Project Name (with phase, if applicable) Implementation (NID # or Levee System ID # and 408#) Review Plan

|  |  |  |
| --- | --- | --- |
| APPROVAL RECOMMENDED BY: |  | *(signature)* |
|  |  | Chief of Engineering and Construction DivisionOrganization (Shows agreement with Review Plan (RP) and SAR determination per ER 1165-2-217, add another signature block if the DSO/LSO is not the same as the Chief of Engineering.) |
|  |  |  |
| APPROVAL RECOMMENDED BY: |  | *(signature)* |
|  |  | OPTIONAL BUT RECOMMENDED, For Dams only (delete if levee) Full Name, TypedDirector of Regional Dam Safety Production Center (Shows agreement with RP given oversight function per ER 1110-2-1156) |
|  |  |  |
| ENDORSED BY: |  | *(signature)* |
|  |  | David E. Carlson, P.E., PMPReview Management Organization RepresentativeCEIWR-RMC |
|  |  |  |
| APPROVED BY: |  | *(signature)* |
|  |  | Division Commander or may delegate to MSC Programs Directorate Chief or the MSC Regional Business Directorate Chief, but no further. |

MSC Approval Date: (enter date of approval, or state ‘Pending’ if not yet approved)

Expiration Date: *(Review Plans expire 3 years after approval. Updates and reapprovals are required if the review efforts extend beyond a 3-year period.)*

Last Revision Date: (enter date of last revision or ‘none’ if no changes since last approved by MSC)

EDITORS NOTE: Please review ER 1165-2-217 and EC 1165-2-220 before beginning. Critical thinking of your project’s risk is needed to make this RP scalable for your project. This template is intended for use by Districts that have received a Section 408 request and are required to produce an alteration specific review plan with a Safety Assurance Review (SAR). If a SAR is not required, please use the appropriate RMO’s RP template. Early and frequent coordination between USACE, the requester, and/or non-federal sponsor, if applicable, is strongly recommended. The District will recommend the level of analysis, see EC 1165-2-220 paragraph 8.c and then will write most of the Review Plan, the requester is responsible for providing their A-Es Quality Control Plan, see Attachment 3 and their SAR Plan, see Attachment 4. When the initial submittal is received, the District will create a database entry for that request, including the assignment of a unique identifier (to be automatically generated by the Section 408 database). The unique identifier will be used for tracking purposes throughout the entire Section 408 request process and will be referenced in all correspondence with the requester. The text in blue needs to be updated to be project specific and formatted black or deleted. In order to expedite the endorsement of the RP make sure the information requested in all sections of the plan, especially risk summaries, is included. Use track changes for faster evaluation of the RP. Attachment 2, Project Risk Information, will summarize the most recent risk assessment information for the dam/‌levee. To help assure a systemic approach larger projects in general should have one RP (use TBD for unknown information) and updated as the project progresses. From ER 1165-2-217, “… the PDT must submit an up-to-date RP for each new phase to the MSC for approval within 30 calendar days of receiving funds.” For Section 408 RPs, the completeness determination is the equivalent to receiving funds. Late or outdated RPs as outlined in ER 1165-2-217 will be considered by the RMO/MSC when determining the need for future Quality Audits. **FOR SCHEDULING PLAN ON 14 CALENDAR DAYS FOR THE RMC TO PROVIDE COMMENTS FOR EACH ROUND OF REVIEWS, A COUPLE OF ROUNDS OF COMMENTS ARE THE NORM**. Concurrent RMC/‌MSC reviews are encouraged. For improvement in the next version of review guidance please send concerns or issues to EC217@usace.army.mil.

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## Introduction

### Purpose

This Review Plan (RP) is intended to help ensure quality of the review by the XXX District for the request to alter a US Army Corps of Engineers (USACE) Civil Works project within the District’s area of responsibility. This RP was prepared in accordance with Engineer Circular (EC) 1165-2-220, “Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408”. This RP will be provided to the Technical Review and SAR Teams. The District Chief of Engineering has assessed that the life safety risk of this project is/is not significant; therefore a Safety Assurance Review (SAR) will/will not be required, see Paragraph 4.1.2. If the answer is not “significant” most likely the MSC is the RMO. Any levels of review not performed in accordance with ER 1165-2-217 will require documentation in the RP of the risk-informed decision not to undertake that level of review. The USACE Risk Management Center (RMC) is the Review Management Organization (RMO) for this project. This RP will be updated for additional project phases and for the construction phase.

* 1. **Decision Authority**

Since the project involves a SAR the Division Commander has approval authority for the Section 408. Division Commanders have discretion to render a decision on any or all milestones but must render the decision for the final milestone. The Division Commander can delegate milestone decisions, except for the final milestone, to District Commanders or the District Commanders’ designee. The decision-maker of the Section 408 request, reference paragraph 8 and 12.c.(4) of EC 1165-2-220, will be the approver of alteration-specific review plans.

### Key References

* ER 1165-2-217, Civil Works Review Policy, 01 May 2021 https://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations/u43546q/313136352D322D323137/
* EC 1165-2-220, Policy and Procedural Guidance for Process Requests to Alter U.S. Army Corps of Engineers Civil Works Projects Pursuant to 33 USC § 408. 10 September 2018
* ECB 2019-15, Interim Approach for Risk-Informed Designs for Dam and Levee Projects, 08 October 2019
* ER 1110-2-1156, Safety of Dams – Policy and Procedure, 31 Mar 2014
* EM 1110-2-1913 Design, Construction, and Evaluation of Levees, 30 April 2000
* EC 1165-2-218, USACE Levee Safety Program, 22 April 2021
* ER 1110-1-1807, Drilling in Earth Embankment Dams and Levees, 31 December 2014
* ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999
* RMC-AD-2019-03 Standard Operating Procedure for Type II Independent External Peer Reviews (Safety Assurance Reviews), 28 January 2019
* Project Management Plan (PMP) (provide link), date
* MSC and/or District Quality Management Plan(s) (provide link)
* Any other relevant quality control/quality assurance District/Division guidance
* List related project specific studies
* Include key project specific ER’s, EM’s, EC’s, ETL’s, etc.

