



**US Army Corps
of Engineers**
Kansas City District

R E V I E W P L A N

UPPER TURKEY CREEK FLOOD RISK MANAGEMENT PROJECT FEASIBILITY PHASE

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HEARTLAND ENGINEERS 

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1. DOCUMENT OBJECTIVE

This Review Plan (RP) is a part of the Project Management Plan (PMP) under the quality control and quality assurance (QC/QA) element in accordance with EC 1105-2-408, the more recent EC 1105-2-410, and the Standard Operating Procedures for the Planning Centers of Expertise (PCX). This RP provides guidance to the Project Delivery Team (PDT) on the specific review levels, responsibilities, and process requirements for execution of review on the Upper Turkey Creek (UTC) project.

2. GENERAL INFORMATION

Executive Summary - Study Purpose and Background. The U.S. Army Corps of Engineers Kansas City District (CENWK) along with the local project sponsor, Merriam, Kansas, are conducting a feasibility study of the UTC watershed to examine measures for flood risk management. Congressional authorization specifically for UTC states this project's primary mission is flood risk management. The study will produce the Upper Turkey Creek Feasibility Report, which is a decision document requiring Congressional Authorization. The study will serve as a decision document not only for federal decision makers but also the locals by presenting cost effective solutions to address environmental degradation under local implementation funds. Other Corps mission areas or authorities are being considered. These include using a systems approach (specifically a watershed approach), collaborative planning, ecosystem restoration, and recreation, are being tied into the plan formulation process where feasible opportunities are found. The PDT is formulating multipurpose alternatives with the main purpose being to examine the full range of structural and nonstructural measures that address the flood risk management authorization, under National Economic Development plans. The project will not change in authorization. Ecosystem restoration and recreation measures will be formulated where feasible under National Ecosystem Restoration plans, as the team recognizes that these secondary mission areas are compatible with local initiatives for addressing urban streambank erosion, best management practices (BMPs), and biking trails. The team is acutely aware of EPA's concerns for UTC, and the team understands that planning ecosystem restoration measures are part of a watershed approach, which addresses the local BMPs and water quality goals.



The Turkey Creek watershed has a history of Corps involvement. Currently, Lower Turkey Creek has an active construction project. One component is to repair an aging tunnel that conveys all flow from the Turkey Creek watershed through a bluff to the Kansas River. Channel widening has also been done. Figure 1 shows Upper & Lower Turkey Creek, labeled in purple. A purple line divides the two. The watershed, encompassing parts of Johnson and Wyandotte Counties in Kansas, consist almost exclusively of highly developed urban areas. The Unified Government (UG), which is a municipality made up of Wyandotte County and Kansas City, Kansas, is a co-sponsor for the UTC study, by separate agreements with Merriam, KS. The UG is a co-sponsor of the authorized Turkey Creek project in Kansas City, Missouri and KS, located in the lower watershed. Such plans will be technically viable, economically feasible and environmentally acceptable.

Study Authority. The legislation authorized under the Flood Control Acts of 1917, 1936, 1938, 1944, and 1970 and authorities to investigate flood risk management measures per the Water Resources Development Acts, beginning with 1986, and per Executive Order 11988.

Project Authority. The UTC project was authorized by the Flood Control Act and approved 16 February 2000 in a resolution of the Committee on Transportation and Infrastructure, U.S. House of Representatives (Docket Resolution 2616).

Feasibility Study Objectives. The Kansas City District is undertaking this feasibility study with the following objectives:

1. Determine possible local and federal projects primarily for flood risk management, and with consideration of multipurpose objectives as outlined by local and federal agencies. These include NGOs such as the Mid-American Regional Council (MARC), and Kansas City Chapter of American Public Works Association (KCAPWA). The local agencies are Merriam Drainage District (MDD), Johnson County Public Works (JOCO), and the Kansas Department of Health and Environment. The federal agencies include FEMA, EPA, USDA's Urban Forestry Initiative, and USGS. To assist local cities, MARC and KCAPWA have been actively creating standards for design for many years, and in the last five they have developed standards for BMPs, which are very relevant for water quality. MDD has been very active in their mission, "the free flow of Turkey Creek," by arbitrarily seeking to widen the channel in Merriam with indifference to this study, so we have been making collaboration attempts. MDD owns much of the parcels in the Merriam damage reach. JOCO has nearly completed revising their FEMA flood maps and has coordinated with Corps, providing models (see below). EPA has listed Turkey Creek for water quality concerns and has enabled the Watershed Institute to monitor activities affecting the environment. USDA has not identified with this study effort yet, though their goals for urban tree cover is consistent with reports by USGS. USGS has assisted with monitoring water quality and has written several reports for the southern Kansas City metro area (see below).
2. Coordinate the integration of the HEC-1 and HEC-RAS models that Johnson County has been using and developing since 1999 for the remapping of FEMA FIRMs with the purpose of reducing repetitive efforts and strengthening interagency collaboration.

