DEPARTMENT OF THE ARMY
US ARMY ENGINEER DIVISION, SOUTHWESTERN
1100 COMMERCE STREET, SUITE 831
DALLAS TX 75242-1317

CESWD-PD-P

07 DEC 2012

MEMORANDUM FOR Commander, Fort Worth District

SUBJECT: Brazos River Basin Systems Assessment Interim Feasibility Study, Phase II, Aquilla Lake Storage Reallocation – Review Plan Approval

1. References:

a. EC 1165-2-209, Civil Works Review Policy, 31 Jan 2010 and Change 1, 31 Jan 2012.

b. Memorandum, CESWD-PDS-P, 21 November 2012, subject: Recommendation for Approval of the Review Plan for the Aquilla Lake Reallocation Report.

2. The review plan for the subject study, enclosed, has been reviewed and recommended for approval by the Water Management and Reallocation Studies Planning Center of Expertise (PCX). It has been prepared in accordance with the referenced guidance, and public comments received will be incorporated into the plan as the study progresses. Independent External Peer Review is required for this study.

3. In accordance with reference 1.a., I hereby approve this review plan for the subject study.

4. Please post the approved review plan with a copy of this memorandum to the District's public internet website and provide the internet address to the Water Management and Reallocation Studies PCX and to Southwestern Division. Before posting to the District website, the names of USACE employees should be removed.

5. The SWD point of contact for this action is Mr. Saji Varghese, CESWD-PD-P, at 469-487-7069.

Thomas W. Kula

Encl

THOMAS W. KULA
Brigadier General, USA
Commanding

CF:
CESWF-PER-PP (Gray)

REVIEW PLAN

Brazos River Basin Systems Assessment
Interim Feasibility Study
Phase II
Aquilla Lake Storage Reallocation

Fort Worth District

Revised

MSC Approved January 15, 2010:

Last Revision Date: TBA

US Army Corps
of Engineers ®

REVIEW PLAN

Brazos Systems Assessment - Interim Feasibility Study
Brazos River Basin
Phase II, Aquilla Lake Storage Reallocation

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1. PURPOSE AND REQUIREMENTS

a. Purpose.

This Review Plan defines the scope and level of peer review for the Brazos River Basin Systems Assessment Interim Feasibility Study Phase II Aquilla Lake Storage Reallocation (here on called Aquilla Reallocation Study) located in the Hill Country within the Middle Brazos River basin of Texas.

b. References

(1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 31 Jan 2010 and Change 1, 31 Jan 2012
(2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
(3) EC 1105-2-407, Planning Models Improvement Program: Model Certification, 31 May 2005
(4) Engineering Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006
(5) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
(6) Project Management Plan for Aquilla Lake Storage Reallocation Feasibility Study, 21 April 2008
(7) FSCA, Supplemental Agreement, 2 December 2005

c. Requirements. This review plan was developed in accordance with EC 1165-2-209, 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 1165-2-209) and planning model certification/approval (per EC 1105-2-412).

(1) District Quality Control (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). It is managed in the home district and may be performed by staff in the home district as long as they are not doing the work involved in the study, including contracted work that is being reviewed. Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc. Additionally, the PDT is responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before approval by the District Commander.

(2) Agency Technical Review (ATR). ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and

professional practices. The ATR team reviews the various work products and assure that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel, preferably recognized subject matter experts with the appropriate technical expertise such as Regional Technical Specialists (RTS), and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team will be conducted or managed by the lead PCX.

(3) Independent External Peer Review (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. IEPR is generally for feasibility and reevaluation studies and modification reports with Environmental Impact Statements (EISs). IEPR is managed by an outside eligible organization (OEO) that is described in Internal Revenue Code Section 501(c) (3), is exempt from Federal tax under section 501(a), of the Internal Revenue Code of 1986; is independent; is free from conflicts of interest; does not carry out or advocate for or against Federal water resources projects; and has experience in establishing and administering IEPR panels. The scope of review will address all the underlying planning, engineering, including safety assurance, economics, and environmental analyses performed, not just one aspect of the project. It is anticipated that this project will necessitate performing IEPR.

(4) Policy and Legal Compliance Review. Decision documents will be reviewed throughout the study process for their compliance with law and policy. These reviews culminate in Washington-level determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the Chief of Engineers. Guidance for policy and legal compliance reviews is addressed further in Appendix H, ER 1105-2-100, Planning Guidance Notebook. When policy and/or legal concerns arise during DQC or ATR that are not readily and mutually resolved by the PDT and the reviewers, the District will seek issue resolution support from the MSC and HQUSACE in accordance with the procedures outlined in Appendix H, ER 1105-2-100. IEPR teams are not expected to be knowledgeable of Army and administration polices, nor are they expected to address such concerns. The home district Office of Counsel is responsible for the legal review of each decision document and signing a certification of legal sufficiency.