The products applicable to determination of impacts to the operation and maintenance of the flood risk reduction project will be reviewed against published guidance, including Engineer Regulations, Engineer Circulars, Engineer Manuals, Engineer Technical Letters, Engineering Construction Bulletins, Policy Guidance Letters, implementation guidance, project guidance memoranda and other formal guidance memoranda issued by HQUSACE. The District will work closely with the requester to determine the applicable USACE standards to be applied and the specific level of detail necessary to be provided for USACE to decide for an alteration request. The requester is responsible for ensuring a proposed alteration meets current USACE design and construction standards.

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## Alteration Specific Background

### Project Description

This section should include a full description of the existing USACE project and proposed alteration. Overview maps and conceptual drawings (if available) should be included if project map is not available. If Google fly-over is available provide a link to the file. As the RP is a standalone document, the reviewers of this section should be able to understand the current risk of the USACE project and the construction and modified operation risk posed by the proposed alteration to ensure the project receives appropriate review by qualified personnel, determine the appropriate decision level, and determine whether review by the appropriate Senior Oversight Group is required. Provide background information of the project along with available risk assessments and the actual alteration being performed (ex. major features of work being constructed, remediation concepts, failure modes addressed, etc.). If the work to be performed will be done using multiple contracts/‌phases, explain the work done per contract/‌phase as the review team requirements may vary per contract/‌phase. If the project duration spans multiple years, explain the schedule and risk assessment updates to be performed and frequency. Summarize what is completed; to include percentage of design or construction for current features. The overall status of the project is xx%, if multiple phases a table should be used. The estimated population at risk is XXX (provide order of magnitude estimated population at risk); this estimate will be updated as refinements are made during future risk assessment efforts. More information on the project and risk associated with the project is provided in Attachment 2. Provide rationale for the determination to either perform or not perform a SAR for each project feature. Sensitive or security related information such as detailed drawings or information revealing infrastructure vulnerabilities and PDT and reviewers’ names should be placed in an appendix of the RP and labeled “Controlled Unclassified Information (CUI) - To be Removed Prior to Posting on District Web Site.” The RP should be vetted through the Office of Counsel and the Security Office for redactions before posting. Note with the publication of EC 1165-2-220 Section 408 RPs are not required to be posted.

### Project Sponsor (if applicable)

Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, Technical Review, Policy and Legal Compliance, BCOES, and SAR reviews. There will/will not be in-kind contributions from the sponsor for this effort. This section should identify the non-Federal sponsor(s) for the project. If the requester is not the non-federal sponsor, the review plan must discuss the opportunities for the non-federal sponsor to provide input on potential impacts to their responsibilities throughout the review process. If there are in-kind contributions describe them in this section and describe how these documents will be reviewed. If the exact extent of sponsor contributions is not known, state that this section of the RP will be updated when further information is available. For USACE projects with a non-federal sponsor, a written “Statement of No Objection” from the non-federal sponsor is required if the requester is not the non-federal sponsor, see EC 1165-2-220, 11.a.

### Phased Review

The requester has submitted on date all information for a Single-Phased Review; USACE will render a decision by date. A Section 408 request is considered complete when all of the basic requirements (reference paragraph 11 of EC 1165-2-220) deemed necessary by the District has been received by USACE; a final Section 408 decision can be made; and will result in a fully functional element once construction is complete.

or

The requester will submit all information for a Multi-Phased Review. The identified project phases are shown in Table 1.

| **Project Phase/Submittal** | **Submission Date** | **Decision Date** |
| --- | --- | --- |
| Initial Phase/Milestone | TBD | TBD |
| Second Phase/Milestone | TBD | TBD |
| Third Phase/Milestone | TBD | TBD |
| Fourth Phase/Milestone | TBD | TBD |
| Construction Phase/Milestone | TBD | TBD |

Table 1. Example of Milestone Submittals Schedule

The District will review the information at each milestone to identify any concerns. Based on the information provided at each milestone, the District will provide a written response providing feedback and a determination as to whether the requester can proceed to the next milestone. For requests using the multi-phased review approach, a completeness determination will be done on each milestone submittal.

### Project Coordination

Discuss anticipated project coordination requirements. Districts are encouraged to adapt existing coordination processes or develop new standard operating procedures to reflect requirements in EC 1165-2-220, 7.h and to support effective and efficient reviews. Requirements for data, analyses, and documentation may be subject to change as additional information about the Section 408 proposal is developed and reviewed. The District determination of the appropriate level of detail will be risk-informed and documented in this review plan. The District should identify timing requirements and communicate early on to the requester anticipated reviews, permits, reports, submissions, environmental, real estate, right of entry, operations and maintenance, procedures for design and construction activities, including documentation, requester’s obligation for their own quality control, submittals, Resident Management System (RMS), bonding, project security, and requirements for as-builts. Discuss the potential considerations for information and/or analyses that may be needed to review alterations to dams and levees listed in Paragraph E-5 of EC 1165-2-220. Depending on the complexity and associated impacts of the proposed alternation on life safety as determined by the Chief of Engineering, the requester may be required to provide a risk assessment showing risk estimates associated with potential failure modes with the proposed alteration in place, see ECB 2019-15. The District must also inform the requester if there is a change in the risk characterization of the dam or levee during the Section 408 review process and how or if the change in risk will require changes to the alteration being requested. The District should work with the requester to develop a realistic project schedule along with the anticipated permits and reviews required throughout the entire 408 process. The District has determined that a hydrologic and hydraulic system analysis is/is not required.

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## Risk Assessment During Design

Risk assessments during design will be performed in accordance with ECB 2019-15. The review activities associated with the risk assessment are to be defined in this RP. Once the risk assessment during design is completed, this RP will be re-visited by the District, MSC, and RMC to determine if the review requirements in this RP need to be revised. Do not wait on the risk assessment to submit the RP as early involvement of the reviews is needed.

The design risk assessment will be reviewed by a small team composed of subject matter experts as deemed appropriate for the project. Note, a DSOG/LSOG representative will be engaged when appropriate. The design risk assessment review will determine if there is a major risk concern, if there is a controversial process being used or if there will likely be a design deviation request. The determination to present a design risk assessment to the DSOG/LSOG will be coordinated through the RMC.

