Review Plan
U.S. Army Corps of Engineers
South Atlantic Division
Savannah District

AUGUSTA ROCKY CREEK GEORGIA, FLOOD RISK MANAGEMENT, SECTION 205 CONSTRUCTION PROJECT

Richmond County, GA

RMC Approval Date: *19 Jul 2018*

MSC Approval Date: *21 Aug 2018*

Last Revision Date: *8 Aug 2018*

US Army Corps of Engineers®

Contents

1. Purpose and Requirements

a. Purpose

This Review Plan (RP) is intended to ensure a quality-engineering project is developed by the Corps of Engineers for the design and construction of the Rosedale Retention Facility associated with the Augusta Rocky Creek CAP Project. The implementation documents to be reviewed under this review plan are Plans and Specifications (P&S) and a Design Documentation Report (DDR) for the demolition of the existing breached dam and the design and construction of the new retention facility. Also covered under this plan will be the completion and review of a Potential Failure Mode Analysis (PFMA) and, if initiated, Semi-Quantitative Risk Analysis (SQRA).

Review activities consist of District Quality Control (DQC), Agency Technical Review (ATR), as well as a Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review of the design phase of the project, Type II Independent External Peer Review (IEPR). The District Chief of Engineering has assessed that risk of the project could be significant; therefore a Safety Assurance Review (SAR) will be required.

This Review Plan was prepared in accordance with EC 1165-2-217, “Review Policy for Civil Works”. The review plan shall layout a value added process that assures the correctness of the information shown. This review plan describes the scope of review for the current phase of work, and will be included in the Project Management Plan upon approval (P2 #321406). This Review Plan sets the scope and schedule for the construction contract that is envisioned for the project so that required review activities can be scheduled and completed. This review plan will be updated when necessary to address designs or schedule changes.

Since this is a new construction small dry dam, a Potential Failure Mode Analysis and consequence analysis will be used to inform the design. If the consequence analysis determines a potential for loss of life, then a full Semi Quantitative Risk Analysis SQRA will be performed during design. This includes an update after the conclusion of the PFMA/SQRA.

b. Guidance and Policy References

Engineering and Construction Bulletin Number 2016-9, Civil Works Review, Issued 04 March 2016

EC 1165-2-217, Review Policy for Civil Works, 20 February 2018

ER 1110-1-12, Quality Management, 31 Mar 2011

ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999

ER 1110-2-1156, Safety of Dams - Policy and Procedures, 31 March 2014

ER 415-1-11, “Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review”, 1 January 2013

c. Requirements

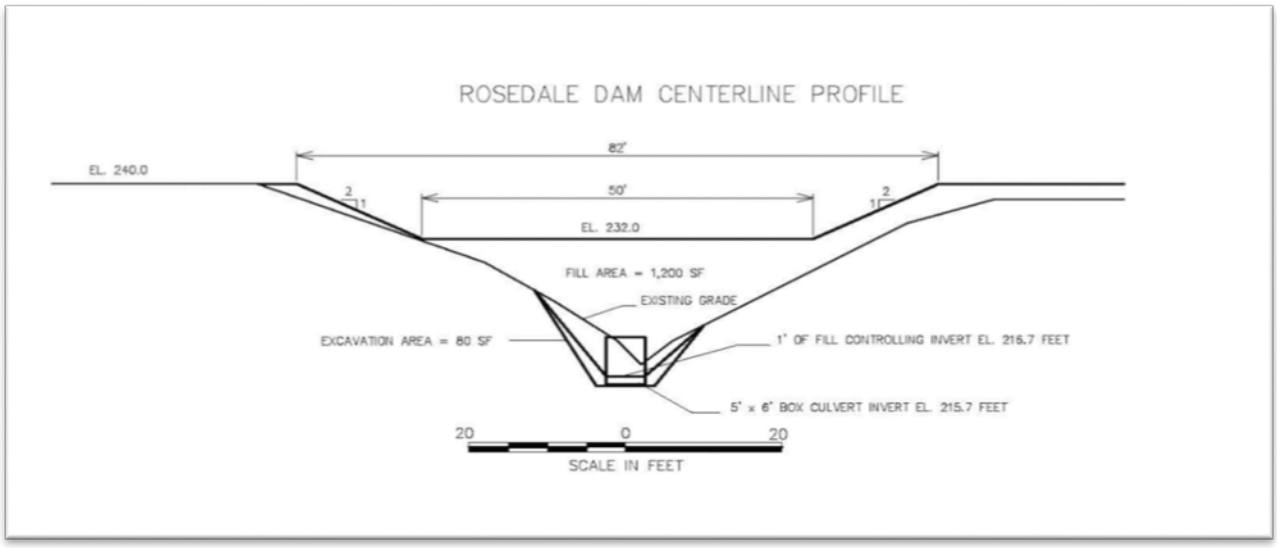
This review plan was developed in accordance with EC 1165-2-217, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The Engineering Circular (EC) outlines four general levels of review: District Quality Control/Quality Assurance, Agency Technical Review, Independent External Peer Review, a Biddability, Constructability, Operability, Environmental, and Sustainability Review, and Policy and Legal Compliance Review. The Review Plan identifies the most important skill sets needed in the reviews and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the individual project. This Review Plan should be provided to the PDT, DQC, IEPR and ATR Teams.

