

## **REVIEW PLAN**

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# **LITTLE COLORADO RIVER AT WINSLOW, NAVAJO COUNTY, ARIZONA FLOOD RISK MANAGEMENT FEASIBILITY STUDY**

## **LOS ANGELES DISTRICT**

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**US Army Corps  
of Engineers®**

**REVIEW PLAN**

**LITTLE COLORADO RIVER AT WINSLOW,  
NAVAJO COUNTY, ARIZONA  
FLOOD RISK MANAGEMENT FEASIBILITY STUDY**

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## 1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan defines the scope and level of peer review for the Little Colorado River at Winslow, Navajo County, Arizona Flood Risk Management Feasibility Study. This feasibility study process is anticipated to culminate with a recommendation to Congress for authorization of a flood risk management project.

### b. References

- (1) Engineering Circular (EC) 1165-2-214, Civil Works Review Policy, 15 Dec 2012
- (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
- (3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
- (4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
- (5) CESP R 1110-1-8, South Pacific Division Quality Management Plan, 30 December 2002
- (6) Little Colorado River at Winslow Feasibility Study Project Management Plan, approved 25 August 2008

c. **Requirements.** This review plan was developed in accordance with EC 1165-2-214, 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 EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-214) and planning model certification/approval (per EC 1105-2-412).

## 2. REVIEW MANAGEMENT ORGANIZATION COORDINATION

The Review Management Organization (RMO) is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is the Flood Risk Management Planning Center of Expertise (FRM-PCX). The RMO will coordinate with the Cost Engineering Mandatory Center of Expertise (MCX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules, and contingencies.

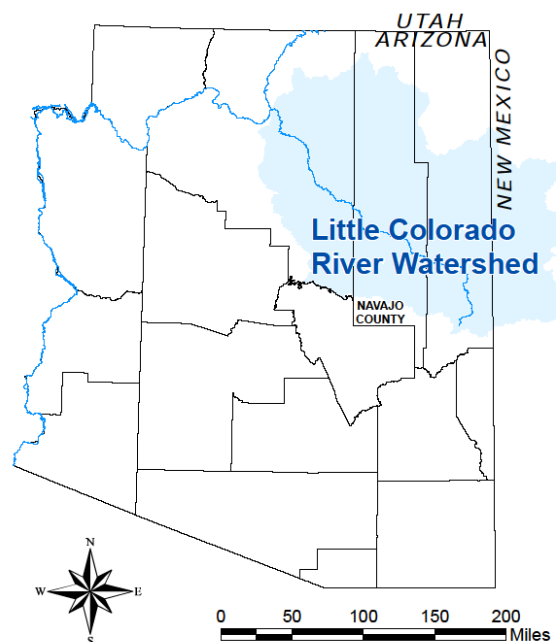
The RMO for Type II IEPR (Section 6 below) is the US Army Corps of Engineers (USACE or Corps) Risk Management Center (RMC). Panel members will be selected using the National Academies of Science (NAS) policy for selecting reviewers. The District Chief of Engineering, as the Engineer-In-Responsible-Charge, will ensure that Type II IEPR is conducted in accordance with EC 1105-2-214, and will fully coordinate with the Chief of Construction, the Chief of Operations, and the Project Manager through the Pre-Construction Engineering and Design (PED) and Construction phases. The Project Manager will coordinate with the RMO to develop the review requirements and to include them in the Review Plan.

### 3. STUDY INFORMATION

- a. **Decision Document.** The authorized name of the study is the Little Colorado River at Winslow (LCR at Winslow) Feasibility Study. The decision document will be titled Little Colorado River at Winslow, Integrated Feasibility Report and Environmental Document (Environmental Assessment or Environmental Impact Statement). This report will present planning, engineering, and implementation details of the recommended plan for approval by the Chief of Engineers and subsequent Congressional authorization.
- b. **Study/Project Description.** LCR at Winslow is a General Investigations study undertaken to evaluate structural and non-structural flood risk management (FRM) measures to reduce the risk of flooding in the City of Winslow and vicinity. Flood risk management is a primary mission of the Corps. Ecosystem restoration measures may be considered as part of larger plans provided they contribute to the primary objective of flood risk management. However, the study team will not formulate ecosystem restoration plans, and National Ecosystem Restoration (NER) benefits will not be determined for the purpose of plan selection. The non-federal sponsor for this study is the Navajo County Flood Control District, Navajo County, Arizona. The feasibility phase of this study is cost shared 50 percent federal, 50 percent non-federal.