The risk assessment completed near the end of construction will be reviewed by a full risk assessment review team, the review team will be composed of an ATR Lead, Geotechnical Engineer, Hydraulics and Hydrology Engineer, Structural Engineer, and Consequence specialist; the same review team will be used for the risk assessment, design, and construction documents to the maximum extent possible. The district DSO/LSO will be a member of the DQC team for risk assessments. The final risk assessment products and decision documents will be presented to DSOG/LSOG as deemed necessary, the timing of this submission to DSOG/LSOG will be coordinated with the RMC.

**Review Requirements**

### Requester Review Requirements

* + 1. **Quality Control**

A robust Quality Control establishes the foundation of quality through exhaustive reviews ensuring its own work is thorough, rigorous, and scientifically correct. Reviewers outside of the design team place inherent trust in the QC process, believing that every calculation has been verified just like each report page has been spell-checked. Subsequent reviews will be weakened by insufficient QC and should not be relied upon as substitutes for comprehensive QC.

The quality control reviews of all 408 alteration documents are the responsibility of the requester/‌requester’s A-E. For alterations involving professional design services, the requester will be required to submit QC certifications that the design underwent an effective quality control process following an approved A-E Quality Control Plan (QCP), see Attachment 3. All Section 408 documents (including supporting data, analyses, reports, environmental compliance documents, water control manuals, etc.) and risk assessment reports shall undergo QC. The products to undergo QC: This should include but is not limited to the DDRs, Plans and Specifications, Risk Assessments, Construction Schedules, etc.

The A-E’s QCP (use Attachment 3) just needs to show that all work was checked and certified down to the component or sub-component level by independent well qualified reviewers in accordance with Chapter 4 of ER 1165-2-217.

* + 1. **Requester-Led Safety Assurance Review**

Due to the Chief of Engineering’s determination shown in 1.1 the requester is responsible for having a Safety Assurance Review (SAR) performed in accordance with ER 1165-2-217. The District will work with requesters to coordinate the development of the SAR review plan. The District has reviewed the SAR plan provided in Attachment 4 and agrees with the scope in the required experts and milestones that it meets the requirements for a SAR provided in ER 1165-2-217. A SAR shall be conducted on design and construction activities for flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life. SARs will be coordinated through the RMC, external panels will review the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. The charges to the SAR panels complement the Technical Review process and do not duplicate it, the SAR will be accomplished by the requester. A SAR is to be provided by an A/E firm contracted by the requester or arranged with another government agency to manage external to USACE. For a SAR, the selection of the review panel members will use the National Academy of Science (NAS) Policy which sets the standard for “independence” in the review process, therefore the requester or the Requester’s Designer of Record A-E CANNOT directly select the experts. The District will include the requester’s SAR review plan as an appendix to the USACE alteration-specific review plan.

* 1. **District and USACE Review Requirements**
		1. **Technical Review**

The review of this alteration request shall include a Technical Review (TR) in accordance with the guidelines established within this RP. Note Technical Review is also known as Agency Technical Review. In general, the purpose of this review is to ensure the proper application of established criteria, regulations, laws, codes, principles, and professional practices.

* + - 1. Purpose

For the purposes of Section 408, the review team will make the following determinations:

* Impair the Usefulness of the Project Determination. The objective of this determination is to ensure that the proposed alteration will not limit the ability of the USACE project to function as authorized and will not compromise or change any authorized project conditions, purposes or outputs.
* Injurious to the Public Interest Determination. Proposed alterations will be reviewed to determine the probable impacts, including cumulative impacts, on the public interest. The decision whether to approve an alteration will be determined by the consideration of whether benefits are commensurate with risks.
* Legal and Policy Compliance Determination. A determination will be made by the appropriate Office of Counsel as to whether the proposed alteration meets all legal and policy requirements.
	+ - 1. Review Procedures and Documentation of Review

Reviews will be conducted in a fashion which promotes dialogue regarding the quality and adequacy of the required documentation. Insert any additional instructions regarding the objective of the reviews as needed. DrChecksSM review software, or equivalent documentation method, may be used to document all review comments, responses and associated resolutions accomplished throughout the review process. Include a description of the review procedures that will be applied to this proposed alteration. Explain how the review will be coordinated, accomplished, and documented. It may be described qualitatively or with detailed step-by-step procedures. The following is an example of a review procedure: comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment normally include:

(a) The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures;

(b) The basis for the concern – cite the appropriate law, ASA(CW)/USACE policy, guidance or procedure that has not been properly followed;

(c) 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

(d) The probable specific action needed to resolve the concern – identify the action(s) that must be taken to resolve the concern.

The requester or requester’s A-E will provide responses to comments in the three-part structure

1. Concur/Non-Concur
2. A statement that specifically addresses how the commend will be resolved or why there is non-concurrence.
3. A statement that indicates all locations in the document where the change was made, and other features of the report that were impacted by the change.

Once District review has been completed, the District will develop a Summary of Findings package in accordance with paragraph 15 b) of EC 1165-2-220 to serve as the basis for the final recommendation on the proposed alteration.

The Technical Review Team will perform Quality Assurance and assess the Quality Control documentation and make a determination if the QC activities employed appear to be appropriate and effective or deficient. If key material reviewed was beyond the reviewer’s qualifications the RMO will be contacted to find a supplemental reviewer. If there are any unresolved issues describe them in the Summary of Findings. If not, the following language may be used. “There are no unresolved issues associated with the review. It was agreed that the Technical Review comments and the recommended changes and additions would be incorporated into the final version of the record file.” Attach a pdf copy of all the review comments and responses. Ensure involvement for all major decisions of the District Dam/Levee Safety Officer (D/LSO) and Dam/Levee Safety Program Manager (D/LSPM) and for dams the regional DSPC as ER 1110-2-1156 gives them oversight authority. A Summary of Findings does not have to be developed for each individual milestone for the multi-phased review approach but is required when the final milestone is reviewed and must summarize the entire Section 408 decision collectively. Note: The Technical Review will be certified in a way like an ATR report, see ER 1165-2-217, including a completion and certification signed by the District, review lead, RMO, and certified by the District Chief of Engineering.