Work-in-kind includes these hydraulic and hydrologic models. The intent is not exact duplication of results within the models, but rather applying as current versions as possible for application to the evaluation and comparison of alternatives in the feasibility study on an order of magnitude basis. This objective is in alignment with the Corps' perspective of a systems approach.

3. Include multipurpose measures and opportunities for ecosystem restoration measures that contribute to water quality as appropriate in an urban environment. Reclaiming the stream way corridors is the strongest example where multipurpose measures could work, and local cities, MARC, and KCAPWA are focusing on stream way setbacks to address various concerns, from water quantity problems to some water quality benefits. The sponsor needs to decide if buyouts or relocations are acceptable, but the area has a special opportunity, since very significant, large areas of redevelopment have already occurred on the nearby hilltops. The USGS studies in the adjacent watershed to the east, Brush Creek, observed water quality effects due to channelization on Brush Creek federal project that could be used in the development of any channel improvements to avoid repeating adverse water quality impacts, for example as the pools and sediment have had (reference Water Quality in the Blue River Basin, Kansas City Metropolitan Area MO & KS, July 1998 to Oct 2004 and Effects of Non-point and Selected Point Contaminant Sources on Stream-Water Quality and Relation to Land Use in Johnson County, Northeastern KS Oct 2002 through June 2004). In addition, the work the Corps has done on Rock Creek (a sub-watershed of Brush Creek) Planning Assistance to States project, is complete and is monitoring BMPs for the locals (reference Rock Creek Watershed Planning Feasibility Report, PAS study).

Summary Study Scope and Execution Parameters. The Project Management Plan for this study is based on a phased approach to performing the feasibility study with no changes to the standard stages F1- F9. The current level is at F4, Conference #2 - Alternatives. The study will be conducted in phases defined by carefully documented decision points. At the identified decision points, reviewers will certify concurrence in the assumptions and rationale for a decision. The stages are identified as follows:

PHASE I (complete). Phase I includes the Existing Conditions and Feasibility Scoping Meeting (FSM). ATR was conducted during this phase before 2006. Since funding delays create a gap between ATRs of three years, the project's ATR is hereby reorganized with this RP.

PHASE II. During 2007 the PDT began doing this phase. The phase develops and screens alternative plans composed of specific flood risk management and environmental restoration measures. Alternatives will be designed during Phase II to the level of detail that supports identification of the National Economic Development (NED) plan and the National Environmental Restoration (NER) plan. On completion, this first iteration of plan formulation will be reviewed by the ATR team. Multipurpose alternatives will be looked at after the first iteration, and then the ATR team will be invited for a field visit. The PDT will consider ATR input for the following iterations of plan formulation. A public meeting will then be organized to gage acceptability. An Alternative Formulation Briefing (AFB) will be held with District, Division and Headquarter and Sponsors. This phase ends with the completion of analysis for

Phase II alternatives and identification of the NED plan, the NER plan, and the Locally Preferred Plan (LPP), if it differs from the other plans.

PHASE III. The ATR will be available throughout Phase III, during which, we will document design of the final array of Plans. A non-structural plan and a No Federal Action plan must be evaluated to the same level of detail as any other plans in the Final Array. Work in Phase III will also resolve any issues expressed in the Project Guidance Memorandum (PGM) that results from the AFB. Phase III ends with identification of one plan from the final array as the Recommended Plan.

PHASE IV. In Phase IV we complete the steps necessary to environmental compliance and prepare final detailed design information for the Recommended Plan, including MCACES baseline cost estimate, real estate plan, and a draft construction phase Project Management Plan (PMP). The products of this phase receive certification by the ATR team and legal review. This phase ends with submitting the final draft report together with the results of quality/independent review, and responses to comments obtained from the agencies and the public to the Division headquarters for review and release of a Division Engineer's Notice of Report Completion.

Local Sponsorship and Funding. Feasibility funding source is 50% Federal General Investigations (GI) -- Civil Works Appropriation & 50% local cost share funding. All local funding will be provided from the City of Merriam, Kansas, although the study extends well into the UG. The Merriam signed an FCSA with the Corps 24 June 2002.

Description of Existing Overall Project and Problem. The study area covers about 20 square miles comprising the Turkey Creek watershed in Wyandotte and Johnson Counties, Kan., from the headwaters to the upstream limits of the authorized Turkey Creek flood risk management project in the lower watershed. The Turkey Creek channel through the upper segment of the fully urbanized watershed is about 15 miles long. The watershed lies in the southwestern part of the Kansas City metropolitan area.