The overall LCR Watershed encompasses an area of approximately 27,051 square miles in northeastern Arizona and northwestern New Mexico (Figure 1). Approximately 80 percent of the watershed is in Arizona and includes parts of Coconino, Navajo, and Apache Counties. The remaining 20 percent of the watershed is in New Mexico and includes parts of San Juan, McKinley, Cibola, and Catron Counties. The drainage basin of the LCR is approximately 245 miles long and 158 miles wide at its widest point. The mainstem of the LCR is entirely in Arizona, has a channel length of 356 miles, and total elevation drop of about 6,300 feet from its headwaters in the White Mountains to its confluence with the Colorado River. The LCR flows in generally a northwest direction and receives runoff from 18 sub-watershed basins and contributing drainage areas with hundreds of miles of small tributary streams. The LCR Watershed is bound on the east by the Rio Grande Basin, on the south by the Gila River Basin, and on the north by the San Juan Basin. The LCR joins the Colorado River in the Grand Canyon on the northwest edge of the Basin.

Figure 1. Little Colorado River Watershed



The study area is located in the middle Little Colorado River Sub-Watershed, in and near the City of Winslow in western Navajo County Arizona. The study area encompasses the floodplain of the LCR from the vicinity of the Clear Creek confluence downstream (northwest) to the north end of the existing Winslow Levee system. The study area includes the majority of the City of Winslow,

including the Ruby Wash Diversion Levee (RWDL) and the Ruby Wash Levee. The tributaries of Ruby Wash, Clear Creek, Cottonwood Wash and Salt Creek join the LCR Mainstem within the study area.

The City of Winslow is located along both Interstate Highway 40 and the Burlington Northern Santa Fe Railroad along the western border of Navajo County. Winslow is the largest city in Navajo County. The population of Winslow has increased from 9,520 in 2000 to 9,655 in 2010 (US Census Bureau). The area is supported by tourism, manufacturing, trade, and retail. The 27,000 square mile Navajo Reservation and the 2,410 square mile Hopi Reservation are located to the north. Elsewhere, the surrounding land consists of a patchwork of private and State Trust lands. Flagstaff is located 55 miles to the west, and Albuquerque lies 265 miles to the east. The state capital of Phoenix is located 133 miles to the southwest.