* + - 1. Products to Undergo Review

List the specific products for the Review Team. This should include but is not limited to the relevant design documents, DDR, Plans, Specifications, risk assessment report(s), environmental report(s), etc. If a multi-phased project is planned a table maybe appropriate, see Table 1.

* + - 1. Required Review Team Expertise and Requirements

The following disciplines will be required for Review of this project:

**The following are examples, update as appropriate.** The disciplines and experience descriptions are a starting point. Add or remove reviewers as appropriate and tailor the experience requirement to the risk inherent in the project (not simply a list of disciplines). The disciplines represented on the Review Team should generally mirror the significant disciplines involved in the accomplishment of the work such as real estate, risk, environmental, planning, economists, etc. If multiple phases of a project require different teams, separate tables for each work product are suggested. Do not include names here but in an attachment.

**Review Lead:** The Review team lead is a senior professional with extensive experience in preparing Civil Works documents and conducting Reviews. The lead has the necessary skills and experience to lead a virtual team through the Review process. The Review lead may also serve as a reviewer for a specific discipline, in this case, List: Structural Engineering, Geotechnical Engineering, etc. (as applicable). If a SAR is required, the ATR Lead should be an engineer/geologist with a strong dam/levee safety background.

**Geotechnical Engineer** - shall have experience in the field of geotechnical engineering, analysis, design, and construction of (Insert type ex. mass concrete) dams. The geotechnical engineer shall have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion protection design, and earthwork construction. The geotechnical engineer shall have knowledge and experience in the forensic investigation of seepage, settlement, stability, and deformation problems associated with high head dams and appurtenances constructed on rock and soil foundations.

**Engineering Geologist** - shall have experience in assessing internal erosion (seepage and piping) beneath (Insert type ex. mass concrete) dams constructed on (Insert project specific ex. bedrock) formations. The engineering geologist shall be familiar with identification of geological hazards, exploration techniques, field and laboratory testing, and instrumentation. The engineering geologist shall be experienced in the design of grout curtains and must be knowledgeable in grout theology, concrete mix designs, and other materials used in foundation seepage barriers.

**Hydraulic Engineer** – shall have experience in the analysis and design of hydraulic structures related to dams including the design of hydraulic structures (e.g., spillways, outlet works, and stilling basins). The hydraulic engineer shall be knowledgeable and experienced with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, Corps application of risk and uncertainty analyses in flood damage reduction studies, and standard Corps hydrologic and hydraulic computer models used in drawdown studies, dam break inundation studies, hydrologic modeling and analysis for dam safety investigations.

**Mechanical Engineer** –shall have experience in machine design, machine rehabilitation and familiarity with design of mechanical gates and controls for flood control structures.

**Structural Engineer** – shall have experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies, and external stability analysis including foundations on high head mass concrete dams. The structural engineer shall have specialized experience in the design, construction and analysis of concrete dams.

**Construction Engineer** – Reviewer should be a senior level, professionally registered engineer with extensive experience in the engineering construction field with particular emphasis on dam safety projects. The Construction reviewer should have a minimum of 10 years of experience.

**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.

**Environmental** - The environmental reviewer should be experienced in National Environmental Policy Act (NEPA) process and analysis, and have a biological or environmental background.

**Real Estate** - Reviewer should be a senior level, experienced in Real Estate Law for dams and levees in the geographic state of the project.

| Milestone Reviews | Geotech | Geologist | Mech | H&H | Structural | Cost | Construction | Environmental | Consequences |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TR 35% Review | X | X |  | X | X | X | X | X |  |
| Design Risk Assessment Report | X |  |  |  | X |  |  |  | X |
| TR 65% P&S Review | X | X |  | X |  | X | X | X |  |
| TR 95% P&S Review | X | X |  | X | X | X | X | X |  |
| TR During Construction | X | X | X |  | X | X | X |  |  |
| Final Risk Assessment Report  | X | X | X | X | X |  |  |  | X |
| *This table will be updated during construction.* |

Table 2. Example of ATR Teams for Milestone Reviews

* + - 1. Review Schedule and Estimated Cost

Although the Technical Review is a seamless process, the preliminary Review milestone schedule is listed in Table 3. The cost for the Technical Review will be approximately $\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| **Project Phase/Submittal** | **Review Start Date** | **Review End Date** | **Site Visit** |
| Review 30% Review | TBD | TBD | X |
| Review 60% P&S Review | TBD | TBD |  |
| Review Final P&S Review | TBD | TBD |  |
| Review During Construction | TBD | TBD | X |
| Note: Include all other relevant reviews. This should include Review reviews scheduled outside of the traditional milestone reviews. |  |  |  |

Table 3. Example of Review Schedule

* + 1. **Senior Oversight Group Review**

As the RMO, the Risk Management Center (RMC) has determined that proposed alteration will/will not be presented to the Dam/Levee Senior Oversight Group (D/LSOG). Address whether the proposed alteration requires review based on whether the benefits of the alteration are generally commensurate with the risks, whether the alteration potentially worsens or creates new failure modes or risk drivers for the USACE project, and whether the alteration is exceptionally complex or high risk*.*

* + 1. **Drilling Program Plan Review** (if applicable)

Drilling Program Plans must be reviewed and approved by the District Dam Safety Officer (Dams)/‌Levee Safety Officer (Levees). If any drilling fluid or other stabilizing or circulating media is proposed, a technical review performed by the Geotechnical and Materials Community of Practice (G&M CoP) Standing Committee on Drilling and Instrumentation is required, see ER 1110-1-1807. The plan will then require approval from the District.

## Review Plan Approval and Updates

The MSC Commander, or delegated official, is responsible for approving this RP. The Commander’s approval reflects vertical team input (involving the District, MSC, and RMC) as to the appropriate scope, level of review, and endorsement by the RMC. The RP is a living document and should be updated in accordance with ER 1165-2-217. All changes made to the approved RP will be documented in Table 11. The latest version of the RP, along with the Commanders’ approval memorandum, will be provided to the RMO The memorandum should include the RP title and date of endorsement.