d. Review Management Organization

The Risk Management Center (RMC) is the Review Management Organization (RMO) for this project. Contents of this review plan have been coordinated with the RMC and with SAD. In-Progress Review (IPR) team meetings with the RMC, SAD, and HQ will be scheduled on an as needed basis to discuss programmatic, policy, and technical matters. This review plan will be updated for design or schedule changes. RMC, as RMO, is responsible for assembling the ATR Team and assuring completion of the ATR in accordance with this review plan and USACE guidance. Savannah District is the Designer of Record (DOR) for this project and will assist RMC with management of the ATR and IEPR reviews and development of the draft ATR and IEPR “charges”.

2. Project Description and Information

Rocky Creek lies in the central portion of Augusta, Georgia. The Rocky Creek basin drains approximately 17.2 square miles into Phinzy Swamp. The Rosedale Detention Facility will be located along the upper portion of the Rocky Creek Basin. The proposed location is the site of a former farm pond and dam that underwent a controlled breach in the 1970's. The new retention facility will deconstruct the existing legacy embankment, and reconstruct the embankment with suitable material. The conceptual design is a single 5'x5' box culvert that will pass storms with a magnitude of approximately the 25-year event or smaller without retaining significant pool. The structure will retain a temporary pool during larger events in order to reduce the peak stages downstream. There will be a 50-foot wide emergency overflow spillway to convey flow for events larger than the 100-year event. The detention area would hold a maximum storage volume of 161 ac-ft, a maximum ponded surface area of approximately 14 acres and approximately 23.3 ft of head during full pool. The Rosedale Detention Facility would be classified as a Small Dam under current Georgia Safe Dams criteria. A sketch of the dam centerline profile is shown below.



3. District Quality Control

a. Requirements and Documentation

All implementation documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo a seamless DQC. A DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). DQC will be performed on the P&S and DDR in accordance CESAS Engineering Division Quality Management Plan. In instances where the QMP is unclear or incomplete, EC 1165-2-217, Section 8 DCQ shall be used as guidance.

DQC occurs during the design development process and is carried out as a routine management practice by each discipline. Checklists are utilized by each discipline for each submittal to facilitate the review and to document the DQC review comments.
Certification of the Final Discipline Quality Check and Review is signed by the Branch Chief certifying that the DQC on all design analyses and products have been completed in accordance with the EN QM process prior to release of the final design documents from the Branch.

The DQC review shall ensure consistency and effective coordination across all disciplines and to assure the overall coherence and integrity of the products. Review comments and responses for this review will be documented in DrChecks. The District Quality Control Review shall be certified by the Engineering Technical Lead (ETL) and all applicable Section and Branch Chiefs. This DQC certification signifies that all

Discipline Specific Quality Checks and Review Certification are complete, as well as the Product Quality Control Reviews.

