis. To mitigate this risk the team will increase communication with the community and more actively engage the vertical team on unique policy issues. The final risk is the use of the full suite of accounts for evaluation and justification of alternatives. The team again will utilize active engagement with the vertical team.

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

Significant flood events occurred in the watershed in 1975, 1979, 1982, 1985, 1996, 1998, 2004, 2008, 2012, and 2017. The 1975 flood, Tropical Storm Eloise, caused over \$1.7 million in damages. During that event, several hundred persons were forced from their homes by the flooding; 99 houses were destroyed and 276 were damaged. Fatalities were reported in the 1975, 1979, 1985, 1998, and 2017 floods (<http://ecoexploratorio.org/amenazas-naturales/inundaciones/inundaciones-en-puerto-rico/#prettyPhoto>). In addition, flood-induced waters, erosion and sediment deposition have induced closures of major area roadways and impeded access to critical facilities including a regional hospital and local fire and police stations. In 2017, Hurricane Maria caused significant overtopping of Rio Guayanilla, and the floodwaters washed out a major bridge and significantly damaged the largest supermarket, a pharmacy, and 106 homes. Several other homes and critical public structures were inundated, banana and coffee fields were destroyed, and the area was left without electricity and telecommunications.

Any plan recommended by the study will provide flood risk management in the watershed, but it is expected that there will also be residual risks associated with the potential for catastrophic project failure and remaining ongoing flooding in some areas of the watershed.

Projects recommended by this study are likely to address not only the economic impacts of flooding, but also life-safety risk. As detailed in Attachment 2, the District Chief of

Engineering Assessment regarding this projects impact on life-safety resulted in the following statement: “The District Chief of Technical Services has determined that a targeted Agency Technical Review (ATR) during the feasibility phase, in addition to the completion of all other standard internal reviews, would ensure any selected alternative would not result in an increased risk to life safety, as compared to the future without project condition. Furthermore, the Chief of Technical Services recommends a Type II IEPR be completed on any potential recommended plan, once the project moves into design and construction.”.

- Has the Governor of an affected state requested a peer review by independent experts?
No. The Governor of Puerto Rico has not requested an external review.
- Will the it likely involve significant public dispute as to the project’s size, nature, or effects?
No, the Feasibility Study is not expected to be controversial. Flooding is a long-term concern of watershed residents and this study is supported by local agencies. Plans will include consideration of mitigation for any impacts of proposed projects. The community is eager to receive any potential relief. The only potential dispute may be in regards to our agency’s focus on NED for evaluation and budgeting decisions. However, we are working with the vertical team to ensure we are addressing all four accounts (NED, RED, OSE, and EQ), within policy limitations.
- Is the project/study likely to involve significant public dispute as to the economic or environmental cost or benefit of the project?
No. See above.
- 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, not at this time.
- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule?
Yes. The hydrologic characteristics of this watershed include severe flash flooding with significant debris. This debris and sedimentation will need to be considered during design, as it could significantly reduce the effectiveness and design life of any engineered feature if ignored. The targeted ATR will include a detailed review of critical structures, including the proposed diversion structure, channel sizing, and levee repairs/ construction to ensure these issues are adequately addressed.
- Is the estimated total cost of the project greater than \$200 million?
No.
- Will an Environmental Impact Statement be prepared as part of the study?
No. An EA or mitigated EA are expected to be sufficient.

- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources?
No.
- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures?
Yes.
- 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?
Yes. The possible source of material for the levees is an area where the Puerto Rican Boa could reside. We have coordinated this with USFWS and have identified the need for a survey and will put in place appropriate mitigation.

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 (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 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.

Cost Engineering Review. 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.

Model Review and Approval/Certification. 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.

Table 1: Levels of Review

(This table will be updated at each IPR and SMART Planning Milestone meeting and presented to the Vertical Team.)

Product(s) to undergo Review	Review Level	Start Date*	End Date*	Cost	Complete
Draft Feasibility Report and EA	District Quality Control	May 28, 2019	June 12, 2019	██████	No
Draft Feasibility Report and EA	Agency Technical Review	JUL 2019	AUG 2019	██████	No
Draft Feasibility Report and EA	Policy and Legal Review	JUL 2019	AUG 2019	n/a	No
Feasibility Design and Associated Information of Key Engineering Features impacting Life Safety	Targeted Agency Technical Review	APR 2020	JUN 2020	██████	No
Final Feasibility Report and EA	District Quality Control	NOV 2020	DEC 2020	██████	No
Final Feasibility Report and EA	Agency Technical Review	DEC 2020	JAN 2021	██████	No
Final Feasibility Report and EA	Policy and Legal Review	JAN 2021	FEB 2021	n/a	No

NOTE: This table may also be used to identify future review work in follow-on phases of a project. This may include products prepared during the pre-construction engineering and design phase or products prepared as part of planning for the Operations and Maintenance phase of a project. This table assumes full calendar months when start or end days are not given.