Severe flash flooding has occurred in the Turkey Creek Watershed in 1977, 1993 and 1998. The October 4, 1998 flood caused over \$12 million in flood damages in Merriam, overtopped Interstate 35 and threatened lives in several areas of Johnson and Wyandotte Counties. The study is evaluating the feasibility of structural and non-structural measures to address the flood threat. Turkey Creek habitat is significantly degraded, and water quality is a serious problem. The study is evaluating stream and wetland habitat restoration measures that will also help reduce flood peaks and contribute to bank stability and water quality improvement.

The UTC watershed is centrally located in a metropolitan region that is conducting bi-state coordination focused on comprehensive watershed planning. The Lower Turkey Creek watershed involves both Kansas City, MO and the UG. The UTC watershed involves Merriam, KS and the UG. The watershed planning approach provides an opportunity to promote interagency cooperation, multipurpose project planning, and the protection of existing federal flood protection investment. The City of Merriam, Kansas, entered into a Feasibility Cost Sharing Agreement and is funding the non-federal share of the study in cooperation with Johnson and Wyandotte Counties. The UG represents Wyandotte County and Kansas City, KS.

The Corps undertook a reconnaissance study at the request of the City and completed a reconnaissance investigation, signed by the district 31 July 2001. The subsequent 905(b) document was approved in 4 Oct 2001 by CENWD.

Under the reconnaissance phase, the team prepared crude channel designs for the two flood damage areas: 1) downtown Merriam and 2) the Roe Lane Industrial Park. The designs are useful to identify obstructions and relocations that must be addressed to improve the hydraulic efficiency of the channel. They do not include the sustainable development features that would be necessary for an implementable project with appropriate environmental sensitivity. The team intends to look at the restoration of a streamway corridor.

The exact course of the NEPA tasks is unclear at this point, since a feasible solution is under formulation. The Existing Conditions work is almost complete. The biologists believe that an environmental assessment will take place, rather than an EIS. At least one public meeting was held in the past.

Modeling Methodologies Used to Evaluate the Alternatives. The methods used to evaluate the formulated alternatives include those for the primary authorized mission, flood damage reduction, and also ecosystem restoration, which was applied to address a systems or watershed perspective. First, the methods for characterizing the response of water surface elevations include the standard hydraulic modeling program, HEC-RAS, and the standard hydrologic program, HEC-1. The AE consultant handled the hydrologic work, and the AE found HEC-HMS necessary for some parts of the work. Because of the high degree of urbanization and number of enclosed conveyance systems, the hydrology used standard practices, ie. formulae for time of concentration adjustments, to characterize how this affected some locations in the watershed. Second, the formulation of bank stabilization and some best management practices, which were formulated under ecosystem restoration, were evaluated using the Kansas Department of Wildlife and Parks', *Subjective Evaluation of Aquatic Habitats*. This stream habitat model had no adjustments to the assessment as established by this State agency in 2004. Finally, economic methods involved the standard Corps of Engineers procedures and involved no special work. Therefore, the decision document, the Upper Turkey Creek Feasibility Report, will not be presenting novel methods. Models used are expected to be approved by the completion of the feasibility report.

Models being applied for hydrology and hydraulics are standard Hydraulic Engineering Center (HEC) national models; these are subject to the Corps of Engineers completion of the certification process. That certification effort is not part of this project. The following models will be certified prior to the submission of the completed feasibility report for this project.

Hydraulic Models: HEC-RAS

Hydrologic Models: HEC-HMS

The hydraulic and hydrologic models used for this study are part of Johnson County's FEMA FIRM updates (effective date expected to be summer 2009) and are sponsor in-kind

contributions. These models have been reviewed by independent parties outside of the Corps as well as by appropriate staff within CENWK. The University of Kansas provided hydraulic modeling experts to review all JOCO's models for the FEMA submittal. JOCO provided the same models to the Corps, which the Corps contracted one of JOCO's consultants to modify for this project. Those additions to the geometries established a hydraulic model outside of JOCO's county line, extending northeast into Wyandotte County. This modification provided a contiguous model for use on evaluating alternatives to the entire system, and this addresses the evaluation of possible induced damages. CENWK then provided senior level review. Finally, the consultant for plan formulation work has reviewed and applied these models. CENWK review has been done for this work, too. The PDT will coordinate with the FRM-PCX to verify if this process for the FEMA FIRM model meets model certification requirements.

Economic Models: HEC-FDA , IWR-PLAN.

The Corps in-house staff has handled all economic models. These models have no deviations from established processes.