(5) Safety Assurance Review. In accordance with Section 2035 of Water Resources Development Act (WRDA) of 2007, EC 1165-2-209 requires that all projects addressing flooding or storm damage reduction undergo a safety assurance review of the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. A future circular will provide a more comprehensive Civil Works Review Policy that will address the review process for the entire life cycle of a Civil Works project. That document will address the requirements for a safety assurance review for the Pre-Construction Engineering Phase, the Construction Phase, and the Operations Phase. The decision document phase is the initial design phase; therefore, ER 1165-2-209 requires that safety assurance factors be considered in all reviews for decision document phase studies. At this time, a Safety Assurance Review is not required for this project, but due to issues related to

concerns, it could be possible to incorporate a Safety Assurance Review to assist the District in resolving existing dam safety concerns so that a pool raise could be implemented. This will be discussed in more detail in subsequent sections of this review plan.

(6) Model Certification/Approval. EC 1165-2-209 requires certification (for Corps models) or approval (for non-Corps models) of planning models used for all planning activities. The EC defines planning models 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 EC does not cover engineering models used in planning. Engineering software is being address under the Engineering and Construction (E&C) Science and Engineering Technology (SET) initiative. Until an appropriate process that documents the quality of commonly used engineering software is developed through the SET initiative, engineering activities in support of planning studies shall proceed as in the past. 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.

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The 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 Water Management and Reallocation Studies (WM&RS) PCX and the RMC.

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies.

3. STUDY INFORMATION

a. **Decision Document.** The purpose of this Aquilla Reallocation Study is to perform detailed investigation of the reallocation of storage within Aquilla Lake in the Brazos River basin and prepare an Integrated Interim Feasibility Report and Environmental Assessment that meets the requirements of ER 1105-2-100. The project is a General Investigations and the feasibility phase is cost shared 50/50 with the project's non-federal sponsor. If this decision document is approved by the Chief of Engineers, it should fall into the Chief of Engineer's discretionary authority for approval and should not require Congressional authorization.

b. Study/Project Description. The Aquilla Reallocation Study is one part of the overall Brazos Systems Assessment that is focusing on optimizing water supply through reallocation studies, overall operations of reservoirs within the Brazos Basin and measures that could mitigate downstream impacts if some of the potential optimization measures were ever implemented. The Aquilla Lake Storage Reallocation Study is very limited in scope and is only exploring reallocation measures in Aquilla Lake. This peer review plan is being developed for the Aquilla Lake Storage Reallocation Study. The non-Federal sponsor for this study is the Brazos River Authority (BRA). The BRA has

executed contracts for all of the existing, available water supply in Aquilla Lake. The BRA and the approved Texas State Water Plan have identified a need for additional water supply in the area that is serviced by Aquilla Lake.

The study area will encompass the floodplain surrounding Aquilla Lake, upstream of Aquilla on Aquilla and Hackberry Creeks as far as necessary to develop enveloping curves, and downstream of Aquilla Dam on Aquilla Creek to the confluence with the Brazos River. Aquilla Lake, which is located in Hill County, became operational in 1982. The Lake has a surface area of approximately 3,164 acres at conservation pool. Aquilla Lake has a total flood pool capacity of 94,634 acre-feet of water and conservation storage of 45,235 acre-feet. The project was built to provide flood control, water supply and recreation.

