



DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, U.S. ARMY CORPS OF ENGINEERS
573 BONNEY LOOP, BUILDING 525
FORT SHAFTER, HAWAII 96858-5440

CEPOD-PDC

SEP 14 2020

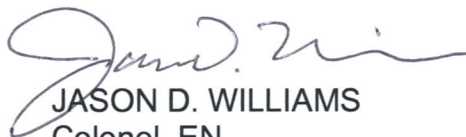
MEMORANDUM FOR Commander, Honolulu Engineer District (CEPOH-PP-C/Milton Yoshimoto), Building 230, Fort Shafter, HI 96858-5440

SUBJECT: Review Plan Approval for Agana River, Guam, General Reevaluation Report, Territory of Guam

1. References:

- a. Engineering Circular 1165-2-217, Review Policy for Civil Works, 20 Feb 18.
 - b. Memorandum, HQ POH, CEPOH-PPC, 23 Jun 20, subject: Review Plan Approval for Agana River, Guam, General Reevaluation Report, Territory of Guam.
 - c. Review Plan for the Agana River, Guam, General Reevaluation Report, Territory of Guam, Honolulu District, U.S. Army Corps of Engineers, Jun 20. (Encl)
2. IAW references 1.a. and 1.b., this memorandum constitutes approval of the Review Plan for the Agana River, Guam, General Reevaluation Report, Territory of Guam, Honolulu District, U.S. Army Corps of Engineers, which does not include a Type I Independent External Peer Review.
3. The approved Review Plan is subject to change as circumstances require, consistent with project development under the Project Management Business Process. Subsequent significant revisions to this Review Plan or its execution require my written approval.
4. POC is Mr. Jason Norris, Pacific Ocean Division Senior Economist, at 304-942-7041 or at Jason.M.Norris@usace.army.mil.

Encl


JASON D. WILLIAMS
Colonel, EN
Acting Commander

REVIEW PLAN

September 2020

Project Name: Agana River, Guam, General Reevaluation Report

P2 Number: 487240

Decision Document Type: General Reevaluation Report & Environmental Assessment

Project Type: Single-Purpose Flood Risk Management

District: Honolulu District (POH)

District Contact: Lead Planner, (651) 323-7178

Major Subordinate Command (MSC): Pacific Ocean Division (POD)

MSC Contact: Planning Chief, (808) 835-4625

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

RMO Contact: NWD/POD Regional Manager, (206) 764-5522

Key Review Plan Dates

Date of RMO Endorsement of Review Plan: 9 June 2020

Date of MSC Approval of Review Plan: Pending

Date of IEPR Exclusion Approval: N/A

Has the Review Plan changed since PCX Endorsement? N/A

Date of Last Review Plan Revision: NONE

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>	March 2020	11 March 2020	Yes
<u>Alternatives Milestone:</u>	9 June 2020	9 June 2020	Yes
<u>Tentatively Selected Plan:</u>	June 2021	(enter date)	No
<u>Release Draft Report to Public:</u>	August 2021	(enter date)	No
<u>Agency Decision Milestone:</u>	November 2021	(enter date)	No
<u>Final Report Transmittal:</u>	October 2022	(enter date)	No
<u>Senior Leaders Briefing:</u>	November 2022	(enter date)	No
<u>Chief's Report:</u>	February 2023	(enter date)	No

Project Fact Sheet

September 2020

Project Name: Agana River, Guam, General Reevaluation Report.

Location: Hagatna, Guam.

Authority: Section 3179 (a) (2) of the Water Resources Development Act of 2007 (Public Law 110-114) and Additional Supplemental Appropriations for Disaster Relief Act of 2019 (Public Law 116-20).

Sponsor: Government of Guam.

Type of Study: General Reevaluation Report & Environmental Assessment.

SMART Planning Status: This study is anticipated to be 3x3x3 compliant.

Project Area: The Territory of Guam is located approximately 3,800 miles west of Honolulu. Guam is the largest island in the Western Pacific (Figure 1). The 209 mi² island of Guam is approximately 30 mi long and ranges from 4 to 8.5 mi wide. The 10.4 mi² Hagatna River drainage basin is situated on the west-central section of the island (Figure 2). Destructive tropical cyclones and heavy rains are frequent occurrences and contribute to an average yearly precipitation of 95 in.