4. Agency Technical Review

a. Requirements for SQRA

ATR for Issue Evaluation Studies conducted using semi-quantitative risk methodology will consist of a review of the technical products by an independent team of USACE dam safety professionals who have past experience with dam safety projects and work products. The team shall be selected by the RMO, and team members will have specialized experience in the analysis and assessment of the deficiencies and risk driver that were identified in the report.

Sine this dam is new construction, there needs to be some level of design completed prior to conducting a PFMA and SQRA. These analyses will take place early in the design process, on or around 25% design completion. If the PFMA produces credible failure modes and a risk to life safety, a full SQRA will be initiated. The SQRA will undergo ATR at the 35% design level.

b. Requirements for PED

Agency Technical Review (ATR) is undertaken to ensure consistency with established criteria, guidance, procedures, and policy in accordance with EC 1165-2-217, ER 10-1-51 and ER 1110-1-12. ATR is mandatory for all implementation documents (including supporting data, analyses, environmental compliance documents, etc.). The ATR will assess whether the analyses presented are technically correct, went through robust DQC, and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. The PDT should obtain ATR agreement on key data such as hydraulic and geotechnical parameters early in design process. The goal is to have early involvement of ATR team, especially when key decisions are made. The ATR Lead should be invited virtually to all PDT meetings, in order to understand the design efforts and to know when to engage other ATR members for concurrence on key decisions. Value added Lessons Learned from the ATR team should be shared early on to have the best chance of being adopted by the PDT. Most of the ATR effort should be accomplished midway through the design effort; after completion of design the ATR effort will check that the effort agreed to at mid-point was accomplished. This is consistent with the requirement that the ATR members shall not be involved in the day-to-day production of the project/product. A site visit will be required.

c. Documentation of ATR for SQRA

The ATR team shall document comments, concerns, and recommendations, in written format using Microsoft Word or DrChecksSM, and shall confirm comments have been adequately addressed in the report using approved back-checking procedures. Four-part comment structure should be used or comments should be provided in a similar manor as directed by the ATR Lead.

d. Documentation of ATR for PED

DrChecks will be used to document all ATR comments during the PED phase, responses and associated resolutions accomplished throughout the review process.

Comments will be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

1. The review concern – identify the deficiency or incorrect application of policy, guidance, or procedures;
2. The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
3. The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
4. The probable specific action needed to resolve the concern.

e. Comment Resolution

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

f. Products to Undergo ATR

An ATR will be performed on the PFMA, SQRA if initiated, contract drawings, technical specifications, and DDR (which will include all relevant design information).

g. Required ATR Team Expertise and Requirements for SQRA

ATR Lead: The ATR team leader will be a senior USACE dam safety professional and will have experience leading and conducting ATR for similar projects and work products. The ATR lead will direct the scope and focus of the review efforts by each discipline. The ATR team leader will be from outside the home MSC and will have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline, in this case, Geotechnical Engineering

Geotechnical Engineer - The geotechnical engineer will have experience in the design, construction, and evaluation of embankment dams, potential failure mode analysis, and dam safety risk analysis. The geotechnical engineer will have experience in subsurface investigations, rock and soil mechanics, internal erosion evaluation, slope stability evaluation, and earthwork construction.

Engineering Geologist - The engineering geologist will have experience in assessing the geologic setting, bedrock geology, unconsolidated deposits, and hydrogeology and correlating the performance of foundations with the significant engineering properties. The engineering geologist will have specialized experience with embankment dam founded on alluvium.

Hydraulics and Hydrology Engineer – The H&H engineer will have experience in the analysis and design of hydraulic structures for dams and will be knowledgeable and experienced with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, evaluation of extreme flood events (e.g., PMF), development of the flood hazard/loading (i.e., stage-frequency and duration relationships), USACE hydrologic and hydraulic modeling, and breach and non-breach inundation for dam safety risk analysis.