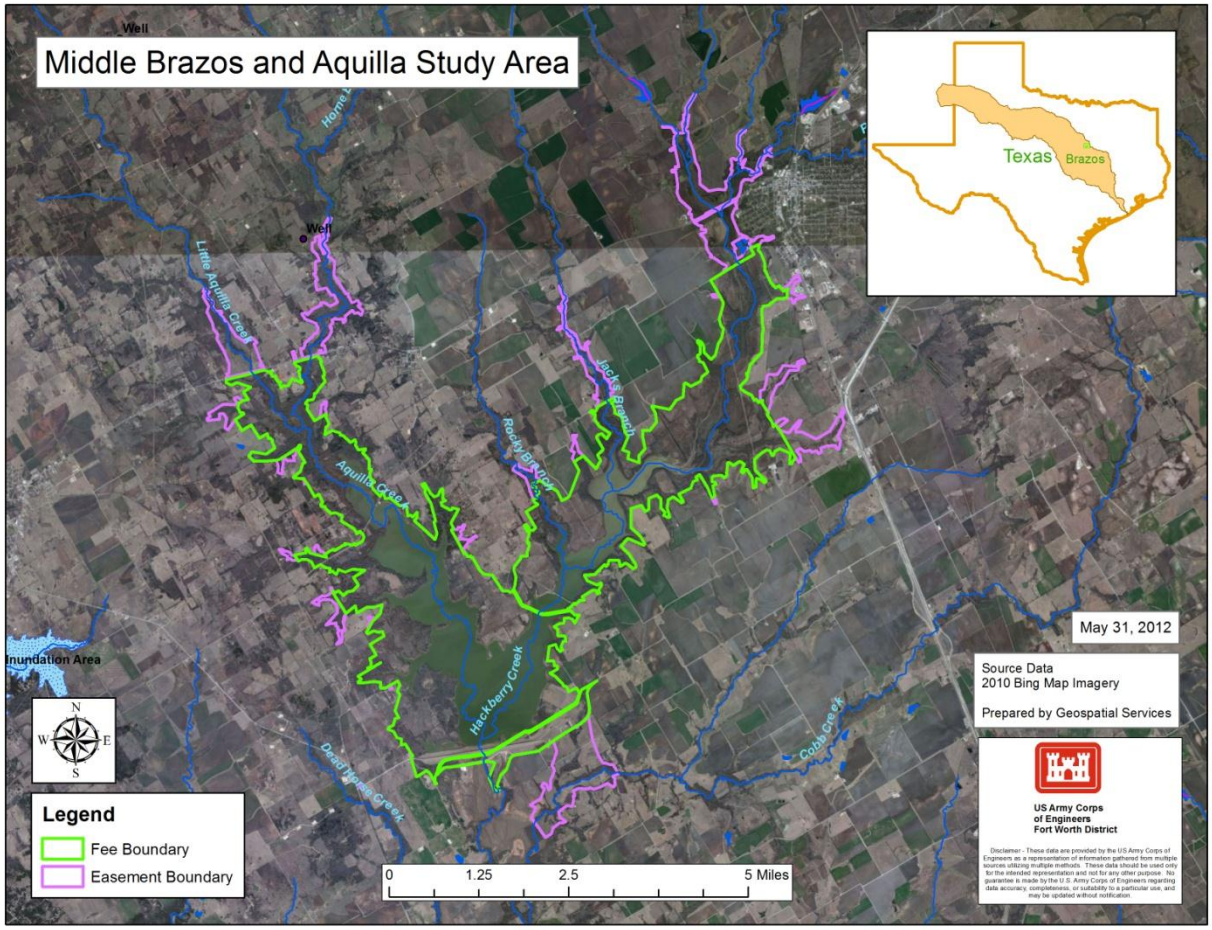

Figure 1-1 Middle Brazos and Aquilla Study Area

The authorized purposes of Aquilla Lake are Flood Control, Water Supply, Recreation and Fish and Wildlife per Public Law 90-483. Access and facilities are provided for recreation but water is not controlled for that purpose. The State of Texas permit for water appropriation issued to BRA requires that whenever the flow in Aquilla Creek downstream from the dam is less than 0.5 cfs, the

Authority will release at least 0.5 cfs through the dam for domestic and livestock uses and for the benefit of fish and wildlife.

This study is submitted as a partial response to House and Senate resolutions by the committee on Public Works, United States Senate, 83rd Congress, adopted August 12, 1954, as quoted below:

> "Resolved by the Committee on Public Works of the United States Senate, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be and is hereby requested to review the report of the Chief of Engineers printed in House Document Numbered 181, Seventy-second Congress, first session, and other reports on the Brazos River and tributaries, Texas, with a view to determining whether any modification of the recommendations contained therein should be made at this time."

The authority granted by the resolution is known as a basin-wide authority. All studies conducted under this authority serve as an interim response to the basin-wide authority, and do not close out the granted authority.

Authority for the Corps to reallocate existing storage space to municipal and industrial (M&I) water supply is contained in Public Law 85-500, Title III, Water Supply Act of 1958, as amended (72 Stat. 319). Section 301(b), of this Act states ". . . it is hereby provided that storage may be included in any reservoir project surveyed, planned, constructed or to be surveyed, planned, and/or constructed . . . to impound water for present or anticipated future demand or need for municipal and industrial water supply." Section 301(d) of the Act states "[M]odifications of a reservoir project heretofore authorized, surveyed, planned, or constructed to include storage as provided in subsection (b), which would seriously affect the purposes for which the project was authorized, surveyed, planned, or constructed, or which would involve major structural or operational changes, will be made only upon the approval of Congress as now provided by law."

The Aquilla Reallocation Study will be a U.S. Army Corps of Engineers (Corps) feasibility study. As such, existing conditions will be identified for hydrology, hydraulics, economics, dam safety, geotechnical, engineering, environmental resources, cultural resources, recreation resources, and public desires, to sufficient level of detail to allow for feasibility level evaluation of selected alternative storage reallocation plans.

The Aquilla Reallocation Study costs are estimated to reach upwards of $2.1 million to evaluate the existing condition and three pool raise alternatives (additional 2.5', 4.5', and 6.5'). However, implementation costs are expected to greatly increase the total project cost. These costs likely would include, but are not limited to, relocation of utilities, roads and recreation facilities; mitigation for adverse impacts to environmental and cultural resources; structural improvements or modifications to the dam or structures, and associated needed real estate acquisition. The estimated total project cost of this project is expected to range from $5 to $l5 million.