## Engineering Models

The use of certified, validated, or agency 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 QC, TR SAR (if required), and Policy and Legal Compliance review.Where such approvals have not been completed, appropriate independent checks of critical calculations will be performed and documented. The following engineering models, software, and tools are anticipated to be used:

| Model Name | Version |
| --- | --- |
| Add relevant engineering models used during design and for risk assessments.  |  |
|  |  |

Table 4. Engineering Models and Status

## Review Plan Points of Contact

| Title | Organization | Phone |
| --- | --- | --- |
| RP POC |  |  |
| District 408 Coordinator |  |  |
| Dam & Levee Safety QM | FOR DAMS Preston FergusonFOR LEVEES Emily Calla | Preston.L.Ferguson@usace.army.mil Emily.K.Calla@usace.army.mil |
| Project Manager | Name of company/entity performing design of alteration.  | Please contact the District 408 Coordinator for information on the alteration or reviews.  |

Table 5. RP POC’s

1.

## Team Rosters (CUI)

## (To be Removed Prior to Posting on District Website)

| Discipline/Role | Name | Description of Credentials |
| --- | --- | --- |
| Facilitator |  | Sentence that summarizes experience. |
| List all required disciplines |  |  |

Table 6 Risk Assessment Team

| Discipline/Role | Name | Description of Credentials |
| --- | --- | --- |
| Facilitator |  | Sentence that summarizes experience. |
| List all required disciplines |  |  |

Table 7 Risk Assessment ATR Team

| Discipline | Name | Description of Credentials |
| --- | --- | --- |
| Technical Review Lead  |  | Sentence that summarizes experience. |
| Geotechnical Engineering |  | "PE that has xx years’ experience in the field of geotechnical engineering, analysis, design, subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion protection design, and construction of earthen Dams."  |
| Hydrology and Hydraulics |   | TBD |
| Civil/Structural Engineering |  | TBD |
| Cost Engineering |  | TBD |

Table 8. Technical Review Team

| Discipline | Name | Description of Credentials |
| --- | --- | --- |
| Hydrology and Hydraulics |  | TBD |
| Geotechnical Engineering |   | TBD |
| Civil/Structural Engineering |  | TBD |

Table SAR Panel

| Role | Name | Email |
| --- | --- | --- |
| RP POC |  |  |
| RMC Review Inbox | N/A | RMC.Review@usace.army.mil |
| RMC | Nate Snorteland Dave Carlson John Clarkson | Nathan.J.Snorteland@usace.army.milDavid.E.Carlson@usace.army.milJohn.D.Clarkson@usace.army.mil  |
| Dam & Levee Safety QM | Amy Jo RiffeeEmily Calla | Amy.J.Riffee@usace.army.milEmily.K.Calla@usace.army.mil  |
| FRM-PCX | Eric Thaut | Eric.W.Thaut@usace.army.mil  |
| LSC Director (Levees only) | Noah Vroman | Noah.D.Vroman@usace.army.mil  |
| DSMMCX Director (Dams only) | Pat Morgan | Steven.P.Morgan@usace.army.mil  |
| HQUSACE 408 Coordinator | Virginia Rynk | Virginia.K.Rynk@usace.army.mil |
| Regional DSPC Director (Dams only) |  |  |
| Technical Review Lead |  |  |
| RMC Program Manager(s) |  |  |
| MSC RBT-Chief |  |  |
| MSC DSO/LSO |  |  |
| MSC DSPM/LSPM |  |  |
| Division 408 Coordinator |  |  |
| District E&C Chief |  |  |
| District DSO/LSO |  |  |
| District DSPM/LSPM |  |  |
| District 408 Coordinator |  |  |
| RP Awareness |  |  |

Table 10. Review Plan Distribution

| Revision Date | Description of Change | Page/Paragraph Number |
| --- | --- | --- |
| TBD | RP Revisions should document major changes after endorsement & approval. | TBD |
|  |  |  |
|  |  |  |
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Table 11. RP Revisions

The PDT will update the RP to reflect minor changes as they occur with coordination of the RMC but without the need for re-approval. Re-approval of the RP by the MSC will be required when there are significant changes as outlined in ER 1165-2-217.

**Review Plan Template Updates**:

V1.2 – 8/31/2021 – inserted paragraph in section 4.1.1 regarding robustness of QC and updated EC 1165-2-218 to reflect publication date.

1.

## Project Risk Information (CUI)

## (To be Removed Prior to Posting on District Website)

This section should include a summary of current risk information associated with the project. A summary of the most recent risk assessment, including the most recent DSAC/LSAC should be included. The latest Dam/Levee Safety Fact Sheet (from screening), Levee Risk Management Summary, or Dam/Levee System Summary (from SQRA/QRA) should be attached. As the RP is a standalone document, the reviewers of this section should be able to understand the risks posed by the work being performed to ensure the project receives appropriate review by qualified personnel. Include discussion and justification on risk-informed decisions made to eliminate, reduce, and/or make reviews concurrent. Describe the project, existing risk conditions, risk during construction, efforts to mitigate the risk during construction, possible changes to risk due to the project, and possible impacts to the existing dam/levee system in sufficient enough detail so that appropriate reviewers can be assigned and to affirm the District Chief of Engineering’s determination of life safety threat. Describe factors impacting the level of reviews, to include uncertainties, public controversy, or any operations or real estate concerns.

A summary of cost estimate and schedule should also be included to communicate the expected order-of-magnitude of the project; at the FYXXXX price level with an estimated duration of X to X years. Include additional background information on the project that is not included in the Project Description due to being of a sensitive nature such as detailed drawings or information revealing infrastructure vulnerabilities, population at risk, estimated economic damage potential, etc. Based on current available risk assessment/Although a risk assessment has not yet been performed, the likely potential failure modes associated with the project are: insert potential failure modes.