Structural Engineer – The structural engineer will have experience evaluating the design, construction, and evaluation of hydraulic structures for dams (including gates/closure structures, flood walls, and penetrations), potential failure mode analysis, and dam safety risk analysis.

Consequences (Economist) – The economist (or consequence specialist) will have experience evaluating flood risk management projects in accordance with ER 1105-2-100 and USACE models and techniques to estimate population at risk, life loss, and economic damages for dam safety risk analysis.

h. Required ATR Team Expertise and Requirements for PED

ATR will be conducted by individuals and organizations that are external to the Savannah District. The ATR Team Leader will be a USACE employee outside the South Atlantic Division. As stipulated in ER 1110-1-12, ATR members are sought from the following sources: regional technical specialists (RTS); appointed subject matter experts (SME) from other districts; senior level experts from other districts; Center of Expertise staff; appointed SME or senior level experts from the responsible district; experts from other USACE commands; contractors; academic or other technical experts; or a combination of the above. The ATR team will be chosen based on each individual's qualifications and experience with similar projects. All ATR team members will be certified in CERCAP: https://team.usace.army.mil/sites/ERDC-CRREL/PDT/atr_certification/default.aspx. The ATR Team will be comprised of the following disciplines; knowledge, skills and abilities; and experience levels.

ATR Lead- The ATR team lead shall be a senior professional outside the home MSC with extensive experience in preparing Civil Works documents and conducting ATRs. The ATR Team Leader should have 10 or more years of experience with Civil Works Projects and have performed ATR Team Leader duties on complex civil works projects. The ATR Team Leader can also serve as one of the review disciplines.

Hydrology and Hydraulics- One or more team members may be required to review

the hydraulic design, navigation design, and wind/wave analyses. The team member(s) will be registered professionals with 10 or more years of experience in conducting and evaluating hydrologic and hydraulic analyses. Experience with HEC-RAS, SEEP/W (or similar groundwater model) and FLO-2D (or similar 2D hydrodynamic model) is required.

Geotechnical Engineering- Team member will have extensive experience in geotechnical evaluation of flood risk management structures such as static and dynamic slope stability evaluation; evaluation of the seepage through earthen embankments; and under seepage through the foundation of flood risk management structures. Experience using SLOPE/W (or similar slope stability model) is required

Structural Engineering- The team member should be a registered professional engineer and have 10 or more years of experience in structural engineering. Experience will include engineering and design of dam outlet works, steel reinforced concrete structures, retaining walls and sheet pile. Experience using STAADPro, RAM Element (or similar 3D structural analysis and design model) is required.

Civil Design- The team member will be a registered professional engineer and have 10 or more years of experience with civil/site work projects to include excavations/embankments, roads and highways, utility relocations, paving and drainage, and prior application of structural flood risk management projects. The team member must be proficient in drafting software, Bentley Microstation and Bentley In-roads

Cost Engineering – Team member will have extensive Corps' experience in the application of scientific principles and techniques to problems of cost estimating, cost control, business planning and management science, profitability analysis, project management, and planning and scheduling.

Real Estate/Lands – Team member will be experienced in federal civil works real estate laws, policies, and guidance.

Environmental Resources – Team member will have a solid background in the habitat types to be found in Central Georgia, understand the factors that influence the reestablishment of native species of plants and animals, and understand requirements for NEPA documentation.

i. Completion and Certification of the ATR

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. The ATR Leader will sign the Review Report. Review Reports will be considered an integral part of the ATR documentation and shall:

1. Identify the document(s) reviewed and the purpose of the review;

2. Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
3. Include the charge to the reviewers;
4. Include line item checks for engineering calculations
5. Describe the nature of their review and their findings and conclusions;
6. Identify and summarize each unresolved issue (if any); and
7. Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR lead will prepare a completion of ATR and Certification of ATR. It will certify that the issues raised by the ATR team have been resolved (or elevated to the vertical team). The completion and certification should be based on the work reviewed to date for the project. A Sample Completion and Certification of ATR can be found in Attachment 1.