The following table characterizes the likely alternatives for pool raises:

Top of Conservation Pool Alternative	Elevation at Top of Conservation (feet)	Conservation Pool Capacity (acre-feet)	Percentage of Existing Flood Pool	Percent of Total Authorized Storage
Existing	537.5	44,577	-	-

2.5’ Pool Raise	540.0	52,659	8.8%	5.5%
4.5’ Pool Raise	542.0	59,650	16.3%	10.3%
6.5’ Pool Raise	544.0	68,144	25.5%	16.1%

Current USACE policy requires that dam safety must be considered in all decisions involving water supply. For projects with safety issues or concerns such that the consequences of failure are considered to be of moderate to high risk, reallocations of storage that would require raising the conservation pool are not allowed. An initial evaluation of Aquilla Lake Dam undertaken in 2008 identified dam safety concerns that currently prohibit the implementation of the proposed reallocation alternatives, should they be recommended. Current policy does not; however, prohibit the completion of a reallocation study recommending a pool raise. Should the completed study find that a reallocation from the flood control pool to conservation storage for water supply is in the public interest, then the study recommendation would be tabled until such time as the dam safety concerns were reduced to a level of acceptable risk.

While there are established programs to identify and correct dam safety concerns, the funding and timing of these measures is based on national priorities for the entire portfolio of dams. The District is currently proposing to implement measures to potentially correct the dam safety concerns. However, a final determination on the resolution of the dam safety concerns will not be made until completion of the Initial Evaluation Studies and assessments of project pool experiences demonstrate the measures reduce the risk at all pool conditions. Therefore, proceeding with the study at this time assumes the risk of potentially recommending a reallocation that cannot be implemented. Both the District and BRA are aware of this situation and have determined that the study is important to the completion of the Brazos River Basin System Assessment and it is in both agencies' interest to proceed with the study at this time. Should a recommendation for reallocation be approved and tabled, at such time in the future as the dam safety concerns are mitigated to a low risk level, a reevaluation of the study recommendations would be required before the reallocation could be implemented.

An additional evaluation of Aquilla Lake Dam included an assessment of life/safety risks. The analysis revealed that the project implementation risks will not change from those of the original project design; therefore, the life safety risks associated with the conservation pool modification to Aquilla Dam is minimal.

There will be district quality control (DQC) and Agency Technical Review (ATR) for this project. Review of submittal packages and feasibility report materials will be required prior to the following major milestones:

- Feasibility Scoping Meeting (FSM) (Completed - July 2008)
- Draft Feasibility Report - Agency Decision Milestone (Chief of Engineers, HQUSACE)
- Final Feasibility Report – Final Report Milestone (ASA/CW)

The timing and scope of these reviews is discussed in the following sections of this RP.

c. Factors Affecting the Scope and Level of Review. This study does not contain influential scientific information or assessment, nor is there apparent economic, environmental or social affects to the nation. Interagency interest is limited to the coordination required by federal law. Currently, a recommended project has not been identified for this study. Close coordination with the sponsor and public meetings are expected to negate significant public dispute with regard to a recommended plan as are coordination with USFWS and USGS and cultural/archeological interests.

No Federal or State agency charged with reviewing the work product is likely to determine that recommended actions will have a significant adverse impact on environmental or cultural resources under the jurisdiction of the agency after implementation of proposed mitigation plans. Current involvement with the public environmental agency USFWS indicates their determination on the unlikelihood to negatively impact aquatic habitat with raising the normal operating level to any of the potential pool rise elevations. Likewise, correspondence from the Texas Historical Commission has issued concurrence on five sites that will suffer no adverse effects if the sites can be protected from damage from potential pool raises. It is anticipated that the report will not contain novel or precedent-setting approaches or influential scientific information. The study analyses, while complex, are well within the scope that is typical of similar reallocation studies.

There is no anticipated significant threat to life safety as the potential pool raises (as discussed in Section 3.b) will not increase flood risks. The hydrologic and hydraulic analysis indicates that raising the top of conservation pool for any of the potential pool raises will not significantly impact flood risk management downstream from the dam. Even with increased operation of the emergency spillway, the maximum extent and depth of flooding downstream from the dam would still be the result of runoff from the downstream watershed. This assessment will be made by the home District Chief of Engineering per EC 1165-2-209.