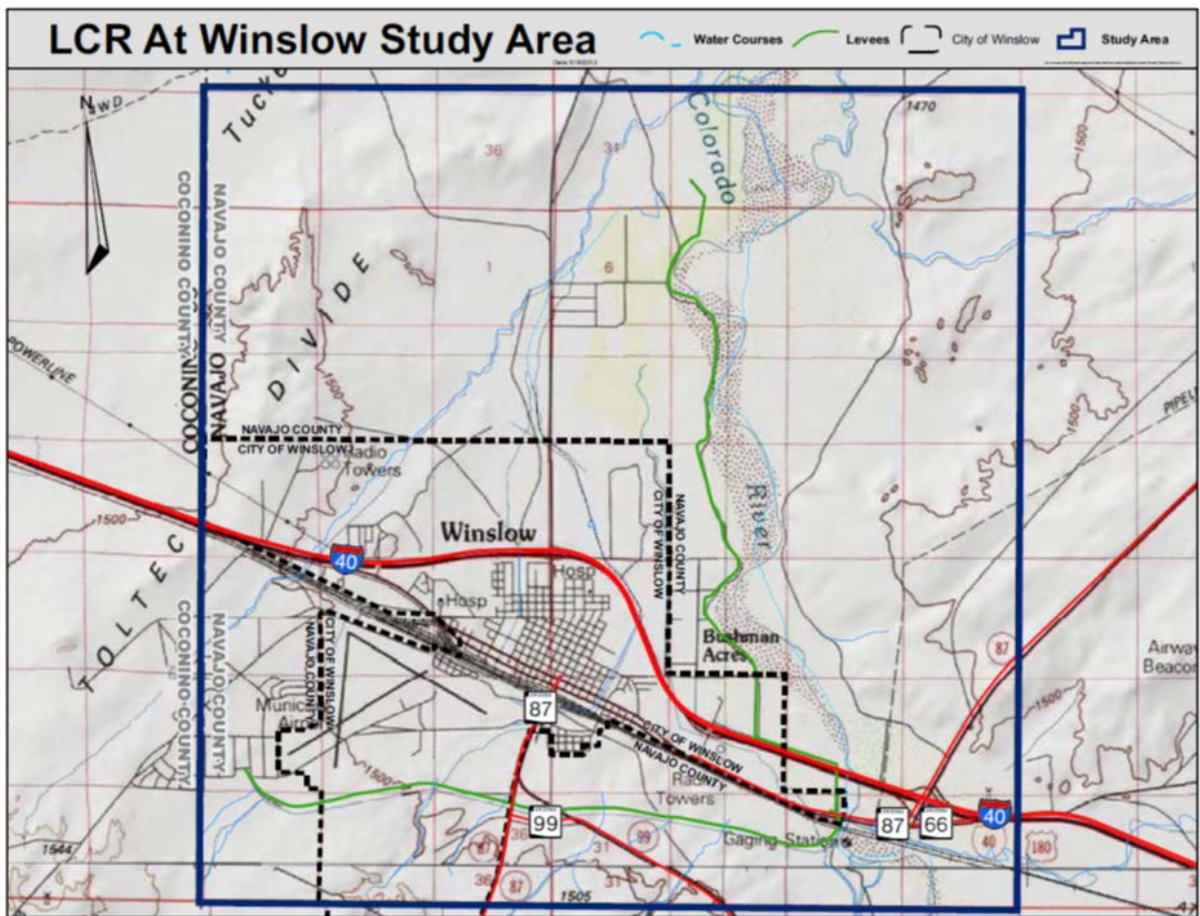


Figure 2. Little Colorado River at Winslow Study Area

As stated previously, the study purpose is to investigate problems and opportunities and potential alternatives to provide flood risk management (FRM) for the City of Winslow and vicinity. Potential FRM measures include both structural and non-structural measures. Structural measures may include levee rehabilitation, construction of new levees, increasing conveyance by raising levees, channel improvements to increase conveyance capacity, grade control structures, bank stabilization, construction of on-line or off-line detention facilities, widening channels and floodway areas, dredging, and constructing/ modifying weirs and bypasses. Non-structural floodplain management measures would include assisting communities with floodplain management and flood warning

systems in areas where needed. In addition, floodproofing, buyout, relocation, retrofitting, dry flood-proofing and/or elevation of structures will be considered. Additional measures may include removal of invasive species, and restoration of floodplain function and habitat while increasing conveyance of floodwaters.

- c. **Factors Affecting the Scope and Level of Review.** The decision document will present the findings of a feasibility study undertaken to evaluate structural and non-structural measures to reduce flood risk to the City of Winslow and vicinity. EC 1165-2-214 established thresholds that trigger IEPR: “In cases where there are public safety concerns, a high level of complexity, novel or precedent-setting approaches; where the project is controversial, has significant interagency interest, has a total project cost greater than \$45 million, or has significant economic, environmental and social effects to the nation, IEPR will be conducted.”

The Winslow Levee has a history of repeated failure at river flows far lower than the original design discharge of 67,000 cfs. The area subject to potential flooding encompasses most of the City of Winslow, including most emergency response and medical facilities, the wastewater treatment plant, and important evacuation routes. The current Winslow Levee Emergency Action Plan (7 June 2011) includes evacuation of the area behind the levee when the river elevation reaches 25 feet (45,500 cfs). This is approximately the 50-year event. Consequently, there are substantial public safety concerns with the current condition of the area’s levee and water conveyance systems. There are no known fatalities associated with the past levee failures.

Aside from the Winslow Levee Emergency Action Plan, there are currently no redundant protections in place for the residents of the Winslow area: that is, if the levee is breached or otherwise fails, there are no other structures in place for the purpose of flood risk management. Depth of flooding varies from several inches to more than ten feet, depending upon where a levee failure occurs, the rate at which flood waters flow over, through or beneath the levee, and where on the hydrograph timeline the failure occurs. There is direct threat to human life by drowning, vehicular entrapment, debris flows, and denial of emergency services at a time when they may be needed. There is potential to provide redundant levels of protection during plan formulation by combining different measures, such as addition of a flood warning system, to the flood risk management strategy.

The study will be complex because of the dynamic river and tributary system, the presence of two existing levee systems, constraints posed by the presence of a major interstate highway and rail corridor, and an anticipated high incidence of cultural sites. Accurate geotechnical characterization of the existing levee system and subsurface geology in a complex floodplain will also be challenging. The available geotechnical information has been provided to the study team to assist with this task; however, substantial geotechnical data gaps still exist. Another challenge will be making reasonable planning assumptions at a time when climate change threatens to modify the watershed in an unpredictable manner. Some of the assumptions that can ultimately affect selection of a recommended plan include hydrologic characterization, channel stability, sediment transport, channel roughness, and the level of future economic growth and development.

Due to the impacts of previous levee failures and FEMA levee de-accreditation in 2008 on mandatory flood insurance requirements, this study may generate significant public interest. To date, the level of public interest has been minimal. Preliminary coordination with the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department indicates minimal issues with special status species. However, the presence of significant cultural resources along the LCR has already

resulted in a high level of agency and tribal interest. If the alternative recommended for implementation is perceived as having an adverse effect upon cultural resources, or requires mitigation for cultural resource impacts, the level of public concern is likely to increase. Proposed implementation of measures affecting either the I-40 bridges or the BNSF railroad bridge crossing the LCR might also be increase the level of interest.

This study is not expected to contain influential scientific information nor be a highly influential scientific assessment. The study is also does not involve novel methods, present complex challenges to interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing flood risk management practices. It is anticipated that the higher cost alternatives developed will have costs ranging from \$50 million to \$90 million. Depending on the results of the economic evaluation, it is possible that we will select a plan with a cost exceeding \$45 million. There is no request from the Governor of Arizona that peer review be conducted by independent experts.

Many challenges will need to be considered or addressed as the feasibility study progresses. It will be important to educate the non-federal sponsor, stakeholders and public as to the precise study purpose (i.e., to address flood risk in the Winslow area, not to rehabilitate the Winslow Levee without first analyzing a full range of structural and non-structural alternatives). It will also be important to communicate that, regardless of what measures are undertaken to address the current flooding problems, there will always be some level of residual risk. Public education, implementation of floodplain management regulations, and use of a flood warning system can help to mitigate this risk.