5. Independent External Peer Review/Safety Assurance Review

a. Requirements

IEPR may be required for implementation documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-214, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted.

A Type I IEPR is conducted on project studies meeting criteria described in the EC and is of critical importance for those decision documents.

Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

b. Decision on IEPR

A risk-informed decision was made as to whether an IEPR is appropriate based on the factors to consider for conducting a Type I or II IEPR review that are outlined in EC 1165-2-214, Appendix E, Section 2 (a) thru (c).

A Type I IEPR is primarily associated with decision documents. No decision documents are addressed/covered by this Review Plan. Therefore, a Type I IEPR is not applicable to the implementation documents covered by this Review Plan.

This project does trigger WRDA 2007 Section 2035 factors for Safety Assurance Review (termed Type II IEPR in EC 1165-2-214), and therefore, a review under Section 2035 is required. The factors in determining whether a review of design and construction activities of a project are necessary as stated under Section 2035 along with this Review Plan's applicability statements follow.

1. The failure of the project would pose a significant threat to human life.

   The project will hold a pool during certain flood events, and if failure occurred during one of these events, the potential exist for higher downstream stages and larger inundation areas which could potentially pose a higher risk or threat

to human life. Formal consequence estimates will be conducted during design.

2. The project involves the use of innovative materials or techniques.

   This project will utilize methods and procedures used by the Corps of Engineers on other similar works.

3. The project design lacks redundancy.

   The project features and components will contain design redundancy and/or resiliency in the design and construction. The final crest elevation of the structure will be rebuilt to an elevation which will allow for a minimum of 3' freeboard during the required design storm, likely the 25% PMP. The downstream stilling basin will be designed to withstand high velocities that may be experienced during submerged jet conditions, with an appropriate factor of safety.

4. The project has unique construction sequencing or a reduced or overlapping design construction schedule.

   This project's construction does involve sequencing, similar to other FRM projects construction that cross a water body and alter the hydraulics. The construction sequence and schedule has been used successfully by the Corps of Engineers on other similar works.

Based on the discussion above and potential consequences, the District Chief of Engineering, as the Engineer-In- Responsible-Charge, recommends a Type II IEPR Safety Assurance Review of the P&S and DDR and construction associated with this project. This decision may be re-evaluated after consequence modeling, and if the District Chief of Engineering determines that a Type II IEPR is not required, the review plan will be updated and returned to the RMO and MSC for approval.

c. Products to Undergo Type II IEPR

External panels will conduct reviews of the design and construction activities prior to the initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule, and before substantial completion of construction activities. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health, safety, and welfare. This review plan is a "living document" and will be updated to discuss Type II IEPR in more detail once design of the remediation is in process. Specific products that the IEPR panel will be required to review are shown as follows:

1. Site Plans
2. Specifications
3. Geotechnical Design Documentation Report
4. Hydraulic Design Documentation Report
5. Hydraulic Model

6. Record of Final Design
7. Construction documents for the construction phase

d. Required Type II IEPR Panel Expertise

The Type II IEPR panel members will be comprised of individuals that have not been involved in the development of the decision document, meet the National Academy of Sciences guidelines for independence, and will be chosen by and outside organization. The following types of expertise may be represented on the Type II IEPR team:

Hydraulic Engineering Panel Member - The member should be a registered professional engineer with a minimum MS degree or higher in engineering science. Member(s) should have 10-15 years' experience in the analysis and design of outlet works and spillways for embankment dams and 5-10 years' experience in physical and numerical modeling. The panel member(s) should be familiar with USACE application of risk and uncertainty analyses in flood risk management studies and a familiarity with standard USACE hydrologic and hydraulic computer models.