The Dam Safety concerns are currently being addressed by the Dam Safety Program and before any reallocation could be implemented, the existing dam safety concerns at Aquilla would have to be alleviated. The District has implemented additional geotech analysis of improvement measures above and beyond the requirements for reallocation to reduce the risk of any dam safety complications with the ongoing studies. These improvement measures have demonstrated reduced risk of pool conditions by sufficiently minimizing foundation seepage and piping of the embankment, and additional conservative analysis per effective guidance indicates adequate spillway erosion. However, a final determination on the resolution of the dam safety concerns will not be made until completion of the re-evaluation process which is on schedule to be presented to the Senior Oversight Group (SOG) 30 December 2012. Therefore, proceeding with the study at this time assumes the risk of potentially recommending a reallocation that cannot be implemented. Both the District and BRA are aware of this situation and have integrated the dam safety risks into the project risk matrix in accordance to the planning modernization paradigm. It was determined that the study is important to the completion of the Brazos River Basin System Assessment and it is in both agencies' interest to proceed with the study at this time. Should a recommendation for reallocation be approved and tabled, at such time in the future as the dam safety concerns are mitigated to a low risk level, a reevaluation of the study recommendations would be required before the reallocation could be implemented.

Consequently, the recommendation of the District is that the level of review be District Quality Control (DQC) and Agency Technical Review (ATR) as well as Independent External Peer Review (IEPR) because of the potential dam safety concerns to be evaluated during the study. An IEPR is anticipated for this study as defined in EC 1165-2-209. IEPR is anticipated to occur prior to drafting the final report, before the Civil Works Review Board and State and Agency Review of the Final Feasibility Report and may occur earlier in the study process as needed. Currently, study reallocation alternatives do not require Congressional approval as described in ER 1105-2-100.

d. In-Kind Contributions. The in-kind products and analyses to be provided by the non-Federal sponsor for an in kind credit is $150,000 include project management and Hydrology and Hydraulic

analysis. These products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR per Corps policy and guidance.

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.

a. **Documentation of DQC.** DQC will be documented using DrChecks and track-changes for all comments, responses and associated resolutions accomplished throughout the review process by the Supervisor/delegated reviewer. Comments should be limited to those that are required to ensure adequacy of the product. Once DQC is complete, the PDT member and Supervisor/delegated reviewer will sign a certification form, and submit the final product to the Planner/PM. The signed certification form will be included in the pre-conference submittals for HQUSACE. Then the draft decision documentation in whole will undergo DQC with the documentation of DrChecks.

b. **Products to Undergo DQC.** DQC will occur for the Report/Appendices/NEPA documentation/models prior to ATR.

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 team lead will be from outside the home MSC.

a. **Products to Undergo ATR.** ATR will occur 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. An in-depth review of the report, all appendices, integrated Environmental Assessment (EA), and models will be coordinated and documented by the PDT leader prior to HQUSACE policy compliance review. As mentioned throughout the PMP, all ATR will be coordinated with the Planning Center of Expertise for Water Management and Reallocation Studies (PCX). The ATR will be accomplished by an independent entity outside the Fort Worth District, within USACE, as designated by the PCX. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices of all project decision documents. The intent is for an ATR to not only ensure technical analyses are correct, but also ensure compliance with all pertinent USACE guidance in or to high quality products early in the study prior to HQUSACE review. ATR will be completed on the following documentation:

- Feasibility Scoping Meeting (FSM) (Completed - July 2008)
- Draft Feasibility Report - Agency Decision Milestone (Chief of Engineers, HQUSACE)-

anticipated April 2014
- Final Feasibility Report – Final Report Milestone (ASA/CW) –anticipated October 2013

Additional Issue Resolution Conferences (IRCs) may be required throughout the study when significant policy issues arise. If these require documentation for major decision making, then additional ATR of this documentation may be required; however, no IRCs are expected at this time. This quality control will occur prior to the decision event so that a firm technical basis for making decisions will be established. As a result, the decision event is free to address critical outstanding issues and set the direction for the next step of the study.

b. **Required ATR Team Expertise**: The expertise and disciplines represented on the ATR team reflect the significant disciplines involved in the planning effort. The ATR team consists of 6-8 team members selected from the respective Community of Practice approved list of ATR reviewers when available and must be outside of the Fort Worth District as determined by the RMO in cooperation with the PDT, vertical team, and the PCX in the following functional areas:

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead will be a senior professional outside of SWD with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Planning	Team member should possess extensive experience in the Corps planning process and be knowledgeable of Corps policies and guidelines. He or she should be familiar with flood risk management projects, water resources, reallocation studies and water supply studies
Economics	Team member will have extensive knowledge and experience in conducting flood risk management studies, reallocation studies and water supply studies.
Environmental Resources	Team members will be familiar with similar studies, projects, and lake ecosystems.
Cultural Resources	Team members will be familiar with similar studies and projects.
Hydrology and Hydraulic Engineering	Team member should be a recognized expert in the field of hydrology and hydraulics, have a thorough understanding of perched spillways.
Hydrologic Engineering Center (HEC)	Team member will be knowledgeable and familiar with reviewing various levels of risk and uncertainty in reallocation studies and projects.