- d. **Life Safety.** In accordance with EC 1165-2-214, for any project where potential hazards pose a significant threat to human life (public safety); the Federal action is justified by life safety; or the failure of the project would pose a significant threat to human life, i.e. when life safety issues exist, a Type I IEPR is required. In addition, since design initiates in the decision document phase, a Safety Assurance Review (SAR) should be incorporated into the Type I IEPR when life safety issues exist.

The Los Angeles District Chief of Engineering has determined that, due to the history of levee failures along the Little Colorado River at Winslow, AZ, and the other factors described in paragraph 3.c above, there is a significant threat to human life associated with the Little Colorado River at Winslow, AZ project. If life safety issues are not minimized during the formulation of the Tentatively Selected Plan (TSP), a Type II IEPR, or Safety Assurance Review (SAR), will be conducted on the design and construction activities for the authorized project.

- e. **In-Kind Contributions.** Products and analyses provided by non-federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. The in-kind products and analyses provided by the non-federal sponsor include execution of a survey and mapping contract, and preparation of a Public Involvement Plan. The survey and mapping products were subjected to quality control review by the contractors, followed by District Quality Control in 2009. The Public Involvement Appendix will document public opportunities to participate in the study, and is not a technical product that needs review.

#### 4. DISTRICT QUALITY CONTROL (DQC)

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. 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). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

- a. **Documentation of DQC.** Non-Project Delivery Team (PDT) members and/or supervisory staff will conduct DQC review for major draft and final products, including products provided by the non-federal sponsor as in-kind services, following review of those products by the PDT. It is expected that the Major Subordinate Command (MSC)/District QMP will address the conduct and documentation of this fundamental level of review. A Quality Control Plan (QCP) is included in the PMP for the subject study and addresses DQC.

The conclusions/agreements reached should be documented, with copies retained by each participant and distributed to the ATR leader and the PDT leader. The documentation shall become part of the project technical review file.

The review team member shall prepare the memorandum that shall become part of the review team's records. Specific issues raised in the review shall be documented in a comment, response, discussion, action required, action taken and, if appropriate, lessons learned format. Unresolved differences between the project delivery team and review team members shall be documented, along with the basis for the function chief's decision on the issue. The software system DrChecks may be used, at the option of the District. These reviews should be completed prior to major decision points in the planning process so that the technical results can be relied upon in setting the course for further study activities.

- b. **Products to Undergo DQC.** For LCR at Winslow, the plan formulation, environmental resources, hydrology and hydraulic analyses, geotechnical analyses, civil design, economics and cost engineering products would undergo DQC. Products that summarize existing background information without using models or making assumptions, such as a Phase I Cultural Resources Survey or an existing condition levee report, will not normally undergo DQC. However, such products will likely be referenced by review team members during later reviews.
- c. **Required DQC Expertise.** Review teams shall be assigned representatives that are senior experienced staff that mirror the expertise of the PDT. A goal will be the establishment of an informed review team with full accountability to maintain objectivity. To ensure this objectivity, the members of the review teams must be independent from those who perform the work. DQC reviewers will need to have expertise similar to that outlined for the ATR team in Table 1 below.

#### 5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct 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. ATR is managed within USACE



by the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR Lead will be from outside the home MSC.

- a. **Products to Undergo ATR.** The hydrology and hydraulic analyses, geotechnical analyses, economics, civil design and cost engineering products will undergo ATR, in addition to the draft feasibility report and integrated NEPA document. Products such as cultural resources surveys and real estate reports are not expected to require ATR unless unforeseen complexity or controversy arises during course of the study. Whenever practicable, technical products that support subsequent analyses will be reviewed prior to being used in the study (scaled ATR).

Scaled ATR has been completed for the without-project hydrology and hydraulic analyses, geotechnical analysis and economics evaluation (Section 10, Table 4). An additional ATR will be conducted immediately following the Tentatively Selected Plan (TSP) milestone (concurrent with policy and legal review, and immediately prior to public review). This ATR is expected to include the with-project hydraulic analysis, economics, civil design and cost engineering products, in addition to the draft feasibility report and integrated NEPA document. As stated previously, cultural resource and real estate products may be submitted for ATR if they involve a high degree of complexity and/or controversy.

- b. **Required ATR Team Expertise.** The Agency Technical Review Team will be comprised of individuals that have not been involved in the development of the decision document and will be chosen based on expertise, experience, and/or skills). The members will roughly mirror the composition of the PDT and, wherever possible, reside outside of the South Pacific Division region. The ATR team may consist of as many as ten reviewers (Table 1). However, it is likely that some disciplines will not involve technical analysis or controversial issues warranting technical review. The ATR team members assigned to the study as of this Review Plan update are listed in Attachment 1. Not all reviewers will be needed for every stage of review. For instance, review of a Real Estate product will not be needed for the without-project documentation.