Figure 1. Study Area.



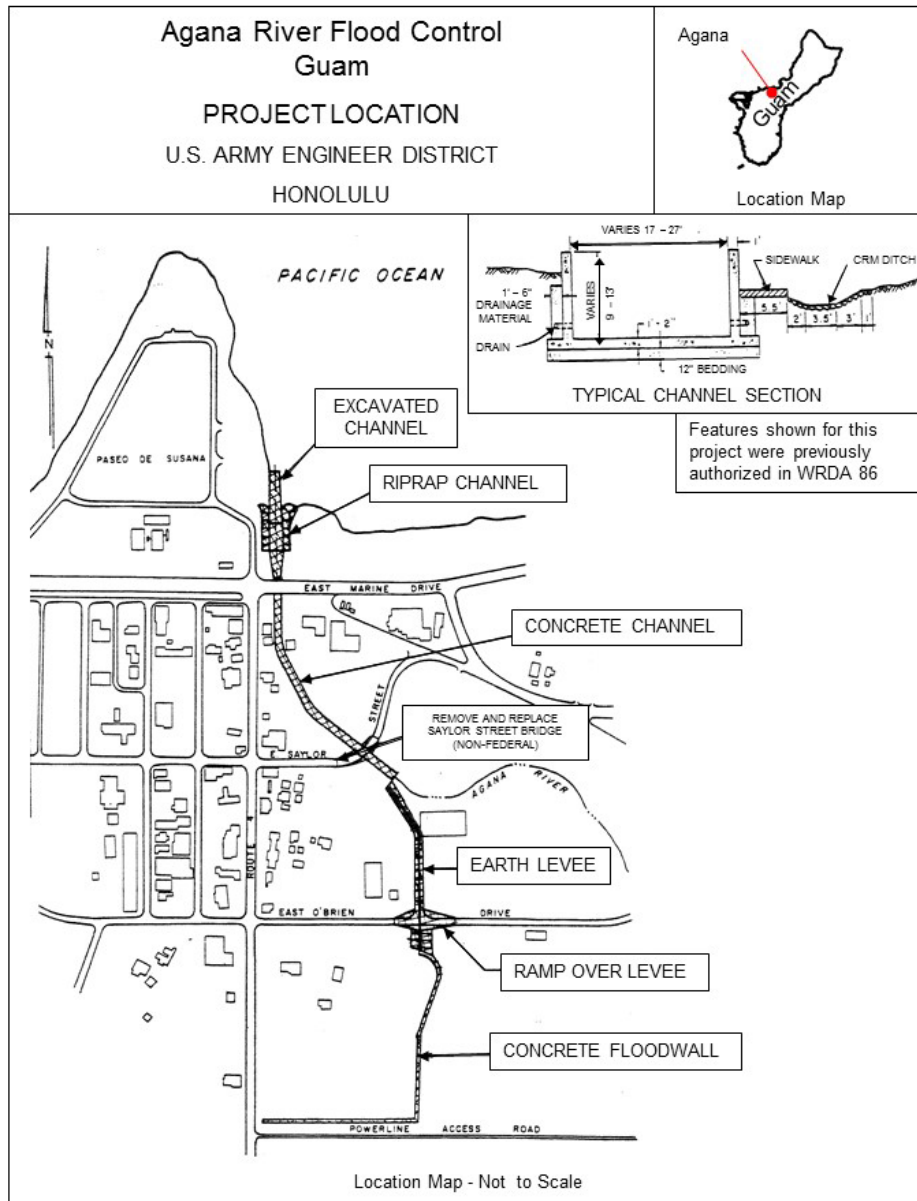
Study History and Background: The project was originally authorized as the Agana River Flood Control Project in Section 401(a) of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662) but never constructed. (Figure 2). The project was administratively de-authorized in 2002 in accordance with Section 1001(b)(2) of the WRDA of 1986, as amended. The project was re-authorized by the WRDA of 2007 (Public Law 110-114) but still not constructed. In order to

address the flood risk management problems in the study area, the Government of Guam sought assistance from the U.S. Army Corps of Engineers (USACE) for the Agana River GRR. The General Reevaluation Report (GRR) will reevaluate flooding

problems on the Hagatna River using updated hydrology and hydraulics (H&H) modeling and will formulate and evaluate alternatives to address flooding problems.