Geotechnical Engineering	Team member will have extensive experience in perched spillways, seepage and Dam design, pre-and post-construction evaluation, and rehabilitation. A licensed/registered professional engineer is strongly recommended.
Civil Engineering	Team member will have experience with utility relocations and positive closure requirements. A licensed/registered professional engineer is strongly recommended.
Real Estate	Team member will have experience with water supply studies involving raising the lake pool elevation.
Structural Engineering	Team member will have a thorough understanding of Dams and structural measures to include, but not be limited to, retaining walls, gate structures, bridges and culverts, utility penetrations, and stop log and sandbag gaps. A licensed/registered professional engineer is strongly recommended.
Cost Estimating	Team member will be familiar with cost estimating for similar projects in MCACES. Review includes construction schedules and contingencies for any document requiring Congressional authorization. The team member will be a Certified Cost Technician, a Certified Cost Consultant, or a Certified Cost Engineer. As the Cost Engineering Center of Expertise, Walla Walla District will assign this team member as part of a separate effort coordinated by the ATR or IEPR team lead in conjunction with the geographic district's project manager.
Recreation	Team members will be familiar with similar studies and projects.

The names, organizations, contact information, credentials, and years of experience of the ATR members are included in Attachment 1 once the ATR team is established. Legal review is the responsibility of the Corps of Engineers, Office of Counsel and is not under the purview of the ATR team.

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, ASA (CW)/USACE policy, guidance or procedure that has not been properly followed;
(3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability and;
(4) The probable specific action needed to resolve the concern – identify the actions(s) that 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 coordination, and lastly the agreed upon resolution. The ATR team will prepare a Review Report which includes a summary of each unresolved issue; each will be raised to the vertical team for resolution as described either in ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. 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 draft report, and final report. SEE ATTACHMENT 2.

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 1165-2-209, 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 1165-2-209.

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

a. **Decision on IEPR**. The Fort Worth District has concluded that the Aquilla Reallocation Study does require independent external peer review (IEPR) based on the criteria in EC 1165-2-209 and the discussion in Section 3 – Factors Affecting the Scope and Level of Review. Although the decision document and supporting work products have no significant controversy, no high level of complexity or significant economic, environmental, and social effects to the nation, there is likely general downstream public safety concerns due to the impoundment of water in a reservoir.

b. **Products for Review.** At minimum, Type I IEPR should be performed for the draft decision document including NEPA environmental compliance documentation and technical appendices. Type I IEPR panel members will be provided with ATR documentation and significant public comments made during public meetings and on the products under review.

c. **Required IEPR Panel Expertise.** The Type 1 IEPR panel members will be composed of individuals who have not been involved in the development of the decision document and will be chosen based on expertise, experience, and skills. It is anticipated that the team will consist of approximately seven reviewers.

IEPR Panel Members/Disciplines	Expertise Required
Economics	Team member will have extensive knowledge and experience in conducting flood risk management studies, reallocation studies and water supply studies.
Environmental	Team members will be familiar with similar studies, projects, lake ecosystems, and NEPA.
Hydrology and Hydraulic Engineering	Team member should be a recognized expert in the field of hydrology and hydraulics, have a thorough understanding of perched spillways.
Hydrologic Engineering Center (HEC)	Team member will be knowledgeable and familiar with reviewing various levels of risk and uncertainty in reallocation studies and projects.
Reservoir Control/Water Management	This Member should have a minimum of 10 years experience directly related to water management and reservoir control. The member shall have expertise in real-time daily and flood operations, regulation decisions, gauging network and system infrastructure, national water control policy, water control data software, and systems operations.

The Outside Eligible Organization (OEO) will determine the final participants on the Type I IEPR panel. The name, organization, contact information, credentials, and years of experience of each member will be identified at the time the review is conducted and will be included in Attachment 1 of this Review Plan.

d. **Documentation of IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-209, 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.

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, 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. COST ENGINEERING DIRECTORY OF EXPERTISE (DX) REVIEW AND CERTIFICATION

All decision documents shall be coordinated with the Cost Engineering DX, located in the Walla Walla District. The DX 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 DX will also provide the Cost Engineering DX certification. The RMO is responsible for coordination with the Cost Engineering DX.

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 cover 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. Various U.S. Fish and Wildlife Service HEP planning models are used in the development of the decision document. No economic models were needed to evaluate flood damage reduction benefits for the subject decision document because a discernible increase is seen neither in downstream flooding even with flow over the spillway nor in the upstream reaches' flood pool extents per HEC-RAS.