National Corps models from HEC (unmodified) and IWR-PLAN (also unmodified) are currently in the certification process. The study ATR team shall be aware of these models in-process status and adjust their review efforts accordingly.

Ecosystem Restoration Models: Kansas Department of Wildlife and Parks' (KDWP) *Subjective Evaluation of Aquatic Habitats* (used previously by the Corps on Turkey Creek's lower portion for mitigation of channel work).

The KDWP will be applied (unmodified) with no deviations from the State of Kansas established format. Certification is being pursued by Kansas City District's Planning Branch with the Ecosystem Restoration Planning Center of Expertise.

Methods used with the model for ecosystem restoration, specifically for the measures that include bank stabilization may need application guidance from the Ecosystem Restoration PCX and approval of the habitat model during Phase II.

Risks of Alternatives. Once the two primary damage reaches have the needed alternatives implemented, the risks to the public in terms of loss of life or property damage will be significantly reduced. However, risk communication will still be important. The requirement for a floodplain management plan will be emphasized. Although the risks will be reduced to the residual risks that will lie behind levees or floodwalls, the PDT will provide strong risk communication to the stakeholders.

3. LEVELS OF REVIEW

The level of review established below will need concurrence from the vertical team once the planning effort has matured and the plan formulation process has at least started the formulation of alternative plans. Since the reconnaissance report did not present an opinion of probable costs for any alternatives, the determination on whether this project's construction cost triggers an external review must be tied to other planning efforts in the UTC watershed.

District Quality Control (DQC). The DQC will be conducted on the project feasibility study. DQC was formerly called Internal Peer Review. As part of the Quality Management Plan (QMP) on any project, internal reviews or design checks that constitute quality control for each deliverable product are done as required under the District's Business Quality Procedures (BQPs). Therefore, a QMP exists, separate from this document. This may be integrated as a section within the Project Management Plan. Each product development team (PDT) member, their supervisors, and the project manager have the responsibility to ensure that every product receives an internal quality control review. The supervisor or section chief for each team member is responsible for ensuring that a qualified internal peer review is selected and conducts a review of their product prior to delivery to the project manager, or prior to completion.

Agency Technical Review (ATR). ATR is an independent review (formerly called independent technical review), and this is a review done outside of Kansas City District and outside of the Division. The review is for the deliverables for the project and constitutes an independent review of the entire project, including the feasibility report and the tools used to do the analyses. In accordance with policy, all outside independent review teams for qualifying projects is coordinated through the Corps of Engineers' Flood Risk Management Planning Center of Expertise (FRM PCX, South Pacific Division) by the District. The FRM PCX works collaboratively with the Division staff and the District project manager to find team member staff outside the Kansas City District with the requisite experience and qualifications to review the project. Review comments will be documented, processed, and resolved through the Dr. Checks software package.

Independent External Peer Review (IEPR). IEPR is an intense review process, which is done outside the Corps of Engineers. 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, or where requested by the Governor of an affected state, IEPR will be conducted. CENWK would nominate candidates in an Outside Eligible Organization if IEPR is selected. IEPR would address all the underlying planning, safety assurance, engineering, economic, and environmental analyses- not just one aspect of the project.

Architect-Engineer (A-E) or Consulting Contracts. Contracts used on this project will undergo a quality assurance review of each deliverable product by assigned District PDT members, and this is included as part of the DQC above. Additionally, any products developed by contract will also undergo ATR along with other products as outlined in the ATR paragraph above. All contractors are required to develop a Quality Control Plan to be submitted as the first

deliverable for the contract. This will detail the firm's internal quality management and design check review processes and is subject to prior approval by the Project Manager and PDT in accordance with the established Kansas City District Business Quality Procedures (BQPs). A-E consultants will respond to all aspects of the RP, as part of their contracts and the budgets the submitted in their proposal.

4. SELECTED REVIEW PROCESS(S)

The decision on the selected review process depends on several items, and the decision rests with the Northwest Division Commander.

The first item is the total combined costs of the FRM authorized project. Recently, the PDT estimated projected total construction costs for the NED plan alternatives at two primary flood damage sites to be a total of about \$26.9 million, including planning and design costs. This breaks out to \$19.5 for the Merriam damage reach and \$7.4 for the Roe Lane reach. The decision on level of review below is based on this initial opinion of probable costs. The total is below the \$45 million policy threshold. Additional costs are anticipated for ecosystem restoration in upstream tributaries as part of the PDT's separable NER plan; however, this is expected to be under \$10 million. The total project cost for all mission areas would be under \$40 million.