**estimated dates based on the current schedule. The review table will be updated as the study proceeds.*

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.

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 experience in flood risk management plan formulation and the SMART study process.
Economics	The economics reviewer should have experience with economic analyses to support flood risk management studies, specifically with modeling structural and transportation damages in HEC-FDA, modeling life safety in FIA/LIFESIM, modeling RED in RECONS, recreation analysis, and evaluation of non-structural measures.
Environmental Resources	The NEPA reviewer should be experienced in analysis of impacts as required by the National Environmental Policy Act (NEPA) and other applicable laws, regulations, and executive orders. The reviewer should have some experience with modifying natural river channels for human puposes.
Cultural Resources	See Environmental Resources
Hydrology & Hydraulic Engineering	The hydrology and hydraulics reviewer will be should be a senior engineer with experience using HEC-RAS and a general understanding of open channel one-dimensional unsteady flow hydraulic models in a coastal region. They should have experience with hydrologic models used to produce input hydrographs.
Geotechnical Engineering	The geotechnical reviewer should be a senior engineer with experience in levee design and construction. They should have experience with embankment stability and seepage analyses.
Civil Engineering	The civil engineering reviewer should be experienced in the design of flood risk management projects including levees, reservoirs, and diversion channels, and non-structural measures such as floodproofing and elevations and will be CERCAP certified.
Cost Engineering	The cost engineering reviewer should have experience with preparing cost estimates for flood risk management projects.
Real Estate	The real estate reviewer should have experience with preparing real estate plans for structural and non-structural flood risk management projects.
Climate Preparedness and Resilience CoP Reviewer	A reviewer will ensure the current climate policy was followed in the development of the document.

Risk and Uncertainty	The risk reviewer should be experienced with performing and presenting risk analyses in accordance with ER 1105-2-101 and other related guidance. This review may be combined with the economics or hydrology and hydraulics review.
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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. 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).

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.

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).
Planning	A senior water resources planner with experience in experience in flood risk management plan formulation and the SMART study process and be ATR certified.
Economics	The economics reviewer should have experience with economic analyses to support flood risk management studies, specifically with modeling structural and transportation damages in HEC-FDA, modeling life safety in FIA/LIFESIM, modeling RED in RECONS, recreation analysis, and evaluation of non-structural measures and be ATR certified for FRM Economics.
Environmental Resources	The NEPA reviewer should be experienced in analysis of impacts as required by the National Environmental Policy Act (NEPA) and other applicable laws, regulations, and executive orders. The reviewer should have some experience with modifying natural river channels for human puposes and be ATR certified.
Cultural Resources	See Environmental Resources

Hydrology & Hydraulics	The hydrology and hydraulics reviewer will be should be a senior engineer with experience using HEC-RAS and a general understanding of open channel one-dimensional unsteady flow hydraulic models in a coastal region. They should have experience with hydrologic models used to produce input hydrographs. This reviewer should be CERCAP certified.
Geotechnical Engineering	The geotechnical reviewer will be CERCAP certified and should be a senior engineer with experience in levee design and construction. They should have experience with embankment stability and seepage analyses.
(TARGETED ATR NEED) Structural Engineering	The structural reviewer will be work with the Geotechnical, Hydrology & Hydraulics, and Civil Engineers to ensure the proper design of structural features in regards to performance and how failure or inadequacy could affect the reduction or transformation of the hazard. This reviewer will be CERCAP certified.
Civil Engineering	The civil engineering reviewer should be experienced in the design of flood risk management projects including levees, reservoirs, and diversion channels, and non-structural measures such as floodproofing and elevations and will be CERCAP certified.
Cost Engineering	The cost engineering reviewer will be certified as a reviewer by the Cost MCX, have experience with preparing cost estimates for flood risk management projects, and be CERCAP certified.
Real Estate	The real estate reviewer will be approved by the Real Estate COP as a Flood Risk Management reviewer and have experience with preparing real estate plans for structural and non-structural flood risk management 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.
Risk and Uncertainty	The risk reviewer should be experienced with performing and presenting risk analyses in accordance with ER 1105-2-101 and other related guidance. This review may be combined with the economics or hydrology and hydraulics review.