Structural Engineer Panel Member – - The member should be a registered professional engineer as a Civil or Structural Engineer with a minimum MS degree or higher in engineering science. . The member should have a minimum of 15 years' experience in static and seismic design per industry code standards and USACE design regulations for Civil Works projects, dynamic site-specific response spectra analysis and evaluation, and soil-structure interaction evaluation and design. This team member will also have relevant construction experience in the structures being designed and constructed.

Geotechnical Engineering Panel Member – The member should be a registered professional engineer as a Civil or Geotechnical Engineer with a minimum MS degree or higher in engineering science. Minimum 20 years' experience in geotechnical seismic design, and embankment dam design and evaluation. Additionally, at least 10 years' experience in and piping and seepage failure mode analysis, and risk analysis of embankment dams, familiarity with USACE dam safety assurance policy and guidance. The Geotech panel member shall also have relevant construction experience in dam construction.

e. Documentation of Type II IEPR

The Type II IEPR will be managed by an AE firm or Government entity which meets the criteria set forth in EC 1165-2-214. DrChecks^{sm} review software may be used to document the Type II IEPR comments and aid in the preparation of the Review Report but is not required.

Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. Type II IEPR comments should generally include the same four key parts as described for ATR comments in

Section 4. An A/E contractor or Government Entity will be responsible for compiling and entering comments into DrChecks[sm].

No later than 60 days following each milestone, the Type II IEPR panel will prepare a Review Report that will accompany the publication of the final report for the project and shall:

1. Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
2. Include the charge to the reviewers;
3. Describe the nature of their review and their findings and conclusions; and
4. Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

This review report, including reviewer comments and a recommendation letter will be provided to the RMC as soon as they become available. Written responses to the IEPR Review Report will be prepared to explain the agreement or disagreement with the views expressed in the report, the actions undertaken or to be undertaken in response to the report, and the reasons those actions are believed to satisfy the key concerns stated in the report (if applicable). These comment responses will be provided to the RMC for concurrence. The revised submittal will be provided to the RMO with the USACE response and all other materials related to the review.

6. Biddability, Constructability, Operability, Environmental, and Sustainability Review

The value of a BCOES review is based on minimizing problems during the construction phase through effective checks performed by knowledgeable, experienced personnel prior to advertising for a contract. Biddability, constructability, operability, environmental, and sustainability requirements must be emphasized throughout the design process for all programs and projects, including during planning and design. This will help to ensure that the government's contract requirements are clear, executable, and readily understandable by private sector bidders or proposers. It will also help ensure that the construction may be done efficiently and in an environmentally sound manner, and that the construction activities and projects are sufficiently sustainable. Effective BCOES reviews of design and contract documents will reduce risks of cost and time growth, unnecessary changes and claims, as well as support safe, efficient, sustainable operations and maintenance by the facility users and maintenance organization after construction is complete. Savannah District will provide the engineering review and certification.

7. Policy and Legal Compliance Review

Decision and Implementation documents will be reviewed throughout the study process for their compliance with law and policy. These reviews culminate in Washington-level determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the Chief of Engineers. Guidance for policy and legal compliance reviews is addressed further in Appendix H of ER 1105-2-100. When policy and/or legal concerns arise during DQC or ATR that are not readily and mutually resolved by the PDT and the reviewers, the District will seek issue resolution support from the MSC and HQUSACE in accordance with the procedures outlined in Appendix H, ER 1105-2-100. The home district Office of Counsel is responsible for the legal review of each decision document and certification of legal sufficiency.

a. Dam Safety Policy and Procedures

The USACE regulation prescribing the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities is ER 1110-2-1156. Chapter 21 of this document requires that prior to beginning the PED phase the DSO, or his representative, must ensure that the design criteria include the most current dam safety requirements, that a review plan has been developed and approved, and that the design will be properly documented for the project records.

The ER further stipulates that current USACE criteria must be used on all federally funded designs. When the design is being prepared for a sponsor on a cost-reimbursable basis, the district DSO may consider use of state criteria.