**Table 1: Agency Technical Review Team**

Discipline	Expertise Needed for Review
ATR Manager/Plan Formulation	Plan formulation for multi-purpose projects, including flood risk management; familiarity with the “Planning Guidance Notebook” (ER-1105-100) and the Water Resources Council’s Principals and Guidelines.
Environmental Resources	Integration of environmental evaluation and compliance requirements pursuant to the “Procedures for Implementing NEPA” (ER 200-2-2), national environmental statutes, applicable executive orders, and other federal planning requirements, into the planning of Civil Works projects.
Cultural Resources	Archaeologist familiar with records searches, cultural resource survey methodology, area of potential effects, Section 106 of the National Historic Preservation Act, and state and federal laws/executive orders pertaining to American Indian Tribes.

Discipline	Expertise Needed for Review
Hydrology and Hydraulics	Hydrologist or hydraulic engineer proficient with river hydraulics, GEO-RAS, HEC-RAS and associated one dimensional models, FLO-2D, floodplain mapping, hydrologic statistics, sediment transport analysis, channel stability analysis, risk and uncertainty analysis, and a number of other closely associated technical subjects.
Geotechnical Engineering	Geotechnical engineer familiar with sampling and laboratory testing, embankment stability and seepage analyses, levee probability failure mode analysis, planning analysis, and a number of other closely associated technical subjects.
Economics	Economist familiar with analysis of demographics, land use, recreation analysis, and flood damage assessments using HEC-FDA; use of RECONS model to address regional economic development associated with a project; discussion of other social effects (OSE) associated with flood risk, and well as OSE benefits from reduction in flood risk; economic justification of projects in accordance with current USACE policy.
Civil Design	Civil engineer with experience in designing grading plans and levees, levee stability, and levee and bank-protection removal or modification.
Cost Engineering <sup>1</sup>	Cost estimating specialist competent in cost estimating for both construction and ecosystem restoration using MCACES/Mii; working knowledge of construction and environmental restoration; capable of making professional determinations based on experience.
Real Estate/Lands	Real estate specialist familiar with real estate valuation, gross appraisal, utility relocations, takings and partial takings as needed for implementation of Civil Works projects.
Risk Analysis	Interdisciplinary team member who can ensure that the decision document includes appropriate identification, analysis and written communication of risk and uncertainty.

<sup>1</sup>Coordination with the USACE Mandatory Center of Expertise (MCX) located in the Walla Walla District will be conducted as required by EC 1165-2-214.

**c. Documentation of ATR.** DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should 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 product’s information 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 be 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 – identify the action(s) that the reporting officers must take to resolve the concern.

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.

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

- Identify the document(s) reviewed and the purpose of the review;
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions;
- Identify and summarize each unresolved issue (if any); and
- 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 Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the without-project documentation and the Tentatively Selected Plan (TSP) milestone reviews. A sample Statement of Technical Review is included in Attachment 2.

- d. Role of ATR Lead.** In addition to facilitating ATR of individual study products, the ATR Lead will be involved throughout the study process. The ATR Lead will review all key study management documents (risk register, decision management plan, review plan, etc.), participate in all In-Progress Reviews (IPRs) and milestone meetings, advise the PDT on FRM planning policy, and recommend if/when to conduct ATR of products other than those included in the draft decision document.

## **6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)**

IEPR may be required for decision 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. There are two types of IEPR:

- **Type I IEPR.** Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-214.
  - **Type II IEPR.** Type II IEPR, or Safety Assurance Review (SAR), is managed outside the USACE and is 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.
- a. Decision on IEPR.** This decision document will present the details of a feasibility study undertaken to evaluate structural and non-structural FRM and ER measures to address problems in the study area. EC 1165-2-214 set forth thresholds that trigger IEPR: Where there is a significant threat to human life; where the project has an estimated cost (including mitigation) of greater than \$45 million; where the Governor of an affected State requests a peer review by independent experts, or; where the DCW or the Chief of Engineers determines that the project study is controversial due to significant public dispute over either the size, nature, or effects of the project or the economic or environmental costs or benefits of the project .

Because of the potential for significant economic, environmental and social effects, including potential threat to human life, IEPR will be conducted. Aside from having a potential threat to human life, there is some chance that the study could encounter a high level of public concern. The potential for increased public interest is discussed in Section 3.c above. There is also a possibility that we will recommend a plan having a cost greater than \$45 million for implementation. The District does not anticipate receiving a request from the Governor of Arizona to conduct IEPR. It is not anticipated that the public, including scientific or professional societies, will be asked to nominate potential external peer reviewers.

- b. Products to Undergo Type I IEPR.** Type I IEPR will be performed for the Draft Feasibility Report and the supporting technical appendices and analyses. Interim Corps and/or contractor products for hydrology, hydraulic design, geotechnical engineering, civil design and economics will be provided before the draft report is released for public review. The full IEPR panel will receive the entire Integrated Draft Feasibility Report/Environmental Document and all technical appendixes concurrent with public and agency review.