It should be noted that the formal name for this study is the Agana River General Reevaluation Report. However, the local name for the river is Hagåtña. “Agana” will be used when referring to the study, but “Hagatna” will be used when referring to the Hagatna River and City of Hagatna.

Figure 2. Authorized Project (not constructed)



Problem Statement: According to past reports, floods are common occurrences within the Hagatna River basin and have been reported to occur following moderate as well as heavy rain. The portion of the drainage basin extending from the Hagatna Swamp to Hagatna Bay is subject to flooding. Flooding is primarily attributed to the limited capacity of the Hagatna River. Because of the small capacity of the river and relatively flat topography, much of the area adjacent to the river banks is subject to flooding when the existing capacity is exceeded following heavy rain. The problem statements for the study area are based on the flooding problems presented in past reports:

- The Hagatna River is subject to flooding during moderate to heavy rains due to the limited capacity of the river and relatively flat topography.
- Typhoons bring tremendous amounts of rain and violent winds to the Island of Guam, further increasing flood risk in the study area.
- Inadequate interior drainage within the basin contributes to the flooding problem in the project area.

Federal Interest: The City of Hagatna is expected to continue as the governmental, commercial, and financial center of Guam. Consequently, Guam considers the improvement and development of this area to be of vital importance to the economic well-being of the territory.

Property, structures, and infrastructure in the Hagatna River floodplain that are subject to possible flood damage include an extensive network of commercial and governmental buildings, residences, and streets. According to Guam's Hazard Mitigation Plan (HMP, July 2019), there are approximately 45,164 residents in the study area, which includes the villages of Hagatna, Agana Heights, Barrigada, Chalan Pago-Ordot, Mangilao, Mongong-Toto-Maite, and Sinjana. Approximately 3,262 residents, or approximately 7% of the total population of the area, could be affected by flooding based on the designated Special Flood Hazard Area (SFHA), which was determined using the 2007 Guam Flood Insurance Rate Map (FIRM). The FIRM will likely be updated based on new H&H modeling currently being completed by USACE. The information in the paragraphs below describe SFHA characteristics for the 1% Annual Exceedence Probability (AEP) floodplain.

Approximately 1.64 square miles in the study area are affected by flooding (Guam HMP, Table F-9, July 2019). Within the seven villages in the study area, there are an estimated 503 residential and non-residential structures that could be potentially affected by flooding, which represent approximately 4.4% of the total General Building Stock (GBS) in the study area.

In addition to residential and non-residential structures, the 1% AEP floodplain is composed of critical infrastructure including major utilities (e.g., wastewater treatment plant) valued at approximately \$8.5 million, essential facilities (e.g., the Hagatna police precinct and the Emergency Operations Center and Homeland Security/Office of Civil

Defense) valued at approximately \$17 million, and major transportation systems (e.g., Route 4) valued at approximately \$3 million (HMP, Tables E-1, F-1, and F-9, July 2019). In total, it is estimated that critical infrastructure potentially affected by flooding is valued at approximately \$28.5 million.

The General Design Memorandum (GDR) and Supplemental Environmental Impact Statement (SEIS) for the project (July 1985) include the primary analysis and documentation for the existing authorized project. Preliminary average annual cost and total project first cost estimates of alternatives identified in the GDR and SEIS ranged from \$4 million to \$15 million (July 1985 price level). The array of alternatives included traditional structural flood risk management features (channel, levees, and floodwalls) to a non-structural alternative, including numerous relocations, floodproofing, and elevations for nearly 200 structures). Alternatives evaluated in the 1985 GDR had benefit-to-cost ratios ranging between 0.5 and 1.4.