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
The United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) Fox Squirrel: Habitat Suitability Index (HSI) Models	HEP requires the use of Habitat Suitability Index (HSI) models developed for each indicator species that use the habitats. The HSI models contain a list of structural habitat composition variables that are contained in optimum habitat. All the variables for each species representing each habitat are compiled and measured in the field. Eighteen variables were evaluated for the riparian woodlands. There were 12 variables measured for herbaceous wetland habitat, 18 savanna variables, 15 shrub land variables, 12 grassland habitat variables and 16 upland forest habitat variables. These variables were measured or estimated within a tenth-acre data plot within the habitat they represent. They are used as indicators of habitat condition or value. Baseline habitat conditions are expressed as a numeric function (HSI value) ranging from 0.0 to 1.0, where 0.0 represents no suitable habitat for an indicator species and 1.0	*Approved for use*
Barred Owl: HSI Model		*Approved for use*
Wood Duck: HSI Model		*Approved for use*
Downy Woodpecker: HSI Model		*Approved for use*

Eastern Meadowlark: HSI Model	represents optimum conditions for the species. HSI values ranging from 0.01 to 0.24 are considered "poor" habitat, 0.25 to 0.49 are considered "below average" habitat, 0.50 to 0.69 are "average" habitat, 0.70 to 0.89 are "good" habitat, and 0.90 to 1.00 are considered "excellent" habitat. Habitat units are calculated by multiplying the HSI for each habitat by the amount of acres of that specific habitat.	*Approved for use*
Eastern Cottontail: HSI Model		*Approved for use*
Northern Bobwhite: HSI Model		*Approved for use*

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

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 4.0	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 in Aquilla Lake watershed.	*HH&C CoP Preferred Model*
HEC-HMS 3.5.	The Hydrologic Engineering Center's Hydrologic Modeling System (HECHMS) simulates precipitation-runoff processes. Version 3.5 was chosen as it has improved efficiency and has additional features and improvements in modeling the terrain present in the Aquilla Lake watershed.	*HH&C CoP Preferred Model*
RiverWare 5.1	The Corps of Engineer's water management system, RiverWare 5.1, is designed to be used to model reservoir operations at one or more reservoirs whose operations are defined by a variety of operational goals and constraints. The program will be used for reservoir simulation to evaluate future conditions in Aquilla Lake with or without the proposed project.	*HH&C CoP Preferred Model*

10. REVIEW SCHEDULES AND COSTS

a. DQC Schedule and Cost. DQC will be completed prior to submission of documentation to the ATR team. DQC costs for the Draft Feasibility Report is included in the costs for PDT activities and is not broken out separately. DQC is anticipated to be conducted on the Report/Appendices/NEPA Documentation June 2012.

b. ATR Schedule and Cost. ATR will be completed prior to submission of documentation to the vertical team for a decision. These costs are cost-shared with the study's non-federal sponsors. ATR will be completed on the following documentation:

- Feasibility Scoping Meeting (FSM) (Completed - July 2008)	$19,000
- Draft Feasibility Report - Agency Decision Milestone (Chief of Engineers, HQUSACE)	$35,000
- Final Feasibility Report – Final Report Milestone (ASA/CW)	$10,000

c. IEPR Schedule and Cost. IEPR will be completed prior to submission of documentation to the Assistant Secretary of the Army Civil Works (ASA/CW) of the Final Feasibility Report. These costs are not cost-shared with the study's non-federal sponsors. IEPR will be completed on the following documentation:

-Draft report, anticipated April 2014	$125,000

d. Model Certification/Approval Schedule and Cost. Not Applicable.

11. PUBLIC PARTICIPATION

The public, including scientific or professional societies, will be able to comment on the feasibility study throughout the decision making process. Several public meetings will be held throughout the study. A public workshop will be held during the development of alternatives, which will be held after the FSM and prior to the Draft Feasibility Report. In addition, after a tentatively selected plan is identified, a public meeting will be held to solicit public comment on the plan. Finally, a public meeting is normally held during the public review process of the draft feasibility report.

The public will have an opportunity to review and provide comments on the draft feasibility report and environmental assessment for 30 days occurring approximately March 2013. In addition, the public can provide comments to the Study Project Manager throughout the feasibility study process to the study's project manager at the following address:

U.S. Army Corps of Engineers, Fort Worth District
ATTN: Aquilla Lake Project Manager, CESWF-PM-C
P.O. Box 17300 Fort Worth, TX, 76102-0300

Comments and responses are documented by the date the comment was received, and provided as an attachment which follows the document from the first ATR in October 2012 through Washington D.C. level review of the final feasibility report expected December 2012. This includes comments from all ATRs and comments received from the public throughout the study process.

All published reports can be found at the Fort Worth District's website (http://www.usace.army.mil/Missions/CivilWorks/ProjectPlanning/SignedChiefsReports.aspx) as well as directions for obtaining any information that may be disclosed under the Freedom of Information Act (Public Law 89-554, 80 Stat. 383; amended 1996, 2002, 2007).