Another item for consideration is the involvement of other agencies within the UTC watershed. Johnson County is revising their flood insurance rate maps (FIRMs) with FEMA. USGS has been involved with water quality science, and EPA has proposed a special area management plan (SAMP). The State of Kansas has also been concerned about the watershed's water quality. Next, the Corps of Engineers and the sponsors, the City of Merriam, KS, and the Unified Government of Kansas City & Wyandotte County, KS, have many stakeholder groups to deal with, including the Merriam Drainage District, Kansas Department of Transportation, Downtown Merriam Partnership, MARC, and the Turkey Creek Coalition, and this influences the decision for choosing the review processes. The PDT has done collaborative effort to address the work of FEMA re-mappings by meetings with FEMA Region VII in the field. EPA and USGS water quality work is being addressed with meetings at various public forums, such as the neighboring watershed's Brush Creek Coordinating Committee. State agency models for habitat evaluation are being used. The PDT believes that although the interagency includes many stakeholders, the project does not reach a significant level of involvement, because the on-going collaborative work is integrating multipurpose measures early on in the planning work.

Currently, the scale of the watershed approach does not require an EIS. Formulation efforts for the two damage reaches will be focused on structural solutions, however the alternatives will also integrate green, environmental measures as well, which will be cost separated from the NED plan. These careful considerations of the beneficial functions of floodplains, where appropriate, make an EA most likely.

Finally, loss of life is something the PDT is including in the planning work. This has not been a historical concern and is not a major factor, based on the reconnaissance study. One non-structural solution, flood warning, has already been addressed in meetings with many of the

cities involved in this watershed. For example, several teleconferences have been held addressing enhancing flood warning tools. The City of Overland Park, KS has been assisting Johnson County with making these tools a reality and a website is in use already. The feasibility report will document the integrated process for flood warning currently in place and will recommend any needed enhancements based on warning time at key locations, floodwater depth & velocity, and an assessment of the population at risk. In conclusion, loss of life has been and will continue to be addressed well, so the PDT believes that the potential for loss of life is not a significant concern.

The UTC project is a basic investigation. No features or components of this project are anticipated to be highly controversial or significant to national policy. The anticipated overall cost of the project is considered to be below the trigger threshold for IEPR. In the proposed study of the UTC area, Corps of Engineers criteria, methods, and models to be utilized are recognized standard criteria and methods with no novel or precedent setting methods anticipated. Based on the proposed standard approach, the project plan, and the criteria established for development of IEPR, the only IEPR for this project was done by Johnson County, KS on the models that they provided for use by the Corps.

Peer Review of Sponsor In-Kind Contributions. The hydraulic and hydraulic models used for this study are part of Johnson County's FEMA FIRM updates (effective date expected to be summer 2009) and are sponsor in-kind contributions. These models have had a good review by parties outside of the Corps as well as by appropriate staff within CENWK. The University of Kansas had hydraulic modeling experts review all JOCO's models. JOCO provided the same models to the Corps, which the Corps contracted one of JOCO's consultants to modify. Those modifications established a hydraulic model outside of JOCO's county line and into Wyandotte County. CENWK then provided senior level review. Finally, the consultant for plan formulation work has reviewed and applied these models. CENWK review has been done for this work, too.

Recommended Decision on Review Process. As a result of all these considerations, IEPR does not apply to the UTC project and will not be conducted. The selected review process for the UTC project is the DQC, ATR and the AE's quality control. The ATR will be developed in coordination with the PCX for Flood Risk Management, and the PCX representative. This process will be coordinated through the Northwestern Division Planning Office. DQC or internal checks will be conducted in accordance with the approved District business practices (or BQPs), as outlined above. AE contracts are anticipated to be utilized for development of technical products for this project. Contracts will be procured in accordance with the prior approval of the District Acquisition Strategy Board, as outlined in the most recent, approved District BQPs and the AE will comply with this review plan.

ATR References:

- EC 1105-2-410 dated 22 Aug 2008
- Refer to ER 1110-1-105, the primary Corps ATR regulation (see enclosed exhibit for summary of the major ATR requirements described in this regulation).

- EC 1105-2-408 dated 31 May 2005
- CECW-CP Memoranda dated 8 November 2006 and 30 March 2007.
- Refer to Kansas City District BQP 5.5.04 (Quality Plans). Pertinent excerpts are quoted below, although the BQP has yet to be updated per the recent EC 1105-2-410 update. Note comments interjected using brackets, [].