Risk Identification: In accordance with Engineering and Construction Bulletin (ECB) 2019-15 and Planning Bulletin (PB) 2019-04, life safety risk must be assessed during the study. Based on early iterations of the planning process, potential risks to life safety have not been identified, as past reports do not specifically comment on life safety concerns within the study area. However, past reports do indicate severe flooding problems in the study area. As such, review of updated H&H modeling will help confirm whether life safety issues exist. Updated H&H modeling and associated economic analysis will evaluate factors that influence life loss including the depth and velocity of flooding, infrastructure performance, socio-economic characteristics of the population, warning systems, evacuation plans, emergency response, and other preparedness measures. Some of this information is available from past reports but will be verified and updated during the planning process.

Study risks are primarily focused on environmental coordination and compliance activities and will be managed by early coordination and communication with resource agencies. Environmental compliance risks are expected to decrease as alternatives are refined and footprints are confirmed. In addition, there is a high study risk associated with the availability and cost of local materials given the remote location of the study area. This risk will not impact technical evaluation for the study but will likely result in a higher cost estimate and associated contingency.

If updated H&H modeling indicates a significant flooding problem does exist, there are a number of smaller-scale, standard flood risk management measures including levees, floodwalls, concrete channel lining, placement of riprap, and vegetation management that could be evaluated for implementation. These traditional flood risk management measures would not pose significant challenges during technical evaluation or decision making. The previously authorized flood risk management plan includes a levee and floodwall system in the project area. If the TSP includes a new dam or levee, a risk assessment on the TSP will be required to inform design of those project features.

1. FACTORS AFFECTING THE LEVELS OF REVIEW

Scope of Review.

- Will the study likely be challenging? No. The study consists of evaluation of a range of flood risk management alternatives commonly implemented in the region. Accordingly, the study does not have any significant technical, institutional, or social challenges. The Corps has conducted technical evaluations in Guam for several decades and has experience implementing alternatives in the region under different Civil Works mechanisms or authorities. Social challenges are primarily related to the logistical challenges of conducting a study in a remote region, but the Project Delivery Team (PDT) has established strong working relationships with the sponsor, agencies, and stakeholders.

- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks. In general, project risks are expected to be low and will be further evaluated upon review of updated 2D H&H modeling. If updated H&H modeling indicates a significant flooding problem does exist, there are a number of smaller-scale, standard flood risk management alternatives including levees, floodwalls, concrete channel lining, placement of riprap, and vegetation management that could be evaluated for implementation. As described above, life safety risk will also be assessed during the study in accordance with ECB 2019-15 and PB 2019-04.

As described above, study risks are primarily focused on environmental coordination and compliance activities and will be managed by early coordination and communication with resource agencies. Environmental compliance risks are expected to decrease as alternatives are refined and footprints are confirmed. In addition, there is a high study risk associated with the availability and cost of local materials given the remote location of the study area. This risk will not impact technical evaluation for the study but will likely result in a higher cost estimate and associated contingency.

If updated H&H modeling indicates a significant flooding problem does exist, there are a number of smaller-scale, standard flood risk management measures including levees, floodwalls, concrete channel lining, placement of riprap, and vegetation management that could be evaluated for implementation. These traditional flood risk management measures would not pose significant challenges during technical evaluation or decision making.

- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? Based on a qualitative review of existing information, life safety risk appears to be low. However, review of updated H&H modeling will help confirm whether life safety issues exist, and whether the project is likely to be justified by life safety. Finally, the study may introduce incremental risk with the implementation of new levees. If alternatives introduce incremental risk, the study team will address the Tolerable Risk Guidelines per ECB 2019-15 and PB 2019-04.

- Has the Governor of an affected state requested a peer review by independent experts? No. The Governor of Guam has not requested a peer review by independent experts.

- Will it likely involve significant public dispute as to the project's size, nature, or effects? No. Based on prior public involvement activities, there is significant interest in constructing flood risk management infrastructure along the Hagatna River.

- Is the project/study likely to involve significant public dispute as to the economic or environmental cost or benefit of the project? No. The project has been well coordinated with the public during prior study efforts including multiple public outreach events. In general, the public is supportive of the project and there is not significant public dispute as to the economic or environmental cost or benefit of the project.