In-Progress Review (IPR) meetings will be scheduled with the vertical team to include the RMC on a as need basis, not to exceed monthly intervals. The IPRs will focus on key decisions made during the design process.

A consequences and Potential Failure Mode Analysis (PFMA) will be performed by the SAS Risk Cadre Team for this project to inform the project specific design parameters. The associated failure mode will be described and the design steps taken to prevent the failure from occurring will be presented. The consequences related to failure of the dam from a breach of the dam with the reservoir at maximum pool – no spillway discharge, maximum pool with full spillway discharge and overtopping of the dam will be presented.

If any credible failure modes result from the PFMA, then a Semi Quantitative Risk Analysis (SQRA) will be performed by the SAS Risk Cadre Team

The following plans will be developed and included as a part of the Design Documentation Report (DDR):

- Instrumentation plan
- Operations plan
- Initial filling plan
- Surveillance plan
- O&M manual
- Emergency action plan
- Water control plan
- Safety/security plan

Post construction documentation will include final versions of these plans as well as documentation of the foundation, materials and construction methods.

Engineering considerations and information for field personnel will be developed by the PDT and will be provided for review during the ATR.

8. Review Schedule and Costs

a. Schedule of ATR and DQC Reviews

While DQC and ATR are seamless, the following milestones are scheduled.

Reviews			
PRODUCT	**Activity**	**Preparer**	**Projected Date (subject to change)**
35% Design DQC	Design	SAS	Nov-2018
35% Design ATR	Design & SQRA	SAS	Nov-2018
65% Design DQC	Design	SAS	Dec-2018
65% Design ATR	Design	SAS	Dec-2018
65% VE Study	VE	SAS	Dec-2018
Type II IEPR SAR	Design	SAS	Dec-2018
95% Design DQC	Design	SAS	Mar-2019
95% Design ATR	Design	SAS	Mar-2019
BCOES Review	Design	SAS	Apr-2019

b. ATR Cost

The Savannah District shall provide labor funding by cross charge labor codes. Funding for travel will be provided through government order, if needed. The Project Manager will work with the ATR team leader to ensure that adequate funding is available and is commensurate with the level of review needed. Any funding shortages will be negotiated on a case by case basis and in advance of a negative charge occurring. The ATR team leader shall provide organization codes for each team member and a responsible financial point of contact (CEFMS responsible employee) for creation of labor codes. Reviewers shall monitor individual labor code balances and alert the ATR team leader to any possible funding shortages. ATR review is estimated to be between $50,000 and $80,000.

c. Type II IEPR Schedule and Cost

The schedule for Type II IEPR will be determined as the time period for review draws closer. Interim products for hydrology, hydraulic, geotechnical design, and will be provided to the panel after the design is completed and before physical construction begins. The full Type II IEPR panel will receive the entire set of civil construction plans, technical documents and appendixes concurrent with the DQC and ATR. The final report to be submitted by the Type II IEPR panel must be submitted to the PDT and posted on the District's within 60 days of conclusion of public review. The Type II IEPR is estimated to be $100,000 -
$150,000.

PRODUCT	Projected Date (subject to change)
Prepare Scope of Work	Sept-2018
Award Task Order	Nov-2018
SAR Team identified	Nov-2018
Initiate review	Dec2018
SAR Briefing Meeting	Dec-2018
Draft Report and technical Appendices	Jan-2018
Incorporate comments	Feb-2019
SAR Team back check	Mar-2019

9. Public Participation of Review Plan

As required by EC 1165-2-217, the approved Review Plan will be posted on the Savannah District public review plan website at http://www.sas.usace.army.mil/About/Divisions-and-Offices/Planning-Division/Plans-and-Reports/. This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. This engagement will ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the federal government.