5.6 ITRT [ATR] Members:

- *Verify compliance with established policy, principles and procedures*
- *Verify criteria applied*
- *Verify assumptions, methods, procedures, and material used in analyses*
- *Evaluate alternatives*
- *Verify the appropriateness of data used and level of data obtained*
- *Verify completeness of design and documents*
- *Verify reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy.*
- *Conduct spot checks for interdisciplinary coordination*
- *Identify the specialized knowledge, experience, or training required to competently complete the product*
- *Verify comments are resolved by:*
 - *Verifying incorporation of their comments or,*
 - *Accepting the verification conducted by either the PM or ATRT Leader or,*
 - *Withdrawing the comment*

6.1.7.7.3 Independent Technical Review: Qualified staff verifies the work meets reasonable professional levels and satisfies the client's need and expectation. For small, simple, low complexity, low risk projects, Agency Technical Review can be accomplished at the section level. Agency Technical Review can be managed at branch levels when a few disciplines are involved, the project is of moderate cost and complexity and the risk for life safety is relatively low. Agency Technical Review for all other projects should include individuals who do not have a vested interest in the project and are not involved in the day-to-day direction of the product. The PMP should define the level of independent technical review. Independent Technical Review [ATR] is not a detailed check but a broad overview including:

- *Review of criteria applied*
- *Review of the methods of analysis and design*

- *Compliance with client and/or program requirements*
- *Completeness of design and documents*
- *Spot checks for interdisciplinary coordination*
- *Biddability, constructability, operability and environmental*

6.1.7.7.4 Independent reviewers are brought on board early on to participate in establishing criteria selection and broad approaches to be taken in addressing potential issues thus ensuring seamless review.

- Reviewers will be required to use the DrChecks web-based system for comments. Refer to <https://www.projnet.org/projnet/home/version1/index.cfm> for additional DrChecks access information.

5. PRIMARY DISCIPLINES AND EXPERTISE NEEDED FOR THE SELECTED REVIEW

Logistics and Coordination of the Review Process. The project manager will coordinate the official review with the PCX most responsible for quality review per the nature of the project's authorization. For UTC this is the FRM PCX, and the both the project manager and FRM PCX has identified names for an ATR team. Names were nominated by the project manager and approved with the FRM PCX. The PCX will not manage the ATR Team, as the ATR Team Leader will assume this responsibility (see below). The ATR Team Members' names are provided in Appendix A to this RP.

Discipline-Specific Guidance & Requirements. ATR Team representation is required in the disciplines listed below, and all representatives on this team will be from outside the home district, CENWK. In general, the ATR team members will each have a minimum of 15 years experience in their respective discipline. A statement of qualifications is required for each team member prior to acceptance as an ATR Team member and for any subsequent changes thereto. Multiple requirements may be filled by one ATR team member, depending on individual qualifications.

Hydrology & Hydraulics: Team member will be an expert in the field of urban hydrology & hydraulics, have a through understanding of the dynamics of the both open channel flow systems, enclosed systems, application of detention / retention basins, effects of best management practices and low impact development on hydrology, approaches that can benefit water quality, application of levees and flood walls in an urban environment with space constraints, non-structural measures especially as related to multipurpose alternatives including ecosystem restoration, non-structural solutions involving flood warning systems, and non-structural alternatives related to flood proofing. The team member will have an understanding of computer modeling techniques that will be used for this project (HEC-HMS, HEC-RAS, UNET, and TABS). A certified flood plain manager is recommended but not required. Required years of experience will be a minimum of 15 years, preferably over 20.

Ecosystem Restoration Specialist: This ATR team member will be a biologist or ecologist familiar with ecosystem restoration, in general, and shall also be specifically familiar with ecosystem restoration for multipurpose projects focused on flood risk management. This team member should be familiar with use of the watershed approach. In addition, this team member should be familiar with best management practices and stream corridor restoration techniques, as applicable within urban watersheds between 30 to 100 square miles in area. The team member should be familiar with the standard Habitat Evaluation Procedure habitat model and the NRCS field assessment, as this are the standard methods applied on UTC and the habitat model used by Kansas has similarities to these methodologies. Minimum years experience will be a minimum of 10 years. For the UTC project, a biologist from Omaha District was involved in review of the existing conditions phase, however this SME has retired.

Structural: Team member will have a thorough understanding of non-structural measures, levee, flood wall, and retaining wall design, and structures typically associated with levees (pump stations, gatewell structures, utility penetrations, stoplog & sandbag gaps, and other closure structures). Experience with internal drainage structures similar to flap gates is preferred. Minimum years of experience for this team member is 15 years. A certified professional engineer is recommended though not required.

Mechanical (*if deemed necessary by team leader*): Team member shall be familiar with levee pump station and closure structure design. Team member should have 10 years minimum experience. *Engineering disciplines other than Mechanical may be acceptable for review of this area of work subject to meeting the experience requirement stated above.*

Electrical (*if deemed necessary by team leader*): Team member shall be familiar with levee pump station and electrical utilities design. Electrical ATR requirements for this study are very minimal. Team member should have 10 years minimum experience.