- 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. Project designs will be based on similar flood risk management projects in the region, including levees, floodwalls, concrete channel lining, placement of riprap, and vegetation management.

- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? No. Project alternatives include standard flood risk management features implemented across the region. The project design is not anticipated to require redundancy, resiliency, or robustness, unique construction sequencing, or an overlapping design/construction schedule.

- Is the estimated total cost of the project greater than \$200 million? No. The recommended plan from the 1986 General Design Memorandum had an estimated total project cost of approximately \$4.9 million. Current costs are expected to be higher due to inflation over time and are expected to be generally higher than typical flood risk management projects on the U.S. mainland due to the remote nature of the project area.

- Will an Environmental Impact Statement be prepared as part of the study? No. It is currently anticipated that an Environmental Impact Statement will not be required. However, if potentially significant impacts are identified during the preparation of the Environmental Assessment, an EIS will be prepared as part of the study. Along the lower reaches of the Hagata River, urban development is immediately adjacent to the river. Because the study area is mostly developed, the likelihood that fish and wildlife species/habitat will be adversely impacted is low. In addition, alternatives are likely to be smaller in scale and footprint, further reducing the likelihood of significant adverse impacts.

- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? No. The project is not expected to have more than negligible adverse impacts to tribal, cultural, or historic resources. A Programmatic Agreement will be developed in coordination with the Guam Historic Preservation Office, which will establish the process for consultation, review, and compliance with Section 106 of the National Historic Preservation Act.

- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures? No. The project is not expected to have substantial adverse impacts on fish and wildlife species. As described above, the study area is mostly developed and alternatives are likely to be smaller in scale and footprint, reducing the likelihood of significant adverse impacts on fish and wildlife species.

- 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? No. The project is not expected to have more than a negligible adverse impact on endangered or threatened species. Based on review of existing information, the Agana swamp is considered important habitat for migratory waterfowl and may provide habitat for the federally listed Mariana Gallinule, Guam rail, and nightingale reed-warbler. Other locations within the study area are mostly developed. As described above, alternatives are likely to be smaller in scale and footprint, reducing the likelihood of significant adverse impacts on endangered or threatened species.

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 fulfills 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 Center 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. Engineer Circular (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. Engineer Regulation (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

Product(s) to undergo Review	Review Level	Start Date	End Date
Technical Approach (Critical Assumptions, Methods and Models for H&H, Economics) ¹	District Quality Control Agency Technical Review (Targeted)	June 2020	July 2020
Future Without-Project Condition: H&H and Economics ²	District Quality Control	July 2020	August 2020
Future Without-Project Condition: H&H and Economics ³	Agency Technical Review (Targeted)	August 2020	September 2020

¹ Targeted ATR of the technical approach to the modeling effort to confirm scope, and study, methods, and model assumptions for future without project and future with project conditions are appropriate. This would be completed shortly after the Alternatives Milestone Meeting and prior to the targeted DQC and ATR of H&H and Economic future without-project conditions. DQC may be completed concurrent with this ATR effort. ATR disciplines include H&H and Economics.

² Targeted DQC of H&H and Economic future without project conditions would be completed prior to targeted ATR effort. Targeted ATR focuses on a review of economic inputs (H&H, structure inventory, etc.) to HEC-FDA, a review of the HEC-FDA models, and a review of the results (expected annual damages and project performance) coming out of the HEC-FDA models. DQC disciplines include H&H and Economics.

³ Targeted ATR focuses on a review of H&H methods, models, and outputs, prior to or concurrent with review of economic inputs (H&H, structure inventory, etc.) to HEC-FDA, the HEC-FDA model, and future without project condition results (expected annual damages and project performance). ATR disciplines include hydrology and hydraulics, climate change, and economics. Other disciplines may include planning and/or geotechnical, if needed.