Describe the risk assessment during design, include how the assessment will take place, at which phase(s) of design the risk assessment will be conducted, what information will be used/available for the risk assessment, the team make-up (will an outside facilitator or team be used?), if only a portion of the dam/levee system will be assessed explain which sections are being considered and reasoning for only assessing a portion of the existing dam/levee system, etc. Also include discussion of how and when the risk assessment will be shared with the design team and how recommendations will be incorporated in the design. The risk assessment performed during the design will have charge questions including verification the risk assessment is based on current best practices resulting in a credible risk assessment, confirming the case is made for the risk estimates, ensuring there is proper documentation to support the design if the design is more or less stringent than traditional standards, there is clear documentation if the risk of the dam/levee system is changed and confirmation of recommendations to be incorporated into the final design of the project with respect to meeting Tolerable Risk Guidelines. Additionally, if a deviation from design standards is being requested this must be clearly documented in the RP with a specific charge to reviewers regarding the deviation request. This RP will be updated with additional project risk information once the risk assessment during design is completed; these updates will be tracked in table in Attachment 3 and coordinated with the RMC and MSC.

The decision to present the design risk assessment to the DSOG/LSOG will be based on factors such as higher risk systems, design deviations, projects with existing risk assessments for which the baseline risk appears to change, and controversial or politically sensitive decisions. The determination to present a design risk assessment to the DSOG/LSOG will be coordinated through the RMC.

1.

## A-E QCP

##  Architect-Engineer (A-E), Sponsor, 408 Requester, or others performing work for USACE

Quality Control Plan

This Quality Control Plan (QCP) template maybe used by A-Es to create an efficient acceptable QCP. This template was created to assist those performing work for USACE, previous QCP efforts from A-Es were excessive but lacked the required information. This template uses the term A-E for all entities performing work for USACE, modify as appropriate. It is acceptable to change the wording and format throughout as needed. The blue text should be edited then changed to black text or deleted as appropriate.

All implementation documents (including design analysis, design documentation reports, plans and specifications, supporting data, reports, graphics, etc.) for task order or contract number will follow this QCP in accordance with ER 1165-2-217. We name of A-E are responsible for our own Quality Control. Name of A-E will perform these required reviews in accordance with this QCP, http://XXX LINK TO LOCATION OF PLAN that describes how the review will be performed. All work submitted and supporting work will be independently checked by well qualified peer reviewers and certified down to the component or sub-component level by independent reviewers in accordance with Chapter 4 of ER 1165-2-217. Reviews will be risk-informed, seamless, and scalable for each effort, commensurate with the level of complexity and relative importance of the actions being supported. State the risks inherent to the project and address any special considerations and/or crucial design features that must be addressed. As the project develops, key decisions will be documented in a technical memorandum and signed by author, peer reviewer, and supervisor or A-E Project Manager. If a portion of the work is given to a supporting A-E, then name of A-E will perform Quality Assurance on this supporting work to assure Quality Control was appropriate and effective. This QC certification is necessary for USACE to help ensure project safety, reliability, and quality of the decisions and products USACE provides to the Nation.

|  |  |
| --- | --- |
| **Design Team** | **Role** |
| Names |  |
|  |  |
| **Quality Control Team** | **Review Responsibilities** |
| Names |  |
|  |  |

Design and Review Quality Control Teams

All work will follow ER 1110-2-1150 Engineering and Design for Civil Works. The documents will contain a full record of design decisions (decision log), assumptions, and methods. Documents should be sufficiently clear so that a reviewer or other individual not familiar with the project could review the documents and understand how the project/analysis evolved into its final recommendation/configuration, and why each key decision was made. Documents should be sufficiently detailed, for each technical specialty, so that the criteria that were used, the critical assumptions that were made, and the analytical methods that were used will be evident for purposes of review and historical documentation. The documents should also contain summaries of important model/calculation results and selected example calculations for all critical elements of the study or design. The documents should be sufficient to support execution of the review process without reference to other records, except for confirming that all supporting documents/computations have been checked.

All work will have Quality Checks. All computations will undergo a rigorous independent check. The reviewer/checker will highlight (e.g., place a “red dot”) on each annotation and number on a computation sheet indicating concurrence with the correctness of the information shown and then initial and date each and every computation sheet being reviewed/checked. Reviewers are required to check computer model computations by having the reviewer place a highlight (e.g., place a “red dot”) on these computations/annotations as well as the model input parameters. All graphics/plans will undergo a rigorous independent check (e.g., place a “red dot”) as part of the Quality Control process. Upon completion of the Quality Control reviews, the author or work group leader will sign a Quality Control certification sheet, see Appendix F, Sample DQC Certification Form from ER 1165-2-217, similar to the example shown below for the product/project feature under their leadership. Name of A-E certifies our work down to the component or sub-component level. From our Work Plan name of A-E anticipates x teams to complete this work therefore there will be (x+1) certification forms submitted including a final form signed by Architect Engineer Project Manager as our last submittal affirming appropriate and effective Quality Control was performed.

**Quality Control Schedule**

Although Quality Control is always seamless, the following milestone reviews are scheduled.

|  |  |  |
| --- | --- | --- |
| **Project Phase/Submittal** | **Review Start Date** | **Review End Date** |
| Quality Control 30% Review | TBD | TBD |
| Quality Control 60% P&S Review | TBD | TBD |
| Quality Control Final P&S Review | TBD | TBD |
| Note: Include all other relevant reviews. This should include Quality Control reviews scheduled outside of the traditional milestone reviews. |  |  |

Example of Quality Control Schedule, change the Quality Control Schedule as appropriate.

Normally intermediate submittals should not have certifications, however if an early release is required of data that USACE will use in subsequent designs, such as hydraulic or geotechnical parameters (PHIs or Cs then this effort will be certified.

Comments on our products from USACE/Sponsor reviews, such as Quality Assurance, Agency Technical Review (ATR) or Safety Assurance Review (SAR) will be answered in a three-part structure:

1. Concur/Non-concur
2. A statement that specifically addresses how the comment will be resolved or why there is non-concurrence.
3. A statement that indicates all locations in the document where the change was made, and other features of the report that were impacted by the change.