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.

c. INDEPENDENT EXTERNAL PEER REVIEW
(i) Type I IEPR.

Decision on Type I IEPR. Based upon an assessment of the three mandatory triggers required for an IEPR, the District has determined that an IEPR is not required for the Rio Guayanilla Flood Risk Management Study. The three mandatory triggers are:

- a. The total estimated study cost of the project, including mitigation costs, is greater than \$200 million;
- b. The Governor of an affected State requests a peer review by independent experts;
- c. The Chief of Engineers has determined that the project study is controversial due to significant public dispute over the size, nature or effects of the project or the economic or environmental costs or benefits of the project (including but not limited to project requiring and Environmental Impact Statement.

(i) 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. Attachment 2 documents the desire of LRC to pursue a Type II IEPR once the project reaches detailed design and construction. It is at this time the study team believes the detailed Safety Assurance Review will provide significant value to the proposed project.

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
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

<p>HEC-LifeSim</p> <p>or</p> <p>HEC-FIA 3.0</p>	<p>The study team will quantify life-safety impacts using one of the two available Hydrologic Engineering Center tools, LifeSim or HEC-FIA.</p> <p>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 and economic damages are then determined by the hazard (e.g. flooding).</p> <p>The Hydrologic Engineering Center’s Flood Impact Analysis (HEC-FIA) uses risk based analysis methods to evaluate life loss, population at risk, and other economic damages, including agricultural damages. HEC-FIA evaluates consequences from events defined by hydraulic model output such as depth and arrival time grids or HEC-DSS (stage hydrograph) files.</p>	<p>V. 2.2. is certified; V. 3.0 is currently being certified by the PCX. LifeSim currently undergoing the certification process.</p>
<p>IWR Planning Suite – Mitigation</p>	<p>If mitigation is necessitated, the IWR Planning Suite would be used to perform the Cost Effective / Incremental Cost Analysis. This program assists with plan formulation by combining user-defined solutions to planning problems and calculating the effects of each combination, or “plan.” The program can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are best financial investments and displaying the effects of each on a range of decision variables.</p>	<p>Certified / Approved</p>
<p>RECONS</p>	<p>The model, RECONS, a Regional ECONomic System model was developed by the U.S Army Corps of Engineers (USACE) Institute for Water Resources (IWR) to provide accurate and defensible estimates of regional and national job creation and other economic measures such as income, value added, and sales. RECONS was created as a modeling tool to evaluate the economic impacts of the direct investment and operational spending of the USACE and to estimate forward linkages or effects stemming from USACE business line activities. RECONS may also be used to evaluate economic consequences of USACE projects and programs at a regional level across all business lines.</p> <p>RECONS utilizes the IMpact on PLANning (IMPLAN) software and data system, provided by the Minnesota IMPLAN Group, to estimate the economic impacts of Federal Spending. IMPLAN model(s) were created for each USACE project, and the impact area data, multipliers, direct ratios, and geographic capture rates were extracted from the IMPLAN models and imported into RECONS. Each USACE project, associated with a program code, is linked with one or more county-based impact areas. USACE work activities were identified with single or multiple IMPLAN industry sectors, depending on the complexity of the activity, and are termed “spending profiles.” IMPLAN’s trade flows regional</p>	<p>Certified</p>

	purchase coefficients and margins are primarily utilized, although in some instances they have been customized to more accurately represent USACE expenditures.	
Habitat Units – Mitigation	After additional research into the availability of natural resource data, habitat types and assessment methodologies within the Rio Guayanilla FRM affected study area, there will be no need to create and certify new models for ecosystem analysis. The analyses would be kept simple, yet transparent, and utilize acres congruent to USACE regulatory assessment and NEPA procedures, as critical habitat units for T&E species and in-kind habitat assessment and mitigation would be characterized and qualified. Off the shelf single species or communities models could be utilized as well, which are already approved and certified in the USACE's planning library. Should the USFWS require any additional analyses that would affect cost and schedule, as a result of ongoing consultation, the Review Plan would be updated.	Certified/Not applicable

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
HEC-RAS 5.0 (River Analysis System)	The software performs 1-D steady and unsteady flow river hydraulics calculations and has capability for 2-D (and combined 1-D/2-D) unsteady flow calculations. It will be used for steady flow analysis to evaluate the future without-project and future with-project conditions.	HH&C CoP Preferred Model
HEC-HMS 4.21	Hydrologic model that simulates rainfall-runoff response of a watershed and computes streamflow hydrographs. Will be used to create hydrographs for use in the hydraulic model.	HH&C CoP Preferred Model
MII	MII is the second generation of the Micro-Computer Aided Cost Estimating System (MCACES). It is a detailed cost estimating software application that was developed in conjunction with Project Time & Cost LLC. MII provides an integrated cost estimating system (software and databases) that meets the U.S. Army Corps of Engineers (USACE) requirements for preparing cost estimates. The program will be used to develop cost estimates for alternatives.	Enterprise Model

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.