12. REVIEW PLAN APPROVAL AND UPDATES

The Southwestern 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

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

- U.S. Army Corps of Engineers, Fort Worth District
  ATTN: Aquilla Lake Project Manager, CESWF-PM-C
  P.O. Box 17300
  Fort Worth, TX. 76102

- U.S. Army Corps of Engineers, Southwestern Division
  ATTN: Chief of Planning & Policy Division, CESWD-PDS-P
  1100 Commerce St.
  Dallas, TX. 75242

- U.S. Army Corps of Engineers, Southwestern Division
  ATTN: WM&RS PCX Director, CESWD-PDP
  1100 Commerce St.
  Dallas, TX 75242

ATTACHMENT 1: PDT ROSTERS

Discipline	PDT Member	Contact Information
Hydrology and Hydraulics	Robert Gergens	robert.e.gergens@usace.army.mil
Civil Design	Rickey Reed	rickey.a.reed@usace.army.mil
Project Manager	Kathy Gately	Kathleen.E.Gately@usace.army.mil
Planning	Susan Alford	Susan.R.Alford@usace.army.mil
Geotechnical	Ronald Gardner	ronald.m.gardner@usace.army.mil
Cost Estimating	Ninfa Taggart	ninfa.e.taggart@usace.army.mil
Economics	Norm Lewis	norman.lewis@usace.army.mil
Environmental	Leeanna Torres	leeanna.torres@usace.army.mil
Real Estate	Thurman Schweitzer	thurman.a.schweitzer.jr@usace.army.mil
Recreation	Susan Haney	Donald.N.Wiese@usace.army.mil
Reservoir Control	Allen Avance	allen.avance@usace.army.mil

DISTRICT QUALITY CONTROL REVIEW TEAM AQUILLIA PLAN FORMULATION DOCUMENT/REPORT				
	Name	**Contact Information**	**Hours**	**Amount**
Hydrology and Hydraulics	Helena Mosser	Helena.P.Mosser@usace.army.mil	40	
Risk & Uncertainty	Harlan Karbs	Harlan.Karbs@usace.army.mil	40	
Civil Design	Efren Martinez	Efren.Martinez@usace.army.mil	40	
Geotechnical	Jason Vazquez	Jason.Vazquez@usace.army.mil	40	
Cost Estimating	Milton Schmidt	Milton.R.schmidt@usace.army.mil	40	
Economics	Charissa Kelly	Charissa.A.Kelly@usace.army.mil	40	
Environmental	Marcia Hackett	Marcia.R.Hackett@usace.army.mil	40	
Planning	Charissa Kelly	Charissa.A.Kelly@usace.army.mil	40	
Real Estate	Roger Jennings	Roger.C.Jennings@usace.army.mil	40	
Recreation	Don Wiese	Donald.N.Wiese@usace.army.mil	40	
Reservoir Control	Brent Higginbotham	Brent.W.Higginbotham@usace.army.mil	40	

AGENCY TECHNICAL CONTROL REVIEW TEAM AQUILLIA PLAN FORMULATION DOCUMENT/REPORT				
	Name	**Contact Information**	**Hours**	**Amount**
ATR - Lead				
Hydrology and Hydraulics				
Risk & Uncertainty				
Civil Design				
Structural Design				
Geotechnical				
Cost Estimating				
Economics				
Environmental				
Real Estate				
Recreation				

INDEPENDENT EXTERNAL PEER REVIEW TEAM AQUILLIA PLAN FORMULATION DOCUMENT/REPORT				
	Name	**Contact Information**	**Hours**	**Amount**
Economics				
Environmental				
Hydrology and Hydraulic Engineering				
Hydrologic Engineering Center (HEC)				
Reservoir Control/Water Management				
Dam Safety				

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 interim feasibility study of the Brazos River Basin Systems Assessment Interim Feasibility Study Phase II Aquilla Lake Storage Reallocation. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. 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[sm].

SIGNATURE _____ _____

Name Date

ATR Team Leader, *Office Symbol/Company*

SIGNATURE _____ _____

Name Date

Project Manager, *Office Symbol*

SIGNATURE _____ _____

Name Date

Architect Engineer Project Manager[1], *Company, location*

SIGNATURE _____ _____

Name Date

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 _____ _____

Name Date

Chief, Engineering Division, *Office Symbol*

SIGNATURE _____ _____

Name Date

Chief, Planning Division, *Office Symbol*

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
May 2012	Old Review Plan content revised and in updated template format	Throughout

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
ASA(CW)	Assistant Secretary of the Army for Civil Works	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
ATR	Agency Technical Review	OEO	Outside Eligible Organization
DQC	District Quality Control/Quality	PCX	Planning Center of Expertise
DX	Directory of Expertise	PDT	Project Delivery Team
EA	Environmental Assessment	PMP	Project Management Plan
EC	Engineer Circular	PL	Public Law
EIS	Environmental Impact Statement	QA	Quality Assurance
FRM	Flood Risk Management	QC	Quality Control
FSM	Feasibility Scoping Meeting	RMC	Risk Management Center
Home	The District or MSC responsible for	RMO	Review Management Organization
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RTS	Regional Technical Specialist
IEPR	Independent External Peer Review	SAR	Safety Assurance Review
MSC	Major Subordinate Command	USACE	U.S. Army Corps of Engineers
NEPA	National Environmental Policy Act	WRDA	Water Resources Development Act