**Control of Documents/Record of Design**

Once the documents, computations, graphics/plans, Quality Control comments and responses, and certification sheets have been reviewed/checked and initialed, they will be converted or scanned into a PDF or equally accessible format to record the design and store it in at http://XXX LINK TO LOCATION OF FILES and provided to USACE.

**Key References**

* ER 1165-2-217, Review Policy for Civil Works, 01 May 2021
* ECB 2019-15, Interim Approach for Risk-Informed Designs for Dam and Levee Projects, 08 October 2019
* ER 1110-1-12, Quality Management, 31 March 2011
* ER 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews, 1 January 2013
* ER 1110-2-1156, Safety of Dams – Policy and Procedure, 31 March 2014
* Draft EC 1165-2-218, USACE Levee Safety Program
* EM 1110-2-1913 Design, Construction, and Evaluation of Levees, 30 April 2000
* ER 1110-1-8159, Engineering and Design, DrCheckssm, 1 January 2015
* ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999
* Project Management Plan (PMP) (provide link)
* MSC and/or District Quality Management Plan(s) (provide link)
* Any other relevant quality control/quality assurance District/Division guidance

*<Project and Document Name>*

100% Review

**A-E QUALITY CONTROL CERTIFICATION OF** *<Product/Feature Name>*

*<Project Team>*

As the *<lead designer/architect/geologist, etc.>* for the *<product/feature name>*, I certify the following work shown herein was completed using the appropriate USACE guidance or industry standard if applicable. I certify the work is based on:

• Appropriateness of assumptions, methods, procedures, computations (including quantities), and materials used in the analyses consistent with the project purpose or decision being made

• Comprehensiveness of the array of alternatives considered, if applicable

• Correctness of calculations and clarity of graphic/plan presentation

• Appropriateness of data and level of data, assumptions, and safety risk based on deterministic criteria and risk-informed decision making information

• Reasonableness of results compared to project purpose in compliance with applicable laws and USACE policy

I certify that the write-up *<page 1-xx>*, computations *<page 1-xx>*, drawings *<page 1-xx>* and specifications *<section no.>* meet the customer requirements shown herein. For items previously designed by others and included as the design basis shown herein, I certify that I have verified the work for adequacy, completeness, and accuracy.

|  |  |  |
| --- | --- | --- |
| *SIGNATURE* |  |  |
| [Name] [Lead Designer/Architect/Geologist] [Office Symbol] |  | Date |

Add appropriate additional signatures (team members, Supervisors, etc.) and/or modify to accommodate local organizational structure.

As the Reviewer/Checker I have performed Quality Control and concur with the findings of the *<lead designer/architect/geologist, etc.>* for the *<product/feature name>*.

|  |  |  |
| --- | --- | --- |
| *SIGNATURE* |  |  |
| [Name] Quality Control Reviewer(s)/Checker(s)  [Office Symbol] |  | Date |
| *SIGNATURE* |  |  |
| [Name] [Quality Control Review Lead/Project Manager/Technical Lead] [Office Symbol]  |  | Date |
| *SIGNATURE OF APPROVER* |  |  |
| [Name] [Supervisor (For Author/Section Where the Product is Produced)] [Office Symbol] |  | Date |

## SAR Plan Developed by the Requester

If the District Chief of Engineering determines a SAR is required, a SAR review plan must be developed by the requester and the requester will be required to cover the costs of the SAR. A SAR is required for design and construction activities where potential hazards pose a significant threat to life safety. Districts will work with requesters to coordinate the development of the SAR review plan. See paragraph 12.c.(4) of EC 1165-2-220. The requester will provide a SAR plan that describes the scope of the SAR review. This plan will show how the requester will accomplish the SAR in accordance with ER 1165-2-217. Resumes and signed conflict of interest forms are required for all proposed SAR reviewers. They are not required to be submitted at the same time as the SAR plan but should be submitted for approval by the District and RMC prior to initiation of the review. When submitted by the requester, they should be added to the SAR plan for record. If a SAR is required, the A-E deliverables will be treated in the same manner as any other in-house product except that issue resolution will be a dual responsibility between the product provider and USACE, with USACE having the final authority.

* + 1. **SAR Review Procedures**

The requester will provide in its plan how it will meet the requirements of ER 1165-2-217 for SAR including all the necessary reporting and documentation requirements. SARs are not exempted by statute from FACA. To help ensure this Act is not violated, the SAR panel should set the agenda, control the meetings, and will not provide a consensus report. It is acceptable to compile all reviewers' comments and assessments into one report, if they are not required to be consensus views for the group. USACE officials may attend panel meetings but may not participate in the management or control of the group, be a voting member of the group and may not direct activities at the meetings. Note: RMC has created an optional SAR SOP that may be advantageous to provide to the requester to help facilitate the SAR. It may be found on ProjectWise here: Pre-Construction Engineering and Design.

* + 1. **Products to Undergo SAR**

List the specific technical products the SAR panel will review. This should include but is not limited to the Plans, Specifications, DDR, relevant design documents, risk assessments, construction schedules, and construction documents for the construction phase of the SAR, etc.

* + 1. **Required SAR Panel Expertise**

SAR panels will be established in accordance with ER 1165-2-217. The following disciplines will be required for SAR of this project:

**The following are examples, update as appropriate.**  The disciplines and experience descriptions are only a starting point. Add or remove reviewers as appropriate and tailor the experience requirement to this project (not simply a list of disciplines). If multiple phases of a project require different teams, separate tables for each work product are suggested. Do not include names here but in an attachment. This may be formatted as a table.

**Geotechnical Engineer** - The Geotechnical Engineering panel member should be a senior-level geotechnical engineer with experience in the field of geotechnical engineering, analysis, design, and construction of embankment dams and levees. The Panel Member should have knowledge and experience in the forensic investigation and evaluation of seepage and piping, settlement, slope stability, and deformations problems associated with embankments constructed on weathered and jointed rock and alluvial soils. The Panel Member should have experience in the design and construction of seepage barriers or cutoff walls. The Panel Member should have experience in failure mode analysis, risk assessment of embankment dams, and evaluating risk reduction measures for dam safety assurance projects.