Product(s) to undergo Review	Review Level	Start Date	End Date
Draft GRR and EA	District Quality Control	June 2021	July 2021
Draft GRR and EA	Agency Technical Review	August 2021	September 2021
Draft GRR and EA	Policy and Legal Review	August 2021	September 2021
Final GRR and EA	District Quality Control	June 2022	July 2022
Final GRR and EA	Agency Technical Review	July 2022	August 2022
Final GRR and EA	Policy and Legal Review	October 2022	November 2022

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 formulation, evaluation, and selection of alternatives for flood risk management.
Economics	The Economics reviewer should have experience in evaluating flood risk management projects including developing and completing Hydrologic Engineering Center – Flood Damage Analysis (HEC-FDA) model analyses to support alternatives evaluation and plan selection.
Environmental and Cultural Resources	The Environmental Resources reviewer should have knowledge of Pacific Island biology and experience on riverine projects. Knowledge of Federal regulations and the National Environmental Policy Act (NEPA) is also required.
Hydrology and Hydraulic Engineering	The H&H Engineering reviewer should have experience designing flood risk management projects including typical structural and non-structural features, and have knowledge of GRR requirements for flood risk management engineering. Knowledge of Hydrologic Engineering Center – River Analysis System (HEC-RAS) unsteady-state modeling is also required.
Civil Engineering	The Civil Engineering reviewer should have experience designing flood risk management projects including typical structural and non-structural features, and have knowledge of GRR requirements for flood risk management engineering.
Geotechnical Engineering	The Geotechnical Engineering reviewer should have experience designing flood risk management projects including typical structural and non-structural features. The reviewer should also have experience with risk assessments including the estimation and portrayal of risk.

DQC Team Disciplines	Expertise Required
Cost Engineering	The Cost Engineering reviewer should have experience using Micro-Computer Aided Cost Estimating System (MCASES) and experience developing cost estimates for flood risk management projects.
Real Estate	The Real Estate reviewer should have experience developing Real Estate Plans supported by appropriate analyses for flood risk management projects.
Levee Safety Officer (LSO)	Per PB 2019-04, if a study proposes modification to existing levees or new levees, the DQC review team will include the levee safety officer to review requirements related to life safety and risk assessments in coordination with the Levee Safety Program Manager (LSPM).
Office of Counsel (OC)	An OC reviewer will conduct a legal sufficiency review.

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).

ATR Team Disciplines	Expertise Required
Planning	A senior water resources planner with experience in formulation, evaluation, and selection of alternatives for flood risk management.
Economics	The Economics reviewer(s) must be certified for review of flood risk management projects. Depending upon availability, multiple economics reviewers may be required to cover the following areas of the analysis: reviewing the assumptions, methodologies, analysis and conclusions; reviewing HEC-FDA economic modeling; and, if applicable, reviewing HEC-LifeSim life safety modeling results.
Environmental Resources	<p>The Environmental Resources reviewer should have knowledge of Pacific Island biology and experience on riverine projects. Knowledge of Federal regulations and NEPA is also required.</p> <p>The Environmental Resources reviewer may be combined with the Cultural Resources reviewer.</p>
Cultural Resources	<p>The Cultural Resources Reviewer should be a senior archaeologist with experience on Section 106 compliance for flood risk management studies, including development and execution of Programmatic Agreements.</p> <p>The Cultural Resources reviewer may be combined with the Environmental Resources reviewer.</p>
Hydrologic Engineering	<p>The Hydrologic Engineering reviewer should have experience designing flood risk management projects including typical structural and non-structural features, tropical storms, and knowledge of requirements for flood risk management engineering. Knowledge of HEC-RAS unsteady-state modeling, flood frequency analysis, and HEC-HMS hydrologic modeling is also required.</p> <p>The Hydrologic Engineering reviewer may be combined with the Hydraulic Engineering reviewer.</p>
Hydraulic Engineering	The Hydraulic Engineering reviewer should have experience designing flood risk management projects including typical structural and non-structural features, and have knowledge of GRR requirements for flood risk management engineering. Knowledge of HEC-RAS unsteady-state and HEC-HMS hydrologic modeling is also required. They should also be experienced in interior drainage design, channel stability, bridge scour, and managed overtopping.