The final report to be submitted by the IEPR panel must be submitted to the PDT within 60 days of the conclusion of public review. A representative of the IEPR panel may attend any public

meeting(s) held during public and agency review of the draft report. The Los Angeles District will draft a response to the IEPR final report and process it through the vertical team for presentation to the Deputy Commanding General of Civil and Emergency Operations (DCG-CEO) for approval. An IEPR panel or OEO representative member will participate in the meeting with the DCG-CEO, preferably in person. Following the meeting, the Corps will issue final response to the IEPR panel and notify the public.

- c. **Required Type I IEPR Panel Expertise.** Disciplines that are anticipated to undergo IEPR are plan formulation, environmental resources, hydrology and hydraulic design, geotechnical engineering, civil design, economics, and cost engineering. Reviewers for these disciplines should be proficient with flood risk management issues in arid environments having highly erodible soils. Major considerations will include geotechnical issues relating to levee construction and failure, channel stability, sediment budget and transport, residual risk associated with multiple flood protection systems, risk and uncertainty, and probability-based economic simulations.

The PDT should make the initial assessment of what expertise is needed based on the PMP and the factors affecting the scope and level of review outlined in Section 3 of the review plan. The Outside Eligible Organization (OEO) will determine the final participants on the panel. Required expertise for these reviewers is anticipated to be as described for the ATR reviews in Table 1 above.

- d. **Documentation of Type I IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 4.d above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- 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.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the Internet.

- e. **Type II IEPR.** The study team will evaluate structural and non-structural measures to reduce the risk of flooding to the City of Winslow and vicinity. If a structural solution is recommended for implantation, then Type II IEPR (Safety Assurance Review, or SAR) will be required for design and construction activities.

Since Type II IEPR will be required, the SAR will be incorporated into the Type I IEPR (EC 1105-2-214, Appendix D, paragraph 1.b(1)). The Review Panel will consider the following during the Type I IEPR: Is the quality and quantity of the surveys, investigations, and engineering sufficient for a concept design (ER 1110-2-1150); Are the models used to assess hazards appropriate?; Are the assumptions made for the hazards appropriate?, and; Does the analysis adequately address the uncertainty given the consequences associated with the potential for loss of life for this type of project?

## **7. POLICY AND LEGAL COMPLIANCE REVIEW**

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H of ER 1105-2-100. These reviews culminate in 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 home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

## **8. MANDATORY CENTER OF EXPERTISE (MCX) REVIEW AND CERTIFICATION**

All decision documents shall be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX), located in the Walla Walla District. The MCX will assist in determining the expertise needed on the ATR team and Type I IEPR team, and in the development of the review charge(s). The MCX will also provide the Cost Engineering MCX certification. The RMO is responsible for coordination with the Cost Engineering MCX.

## **9. MODEL CERTIFICATION AND APPROVAL**

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. 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.

EC 1105-2-412 does not address engineering models used in planning. 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. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR.

- a. Planning Models.** The following planning models are anticipated to be used in the development of the decision document:

**Table 2: Planning Models**

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.5 (Flood Damage Analysis)	The Hydrologic Engineering Center’s Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans along the Little Colorado River near Winslow to aid in the selection of a recommended plan to manage flood risk.	Certified
IWR-Planning Suite	This software assists with the formulation and comparison of alternative plans. While IWR-PLAN was initially developed to assist with environmental restoration and watershed planning studies, the program can be useful in planning studies addressing a wide variety of problems. IWR-PLAN can assist with plan formulation by combining solutions to planning problems and calculating the additive effects of each combination, or "plan." IWR-PLAN can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are the best financial investments and displaying the effects of each on a range of decision variables.	Certified
RECONS	RECONS is a Corps corporate model specifically developed to assess the Regional Economic Development (RED) impacts of Corps civil works projects. This model will be used to support discussion of the RED benefits associated with project implementation. The RECONS model will estimate the impacts to the local economy, in terms of income, employment and tax revenues, resulting from project construction.	Approved for Use

**b. Engineering Models.** The following engineering models are anticipated to be used in the development of the decision document:

**Table 3: Engineering Models**

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 4.0 (River Analysis System)	The Hydrologic Engineering Center’s River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for steady flow analysis to evaluate the future without- and with-project conditions along the LCR. [For a particular study the model could be used for unsteady flow analysis or both steady and unsteady flow analysis. The review plan should indicate how the model will be used for a particular study.]	H&H Community of Practice Preferred Model
FLO-2D – v2009	FLO-2D is a dynamic flood routing model that simulates channel flow, unconfined overland flow and street flow. It can simulate a flood over complex topography and roughness while reporting on volume conservation; the key to accurate flood distribution. The model uses eight potential flow directions to predict the progression of a flood hydrograph over a system of square grid elements.	Approved for Use
HEC-FFA	Hydrologic Engineering Center Flood Frequency Analysis. HEC-FFA performs frequency computations of given annual maximum floods, allows the user to calculate frequency factors and confidence limits for estimates, and allows alteration of skew coefficients.	Approved for Use
Seep/W	Seep/W is a finite difference seepage modeling tool. The tool is used to estimate exit seepage gradients due to channel loading and also to estimate pore pressures used in the seepage analysis. Inputs for the tool include cross section geometry and hydraulic boundary conditions, as well as soil layer hydraulic conductivity (including anisotropic ratios, and material property orientation).	Approved for Use
Slope/W	Slope/W is used to calculate slope stability factors of safety using limit equilibrium methods. Cross section geometry, soil engineering properties and pore water pressures (calculated from Seep/W) are required inputs to calculate stability factors of safety. The program uses an iterative approach to evaluate thousands of potential slip surfaces that meet input criteria, and the surface with the lowest factors of safety are reported.	Approved for Use
MCACES or MII	These are cost estimating models	Approved for Use