Geotechnical: Team member will have extensive experience in levee & floodwall design, post-construction evaluation, and rehabilitation. This is a critical ATR team member, and a certified professional engineer is recommended with a minimum of 15 years experience.

Economics: Team member will have extensive experience in related flood risk management multipurpose projects, and have a thorough understanding of HEC-FDA. This team member should be able to provide guidance on cost effective / incremental cost analysis (CE/ICA) and trade-off analysis. A team member able to review the ecosystem restoration alternatives as applicable for an urban watershed is preferred, specifically in terms of applying IWR-PLAN on a watershed-wide basis. In the early stages of the feasibility study, the economics ATR reviewer assisted from Portland District. This team member should have at least 15 years experience.

Plan Formulation: Team member will be familiar with current flood risk management planning and policy guidance, and have experience in plan formulation for multipurpose projects, specifically integrating measures for flood risk management, ecosystem restoration, recreation, a watershed approach, and planning in a collaborative environment. Minimum years of experience needed is 15 years.

Civil / Site / Utilities / Relocations: This discipline may require a dedicated team member, or may be satisfied by structural or geotechnical reviewer, depending on individual qualifications. Team member will have experience in utility relocations, positive closure requirements and internal drainage for levee construction, and application of non-structural flood risk management, specifically flood proofing. A certified professional engineer is suggested. Minimum years of experience needed is 15 years.

Cost Estimating: Team member will be familiar with cost estimating for similar projects. Team member will review only on the selected plan, not the entire suite of formulated alternatives, as presented by the PDT in the latest version of MCACES, which is MII. Team member will be a Certified Cost Technician, Certified Cost Consultant, or Certified Cost Engineer. These efforts will be coordinated with Cost Engineering Directory of Expertise at the Walla Walla District. Minimum years of experience needed is 10 years.

Other disciplines/functions: The planning process typically involves other PDT members whose work may need ATR. The team leader will make a decision on the need for these disciplines. The notable disciplines that need ATR by subject matter experts (SMEs) on this project include the disciplines of Water Quality, Environmental/NEPA, Real Estate, Cultural Resources, Hazardous/Toxic Waste, and Legal. For Water Quality, the AE consultant's work has been actively reviewed by CENWK's strong water quality staff, including limnologists. These disciplines should have a minimum of 10 years experience each. Legal review is **not** under the purview of the ATR Team Leader but is instead responsible to the Corps of Engineers Office of Counsel chain-of-command.

ATR Team Leader. One member of the ATR Team will act as the team leader, and this lead will come from outside of both the District and the Division in which CENWK is located. The leader shall, in addition to discipline-specific requirements, be responsible for

- Organizing the ATR team. The ATR team is *not* geographically co-located. Therefore, it is of paramount importance that the ATR Team Leader be capable of organizing the total ATR efforts across District and Division boundaries.
- Acting as a liaison between the PDT and the ATR Team
- Distributing information for review and coordinating efforts of the ATR Team
- Performing, in conjunction with the PM, active coordination of the ATR process and study findings with the Corps Flood Risk Management Center of Expertise (FRM-PCX) in San Francisco District, and ensure compliance with an adequate level of FRM-PCX review.
- Ensuring that individual ATR Team members are operating in accordance with the guidelines (see above summary of the major ATR requirements).

- Being available for the as much of the project's review as possible. A substitute ATR Team Leader from the ATR team will be named by the ATR team leader for periods of extended (over 60 days) absence.

The ATR team members will be contacted on a regular basis by the corresponding PDT members so as to be kept aware of criteria selection and the broad approaches employed in this study thus ensuring a seamless review when products are submitted for ATR.

6. ATR SCHEDULE

The feasibility phase was initiated in 2002. Some ATR was done in 2004 under the project's first project manager. The first project manager presided over the Feasibility Scoping Meeting (FSM) in 2004. In 2006, a new project manager replaced the retiring one. The new project manager established the first RP in February 2008, which this RP supersedes. The ATR team identified by this RP can begin as soon as the PDT completes the screening of formulation of alternatives in the fourth of six planning steps, Evaluate Effects of Alternative Plans. The Federal funds have been fully allocated in FY2008 and by December 2008 the local cost share was fully available. Cost estimates are nearing completion and allowing the ATR members to begin review in March 2009. The Alternative Formulation Briefing (AFB) is scheduled for September 2009. Review of the draft feasibility report is anticipated to follow in the Fall of 2009, aiming for a winter Civil Works Review Board (CWRB).