ATR Team Disciplines	Expertise Required
	The Hydrologic Engineering reviewer may be combined with the Hydraulic Engineering reviewer.
Real Estate	The Real Estate reviewer will have experience in development of SMART Planning Real Estate Plans and will have experience in verification of considerations of utility relocations, and staging.
Risk and Uncertainty	The risk and uncertainty reviewer should be a subject matter expert in multi-discipline flood risk analysis to ensure consistent and appropriate identification, analysis, and written communication of risk and uncertainty per ER 1105-2-101 and life safety per PB 2019-04 and ECB 2019-15 if needed. The reviewer may be combined with the Economics, Geotechnical, and/or H&H disciplines if all qualifications are met.
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 experience in inland climate change and sea level rise. The reviewer may be combined with the H&H reviewer.
Cost Engineering	The Cost Engineering reviewer will be identified by the Cost MCX and will have experience using MCACES and experience developing cost estimates for flood risk management projects.
Civil Engineering	The Civil Engineering reviewer should have experience designing flood risk management projects including diversion structures, and have knowledge of General Investigation requirements for flood risk management engineering.
Geotechnical Engineering	The Geotechnical Engineering reviewer should have experience designing flood risk management projects including typical structural and non-structural features. The reviewer should also have experience with risk assessments including the estimation and portrayal or risk including incremental life safety risk, probable failure mode analysis, and life safety consequences if necessary and not covered by other technical expertise.

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 on a risk-informed decision process referencing CECW-CE Memorandum dated 05 April 2019 (Subject: Interim Guidance on Streamlining Independent External Peer Review for Improved Civil Works Project Delivery), a Type I IEPR will not be required. The project does not meet any of the three mandatory triggers for Type I IEPR outlined in the CECW-CE Memorandum: the estimated project cost is well under \$200 million; the Governor of Guam has not requested peer review; and the Chief of Engineers has not determined the project is controversial due to significant public dispute over the size, nature, or effects of the project or environmental costs or benefits of the project.

The decision to not conduct Type I IEPR is also based on a risk-informed assessment regarding the scope and complexity of the project. Information used for the study will be based on methods commonly used for flood risk management development and design, including past experience working in the region. In addition, the project would be for an activity for which there is ample experience with USACE and is not likely to contain influential scientific information. Life safety impacts are expected to be low. Finally, the Chief of Engineers has not determined the project is controversial due to significant public dispute over the size, nature, or effects of the project or environmental costs or benefits of the project.

(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 decision regarding whether or not to conduct Type II IEPR will be made at a later date pending confirmation of Federal Interest in the study.

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 v1.4.2 (Flood Damage Analysis)	The HEC-FDA program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating FRM plans using risk-based analysis methods. The program will be used to evaluate and compare the future without-project and future with-project economic consequences in the study area.	Certified
HEC-LifeSim v1.0	HEC-LifeSim simulates the entire warning and evacuation process for estimating potential life loss resulting from a flood event. During an evacuation, individuals are interacting with the roads, other vehicles, and the incoming flood. Following the warning and evacuation process simulation, HEC-LifeSim calculates lethality for exposed individuals and direct flood damages. By tracking individuals and their movements, HEC-LifeSim helps to identify where people are most at risk of losing their lives, on roads or in structures, and pinpoints the locations of greatest potential life loss risk.	Certified
RECONS v2.0	The Civil Works Regional Economic System (RECONS) Program is a regional economic impact modeling tool that was developed to provide accurate and defensible estimates of regional economic impacts associated with USACE spending. It can be utilized to track progress and justify continued operation, maintenance and construction work performed by the Corps. If an Regional Economic Development (RED) assessment is required for this study, RECONS will be used.	Certified

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
Microcomputer Aided Cost Engineering System (MCACES) 2 nd Generation (MII)	The MCACES MII construction cost estimating software, developed by Building Systems Design, Inc., is a tool used by cost engineers to develop and prepare all USACE Civil Works cost estimates. Using the features in this system, cost estimates are prepared uniformly allowing cost engineering throughout USACE to function as one virtual cost engineering team.	Cost Engineering MCX Required Model / Enterprise Model
HEC-RAS 5.0.7 (River Analysis System)	The HEC-RAS program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for unsteady flow analysis to evaluate the future without- and with-project conditions in the study area.	HH&C CoP Preferred Model
HEC-HMS 4.3	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

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.