## 10. REVIEW SCHEDULES AND COSTS

- a. **ATR Schedule and Cost.** The schedule for previously completed and future ATR activities is presented in Table 4. The current cost estimate for ATR is \$100,000. The cost for ATR will be negotiated with the PCX and the ATR team.

**Table 4: Schedule for Agency Technical Review**

Task	Date
ATR Without-Project Hydrology	August 2010
ATR Without-Project Levee Fragility	March 2012
ATR Without-Project Hydraulics	April 2012
ATR Without-Project Economics	August 2012
ATR With-Project Hydraulics for TSP	March 2014
ATR With-Project Cost Engineering for TSP	March 2014
ATR With-Project Economics for TSP	April 2014
ATR With-Project Plan Formulation for TSP	May 2014
ATR of Draft Report (Following TSP Milestone)	September 2014 <sup>1</sup>

A listing of the products expected to undergo ATR following the TSP Milestone is provided in Section 5.a above.

- b. **Type I IEPR Schedule and Cost.** Interim Corps and/or contractor products for hydrology, hydraulic design, geotechnical engineering, civil design and economics will be provided before the draft report is released for public review. The full IEPR panel will receive the entire Integrated Draft Feasibility Report/Environmental Document and all technical appendices concurrent with public and agency review. Based on the current study schedule, this will be in July of 2014. The final report to be submitted by the IEPR panel must be submitted to the PDT within 60 days of the conclusion of public review.

IEPR is currently estimated to cost \$165,000. IEPR is a project cost. The IEPR panel review cost will be 100% federally funded. In-house costs associated with obtaining the IEPR panel contract as well as responding to IEPR comments will be cost shared expenses.

- c. **Model Certification/Approval Schedule and Cost.** The planning models to be employed in the Little Colorado River at Winslow Feasibility Study have been either certified or approved for use (Table 2). All of the engineering models are either certified by the H&H Community of Practice, or otherwise approved for use (Table 3). Model certification and approval for all identified planning models will be coordinated through the PCX as needed.

## **11. PUBLIC PARTICIPATION**

The public and other agencies have multiple opportunities to participate in this study. The non-federal sponsor has already developed a public involvement plan that outlines both formal and informal opportunities for public participation in this study. The earliest opportunity for public comment occurred at the public scoping meeting in Winslow, Arizona on March 24, 2009. Many sponsor coordination meetings are held concurrently with quarterly meetings of the Winslow Levee Advisory Board. These meetings are attended by the Navajo County Board of Supervisors, and are open to the public for comment.

Public review of the Draft Feasibility Report will occur after issuance of the policy guidance memo and concurrence by HQUSACE that the document is ready for public release. Public review of the draft report will begin approximately one month after the completion of the ATR process and policy guidance memo. The period will last a minimum of 30 or 45 days, depending upon which type of NEPA document (EA or EIS) is required. One or more public workshops will be held during the public and agency review period. Comments received during the public comment period for the draft report could be provided to the IEPR team prior to completion of the final Review Report and to the ATR team before review of the final Decision Document. The public review of necessary state or federal permits will also take place during this period. A formal State and Agency review will occur concurrently with the public review. However, it is anticipated that intensive coordination with these agencies will have occurred concurrent with the planning process. Upon completion of the review period, comments will be consolidated in a matrix and addressed, if needed. A comment resolution meeting will take place, if needed, to decide upon the best resolution of comments. A summary of the comments and resolutions will be included in the document.

It is not anticipated that the public, including scientific or professional societies, will be asked to nominate potential external peer reviewers for this study.