FSM – 2004

Review Structural NED Plan – February 2009

Review Non-Structural NED Plan – April 2009

Cost Estimates for NED Available – January 2009

Approval of NED Plan H&H Models – January 2009

Approval of NER Plan Habitat Model – January 2009

Cost Estimates for NED Available – February 2009

Review of Economics (HEC-FDA, IWR-PLAN) – March 2009

Review NER Plan developed under the watershed approach – March 2009

AFB Documentation Ready – June 2009

AFB – September 2009

CWRB – January 2010

ATR Team Site Visit. An initial site visit was done in 2004 with the previous ATR members. Another site visit is anticipated as the new ATR team needs to re-group after the project delays. The site visit for the ATR members may be done in March 2009, if the team leader deems this necessary. This site visit will provide each reviewer with the opportunity to view existing conditions and to meet corresponding PDT members.

7. ATR BUDGET

ATR is currently budgeted at \$30,000 and is identified in the current project management plan budget.

8. PUBLIC INVOLVEMENT

Public access to the RP will be possible by accessing the Kansas City District website, link as follows: <http://www.nwk.usace.army.mil/projects/utc/>. Public review can begin as soon as this is reviewed by the PCX and posted by CENWK, which will be by the beginning of January 2009. This will supersede the previous RP at that time. After posting of this new RP, public comments will be received up to March 2009. No specific scientific or technical societies will be asked to nominate potential external reviewers, because of the recommendation in this RP for no IEPR. The general public may call the District or the FRM PCX for more information, (816) 389-2000 or (916) 557-7211, respectively. The public comments on the RP will be available to the review team.

Public and interagency review for this project will be conducted in accordance with NEPA, as well as the provisions of the Water Resources Development Act (WRDA) 2000, and as outlined in ER 1105-2-100. As such the review plan will be available through all public and agency scoping and other processes for the project. Public input from the NEPA workshops and the public scoping meetings will be available to the ATR members to ensure that public comments have been considered in the development of reviews and final reports.

9. DOCUMENTATION OF OUTPUT FROM THE REVIEW PLAN

Several items will serve to document that this RP is followed. First, the text on the following page will be completed and signed by the Division Commander, and this will be the update to the post review plan previously accepted by the Division.

Date:

Subject: Review Plan approval for the Upper Turkey Creek Feasibility Phase

The attached Review Plan for the Upper Turkey Creek Feasibility Study has been prepared in accordance with EC 1105-2-410.

The Review Plan has been made available for public comment, and the comments received have been incorporated into the Review Plan. The Review Plan has been coordinated with the Flood Risk Management Planning Center of Expertise of the South Pacific Division which is the lead office to execute this plan. For further information, contact the PCX at (916) 557-7211. The Review Plan does not include independent external peer review.

I hereby approve this Review Plan, which is subject to change as study circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

Brigadier General Rapp
Commander, Northwest Division

The second item to serve as documentation will be a print out of all comments and responses conducted within DrChecks. If IEPR becomes necessary, then the IEPR review team members would use DrChecks differently: They would provide comments to the project manager who would then enter the comments and track responses in DrChecks. Output from DrChecks would then be printed as documentation.

10. SAFETY ASSURANCE FACTORS

All projects addressing flooding or storm damage reduction also will be required to undergo a safety assurance review during design and construction, also known as the Preconstruction Engineering & Design (PED) phase. As specifically stated in the EC 1105-2-410, Appendix D paragraph 1c, factors to consider for a safety assurance review include

- Where the failure of the project would pose a significant threat to human life;
- Cases where information is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices;
- The project involves the use of innovative materials or techniques;
- The project design lacks redundancy, resiliency, or robustness:
 - Redundancy. The use of multiple lines of defense that are linked to potential failure modes. The most vulnerable failure modes need the greatest redundancy.
 - Resilience. The use of enhancements to improve the ability of the system to sustain loads greater than the design load to achieve gradual failure modes over some duration rather than sudden failure modes.
 - Robustness. The use of more conservative assumptions to increase capacity to compensate for greater degrees of uncertainty and risk.
- The project has unique construction sequencing or acquisition plans;
- The project has a reduced or overlapping design construction schedule; or
- Those factors described as directed by the Chief of Engineers.

Furthermore, the Safety Assurance Review shall focus on the quality of the surveys and investigations, quality of in-kind-contributions and whether it is certifiable for credit in accordance with EC1165-2-208, the range of alternatives considered, the models used to assess hazards, the level of uncertainty in assessments, and whether the quality and quantity of engineering per ER 1110-2-1150 are sufficient to ensure public welfare, safety, and health.

This RP will therefore need to be updated in the PED phase, if Congress authorizes construction of the selected plan.