**Engineering Geologist** - The Engineering Geologist panel member should be a senior-level geologist familiar with identification of geological hazards, exploration techniques, field and laboratory testing, and instrumentation. The Panel Member should be proficient in assessing seepage and piping through and beneath dams constructed on fractured and faulted rock, karstic rock, or within various geologic environments, including but not limited to alluvial (including open-work gravels) and colluvial (including boulders and cobbles) materials. The Panel Member should be experienced in the design and construction of seepage barriers or cutoff walls.

**Hydraulic Engineer** – The Panel Member should have experience with engineering analysis related to flood risk management and dam safety projects. The Panel member will hold a degree in Civil Engineering, or Hydrology and Hydraulics Engineering. The Panel Member should have experience with unsteady flow dam failure analysis modeling. The Panel Member must demonstrate knowledge and experience with the routing of inflow hydrographs through multipurpose flood control reservoirs. Experience should emphasize modeling spillways and outlet works related to flood control reservoirs, particularly for large dams. Demonstrate experience in dealing with discharge being utilized at the individual flood control reservoir during a large flood event such as the Probable Maximum Flood (PMF).

**Structural Engineer** – shall have experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies, and external stability analysis including foundations on high head mass concrete dams. The structural engineer shall have specialized experience in the design, construction and analysis of concrete dams.

**Construction Engineer** – Reviewer should be a senior level, professionally registered engineer with extensive experience in the engineering construction field with emphasis on dam safety projects. The Construction reviewer should have a minimum of 15 years of experience.

* + 1. **Documentation of SAR**

Documentation of SAR will be prepared in accordance with ER 1165-2-217. See RMC SAR Report template.

* + 1. **Scope, Schedule, and Estimated Cost of SAR’s**

This section may be used to instruct the requester on how many reviews USACE will require to consider that the SAR was properly performed. The SAR’s will be performed in accordance with ER 1165-2-217. SAR reviews will occur at the milestones shown in Table X. The estimated cost for the SAR’s of this project is in the range of $\_\_\_\_\_\_\_\_\_\_\_ to $\_\_\_\_\_\_\_\_\_\_\_. The Cost will come from the Requester. Rule of thumb costs for SAR reviewers is $20-$30k per panel member per milestone. This estimate will be refined when the Scope of Work for the SAR task order is completed. Milestones to consider for a SAR are at the third points (35% and 65%) of design in the Design Documentation Report; at the completion of the plans, specifications, and cost estimate; at the completion of foundation preparation or near the midpoint of embankment placement or at the third points (35% and 65%) of construction for a particular contract, prior to final inspection, or at any critical design or construction decision milestones. Other points to consider is when a temporary structure provides the flood protection such as when a temporary levee is built, or a temporary cofferdam is needed when a dam is degraded to make repairs. If construction is routine Construction and Civil panel members are likely not needed. The SAR panel’s purpose is to assess the Probable Failure Modes, therefore the Construction and Civil disciplines are likely not required by the RMO; however, if the district wants to add additional panel members it is a district decision.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Milestone Reviews** | **Geotech** | **Mech** | **H&H** | **Structural** | **Construction** | **Site Visit or Conference Call Duration (days)** | **Review Start Date** | **Review End Date** |
| 35% Design | X | O | X | X | X | 1.5 |  |  |
| 95% Design | O |  | O | O |  | 0.5 |  |  |
| P&S | O |  | O | O |  | 0.5 |  |  |
| Cutoff Wall Critical Feature | X |  |  |  |  | 1 |  |  |
| 50% Construction or Embankment/T-wall Placement | X |  |  | X | X | 1 |  |  |
| Gate Testing |  | X |  | X |  | 0.5 |  |  |
| End of Construction | X |  | O | X | X | 1 |  |  |

*Table 1 Example of* *Scheduled Milestone Reviews with Required Reviewers and Site Visit Duration (X – Indicates attendance at the site visit. O – Indicates participation via conference call.)*

## Abbreviations

AEP Annual Exceedance Probability

ASA(CW) Assistant Secretary of the Army for Civil Works

CEQ Council on Environmental Quality

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations

CWBI Civil Works Business Intelligence

DSO Dam Safety Officer

DSOG Dam Senior Oversight Group

EA Environmental Assessment

EC Engineer Circular

EFH Essential Fish Habitat

EIS Environmental Impact Statement

EO Executive Order

EPA Environmental Protection Agency

ERDC Engineer and Research Development Center

ESA Endangered Species Act

FAST-41 Title 41 of the Fixing America’s Surface Transportation Act

FCA Flood Control Act

FERC Federal Energy Regulatory Commission

FHWA Federal Highway Administration

FONSI Finding of No Significant Impact

FTA Federal Transit Administration

H&H Hydrology and Hydraulics

HEC Hydrologic Engineering Center

HQUSACE Headquarters USACE

LSO Levee Safety Officer

LSOG Levee Senior Oversight Group

LSPM Levee Safety Program Manager

M&I Municipal and Industrial

MFR Memorandum for Record

MOA Memorandum of Agreement

MOU Memorandum of Understanding

NEPA National Environmental Policy Act

NFIP National Flood Insurance Program

NHPA National Historic Preservation Act

NID National Inventory of Dams

NLD National Levee Database

NOAA National Oceanic and Atmospheric Administration

O&M Operation and Maintenance

OMRR&R Operation, Maintenance, Repair, Replacement, and Rehabilitation

PL Public Law

PMF Probable Maximum Flood

QC Quality Control

QCP Quality Control Plan

RIT Regional Integration Team

RMC Risk Management Center

RMO Review Management Organization

ROD Record of Decision

SAR Safety Assurance Review

SLOPES Standard Local Operating Procedures for Endangered Species

SOG Senior Oversight Group

TR Technical Review

USACE U.S. Army Corps of Engineers

USC United States Code

USCG U.S. Coast Guard

USDOT U.S. Department of Transportation

USFWS U.S. Fish and Wildlife Service

WCM Water Control Manual

WRDA Water Resources and Development Act

WRRDA Water Resources Reform and Development Act

WSA Water Supply Act