## **12. REVIEW PLAN APPROVAL AND UPDATES**

The South Pacific Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should 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 Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

### **13. REVIEW PLAN POINTS OF CONTACT**

Public questions and/or comments on this review plan can be directed to the following points of contact:

- Los Angeles District Project Delivery Team Planning contact, at (602) 230-6907
- South Pacific Division District Support Team Lead, at (415) 503-6556
- Program Manager for the Planning Center of Expertise for Flood Risk Management, at (415) 503-6852

**ATTACHMENT 1: TEAM ROSTERS**

**PROJECT DELIVERY TEAM**

<b>Name</b>	<b>Discipline</b>	<b>Phone</b>	<b>Email</b>
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Steve Brown	Soils & Materials	213-452-3689	<a href="mailto:Stephen.L.Brown@usace.army.mil">Stephen.L.Brown@usace.army.mil</a>

**AGENCY TECHNICAL REVIEW TEAM**

<b>Name</b>	<b>Discipline</b>	<b>Phone</b>	<b>Email</b>
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TBD	Environmental Resources		
TBD	Cultural Resources		
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Brian Harper	Economics	571-239-0726	<a href="mailto:Brian.K.Harper@usace.army.mil">Brian.K.Harper@usace.army.mil</a>
TBD	Civil Design		
James Neubauer	Cost Engineering MCX	509-527-7332	<a href="mailto:James.G.Neubauer@usace.army.mil">James.G.Neubauer@usace.army.mil</a>
TBD	Real Estate/Lands		

**INDEPENDENT EXTERNAL PEER REVIEW PANEL**

<b>Name</b>	<b>Discipline</b>	<b>Phone</b>	<b>Email</b>
TBD	Plan Formulation		
TBD	Environmental Resources		
TBD	Hydrology and Hydraulics		
TBD	Geotechnical Engineering		
TBD	Civil Design		
TBD	Economics		
TBD	Cost Engineering		

**VERTICAL TEAM**

<b>Name</b>	<b>Discipline</b>	<b>Phone</b>	<b>Email</b>
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**PLANNING CENTER OF EXPERTISE  
FLOOD RISK MANAGEMENT**

<b>Name</b>	<b>Discipline</b>	<b>Phone</b>	<b>Email</b>
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**ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS**

**COMPLETION OF AGENCY TECHNICAL REVIEW**

The Agency Technical Review (ATR) has been completed for the <type of product> for <project name and location>. The ATR was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-209 and, subsequently, EC 1165-2-214. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer’s needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks<sup>sm</sup>.

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
ATR Team Leader  
Office Symbol/Company

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Project Manager  
Office Symbol

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Architect Engineer Project Manager<sup>1</sup>  
Company, location

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Review Management Office Representative  
Office Symbol

**CERTIFICATION OF AGENCY TECHNICAL REVIEW**

Significant concerns and the explanation of the resolution are as follows: Describe the major technical concerns and their resolution.

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Chief, Engineering Division  
Office Symbol

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Chief, Planning Division  
Office Symbol

<sup>1</sup> Only needed if some portion of the ATR was contracted

### ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
14 Dec 2011	Rewritten to follow new EC 1165-2-209 template	
14 Dec 2011	Updated model list and certification/approval status	
14 Dec 2011	Updated study schedule	
14 Dec 2011	Updated roster of PDT members	
29 Aug 2012	Updated roster of ATR team	
4 Dec 2012	Updated RP for consistency with study findings to date, and to incorporate SMART Planning milestones	
15 Jan 2013	Rewritten to follow new EC 1165-2-214 guidance	
4 Feb 2014	Updated review schedule and ATR team members	
10 Mar 2014	Updated review schedule and ATR team members	Pages 15 and i

**ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS**

<b>Term</b>	<b>Definition</b>	<b>Term</b>	<b>Definition</b>
ASA(CW)	Assistant Secretary of the Army for Civil Works	OMB	Office and Management and Budget
ATR	Agency Technical Review	O&M	Operation and Maintenance
CEFMS	Corps of Engineers Financial Management System	OEO	Outside Eligible Organization
CESPD	Corps of Engineers, South Pacific Division	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DGC-CEO	Deputy Commanding General of Civil and Emergency Operations	OSE	Other Social Effects
DQC	District Quality Control	OWPR	Office of Water Project Review
DST	District Support Team	PCX	Planning Center of Expertise
EA	Environmental Assessment	PDT	Project Development Team
EC	Engineering Circular	PED	Preconstruction Engineering and Design
EIS	Environmental Impact Statement	PMP	Project Management Plan
EO	Executive Order	PMIP	Planning Models Improvement Program
ER	Engineering Regulation or Ecosystem Restoration	QA	Quality Assurance
FDR	Flood Damage Reduction	QC	Quality Control
FEMA	federal Emergency Management Agency	QCP	Quality Control Plan
FRM	Flood Risk Management	QMP	Quality Management Plan
HQUSACE	Headquarters, USACE	RED	Regional Economic Development
IEPR	Independent External Peer Review	RIT	Regional Integration Team
IPR	In Progress Review	RMC	Risk Management Center
ITR	Independent Technical Review	RMO	Review Management Organization
LCR	Little Colorado River	RP	Review Plan
MCX	Mandatory Center of Expertise	RTS	Regional Technical Specialist
MSC	Major Subordinate Command	SAR	Safety Assurance Review
MVD	Mississippi Valley Division	TSP	Tentatively Selected Plan
NAS	National Academies of Science	USACE	US Army Corps of Engineers
NED	National Economic Development	WRDA	Water Resources Development Act
NEPA	National Environmental Policy Act		
NER	National Ecosystem Restoration		