10. Review Plan Approval and Updates

The MSC for this product(s) is the South Atlantic Division. The MSC Commander is has approval authority this Review Plan. The Commander's approval reflects vertical team input (involving the Savannah District, RMC, and MSC) as to the appropriate scope and level of review for the project. Like the PMP, the Review Plan is a living document and may change as the study progresses, the Savannah District is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval will be documented in an attachment to this plan. Significant changes to the Review Plan (such as changes to the scope and/or level of review) will be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commander's approval memorandum, will be posted on the Savannah District public review plan website at http://www.sas.usace.army.mil/About/Divisions-and-Offices/Planning-Division/Plans-and-Reports/ and linked to the HQUSACE webpage. The latest Review Plan should also be provided to the RMO and home MSC.

11. Engineering Model Certification and Approval

The use of certified or approved engineering models is required for all activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The responsible use of well-known and proven USACE developed and commercial

engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. 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. The following engineering models are anticipated to be used:

MODEL
Bentley Microstation V8i
Bentley InRoads Microstation V8i
HEC- RAS
HEC-HMS
HEC-LifeSim
HEC-FIA
SEEP/W, GeoStudio 2012 Version 8.0.9.6484
SLOPE/W, GeoStudio 2012 Version 8.0.9.6484
STAADPro v8.0
Ram Element Version 10.7

Other models may be added as needed as the study progresses. The PDT will coordinate all certification.

ATTACHMENT 2: PARTIAL LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms	Defined
AFB	Alternatives Formulation Briefing
ATR	Agency Technical Review
BCOES	Biddability, Constructability, Operability, Environmental, and Sustainability Review
CAP	Continuing Authorities Program
CERCAP	Corps of Engineers Reviewer Certification and Access Program
CY	Cubic Yards
DDR	Design Documentation Report
DQC	District Quality Control
DQCR	Discipline Quality Control Review
EC	Engineering Circular
EA	Environmental Assessment
ER	Engineering Regulation
ERDC-CERL	Engineer Research and Development Center – Construction Engineering Research Laboratory
ESA	Endangered Species Act
ETL	Engineering Technical Lead
FDEP	Florida Department of Environmental Protection
FONSI	Findings of No Significant Impacts
FSCA	Feasibility and Cost Sharing Agreement
FY	Fiscal Year
GRR	General Reevaluation Report
IEPR	Independent External Peer Review
LPP	Locally Preferred Plan
MCX	Mandatory Center of Expertise
MLLW	Mean Low Low Water
MSC	Major Subordinate Command
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
ODMDS	Ocean Dredged Material Disposal Site
OMB	Office of Management and Budget
OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
P&S	Plans and Specifications
PED	Preconstruction Engineering and Design
PDT	Project Delivery Team
PFMA	Potential Failure Mode Analysis
PM	Project Manager
PMP	Project Management Plan
PPA	Project Partnering Agreement
PQCR	Product Quality Control Review

Acronyms	Defined
QA	Quality Assurance
QCP	Quality Control Plan
QMP	Quality Management Plan
QMS	Quality Management System
RMC	Risk Management Center
RMO	Review Management Organization
RP	Review Plan
RTS	Regional Technical Specialist
SAS	South Atlantic Savannah District Office
SAD	South Atlantic Division Office
SAR	Safety Assurance Review (also referred to as Type II IEPR)
SME	Subject Matter Expert
SQRA	Semi-Quantitative Risk Analysis
USACE	U.S. Army Corps of Engineers
WRDA	Water Resources and Development Act

ATTACHMENT 3: REVIEW PLAN REVISIONS

Non-significant revisions to the District's Procedural Review Plan since the last approval by the Division Commander shall be recorded in the table, below. Significant changes (such as changes to the scope and/or level of review) must be re-endorsed by the RMC and re-approved by the Division Commander via a revised/updated Review Plan.

Description of Revision	Section of the Review Plan	Date of Revision
Clarifying that the SQRA initiation was dependent on the results from the PFMA and consequence estimation. Added ATR team Lead name, added additional consequence models to model list.	1a, 4a, 5b, 11	8-Aug-2018

ATTACHMENT 4: REMOVED TEAM MEMBERS

The following is a list of team members that will be removed prior to posting to the district website.

Name	Discipline	Organization