ATTACHMENT 1: TEAM ROSTERS

PROJECT DELIVERY TEAM			
Name	Office	Position	Phone Number
[REDACTED]	LRC	Project Manager	[REDACTED]
[REDACTED]	LRC	Planner / NEPA / Ecologist	[REDACTED]
[REDACTED]	LRC	Plan Formulator / GIS	[REDACTED]
[REDACTED]	LRC	Water Resources Certified Planner / Leadership	[REDACTED]
[REDACTED]	LRC	Economist	[REDACTED]
[REDACTED]	SPL	Economist	[REDACTED]
[REDACTED]	LRC	Risk Manager / Economist	[REDACTED]
[REDACTED]	LRC	Hydraulic Engineer	[REDACTED]
[REDACTED]	LRC	Environmental Engineer	[REDACTED]
[REDACTED]	LRC	Civil Engineer	[REDACTED]
[REDACTED]	LRC	Civil Design / CADD / GIS	[REDACTED]
[REDACTED]	LRC	Cost Engineer	[REDACTED]
[REDACTED]	LRC	Geotechnical Engineer	[REDACTED]
[REDACTED]	SAJ	Real Estate	[REDACTED]
[REDACTED]	LRC	Office of Counsel	[REDACTED]
[REDACTED]	SAJ	Cultural Resources	[REDACTED]
[REDACTED]	LRC	Public Affairs Office	[REDACTED]

DISTRICT QUALITY CONTROL TEAM			
Name	Office	Position	Phone Number
[REDACTED]	LRC	DQC Lead	[REDACTED]
[REDACTED]	LRC	Economics/Risk Analysis	[REDACTED]
[REDACTED]	LRC	NEPA/Environmental Resources/ Cultural Resources	[REDACTED]
[REDACTED]	LRC	Hydrology & Hydraulics and Climate Change	[REDACTED]
[REDACTED]	LRC	Geotechnical Engineering	[REDACTED]
[REDACTED]	LRC	Civil Engineering	[REDACTED]
[REDACTED]	LRC	Cost Engineering	[REDACTED]
[REDACTED]	LRC	Plan Formulation	[REDACTED]

AGENCY TECHNICAL REVIEW TEAM			
Name	Office	Position	Phone Number
[REDACTED]	NAE	ATR Lead / Plan Formulation	[REDACTED]
		Economics / Risk Analysis	
		NEPA / Environmental Resources / Cultural Resources	
		Cultural Resources	
		Hydrology and Hydraulic Engineering	
		Risk Analysis	
		Geotechnical Engineering	
		Civil Engineering	
[REDACTED] NWW	NWW/Cost MCX	Cost Engineering	[REDACTED]
		Structural Engineering	
		Real Estate	
		Climate Preparedness and Resilience CoP Reviewer	

VERTICAL COORDINATION TEAM			
Name	Office	Position	Phone Number
[REDACTED]	LRD	LRD District Liaison	[REDACTED]
[REDACTED]	HQ	Regional Integration Team Planner	[REDACTED]

POLICY REVIEW TEAM			
Name	Office	Position	Phone Number
[REDACTED]	OWPR	Plan Formulation	[REDACTED]
[REDACTED]	LRD	Risk and Uncertainty	[REDACTED]
[REDACTED]	LRD	Plan Formulation	[REDACTED]
[REDACTED]	LRD	Hydraulics	[REDACTED]
[REDACTED]	LRD	Real Estate	[REDACTED]
[REDACTED]	LRD	OC	[REDACTED]
[REDACTED]	LRD	E&C	[REDACTED]
[REDACTED]	OWPR	Economics	[REDACTED]
[REDACTED]	HQ	Environmental	[REDACTED]
[REDACTED]	MVP	Climate Change Preparedness	[REDACTED]

FLOOD RISK MANAGEMENT PLANNING CENTER OF EXPERTISE			
Name	Office	Position	Phone Number
	FRM PCX	Deputy Director	