



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

REPLY TO
ATTENTION OF

CESWD-PDP

02 MAR 2016

MEMORANDUM FOR Commander, Little Rock District

SUBJECT: Three Rivers Feasibility Report and Integrated EIS, AR - Review Plan Approval

1. References:

- a. EC 1165-2-214, Civil Works Review Policy, 15 December 2012.
- b. Memorandum, CESWL-PE, 19 February 2016, subject: Three Rivers Feasibility Study – Request SWD Review and Approval of Review Plan, P2 #145513 Report\Environmental Impact State Report – Review and Approval Request (Encl 1).
- c. Memorandum, CELRH-PCXIN-RED, 12 February 2016, subject: Review Plan for the Three Rivers, Southeast Arkansas, Integrated Feasibility Report\Environmental Impact State Report –Endorsement (Encl 2).

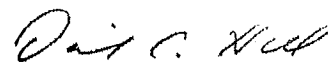
2. In accordance with reference 1.a., I hereby approve the enclosed Review Plan (RP) for the subject project study.

3. The RP has been prepared in accordance with the referenced guidance and has been reviewed and cleared for approval by the Center of Expertise for Inland Navigation and Risk-Informed Economics Division (PCXIN-RED (Encl 1). An Independent External Peer Review is required and public comments received will be incorporated into the plan as the study progresses.

4. Please post the final approved RP with a copy of this memorandum to the District's public internet website and provide the internet address to the PCXIN-RED and 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 Ms. Lanora Wright, CESWD-PDP, at 469-487-7032.

2 Encls


DAVID C. HILL
Brigadier General, USA
Commanding

REVIEW PLAN

**Three Rivers Study, Southeast Arkansas
Integrated Feasibility Report / Environmental Impact Statement**

Little Rock District

PCX Endorsement Date: _____

MSC Approval Date: _____

Last Revision Date: _____

REVIEW PLAN

Three Rivers, Arkansas Integrated Feasibility Report / Environmental Impact Statement

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1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan defines the scope and level of peer review for the Three Rivers Study, Southeast Arkansas, Integrated Feasibility Report and Environmental Impact Statement.

b. References

- (1) Engineering Circular (EC) 1165-2-214, Civil Works Review Policy, 15 December 2012
- (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
- (3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
- (4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
- (5) Cost and Schedule Risk Analysis Guidance, 17 May 2009
- (6) Three Rivers Feasibility Study, 30 Jun 2015

c. **Requirements.** This review plan was developed in accordance with EC 1165-2-214, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, rehabilitation, and replacement (OMRR&R). The EC outlines four general levels of review: District Quality Control (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-214) and planning model certification/approval (per EC 1105-2-412).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO for the peer review effort described in this Review Plan is the Planning Center of Expertise, Inland Navigation and Risk-informed Economics Division (PCXIN-RED).

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO will coordinate with the Cost Engineering Agency Technical Review and Mandatory Center of Expertise (MCX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. The feasibility study for the Three Rivers project is a multi-purpose study; no life safety issues are anticipated.

3. STUDY INFORMATION

a. **Decision Document.** The authorized name of the study is Three Rivers Study, Southeast Arkansas. The location is Desha and Arkansas Counties, Arkansas. The decision document will be an integrated Feasibility Report and National Environmental Policy Act (NEPA) report. The NEPA document will be an Environmental Impact Statement (EIS). For simplicity's sake, the integrated document will be referred to as a FR/EIS in this Review Plan. The purpose of the FR/EIS is to document the project delivery team's (PDT)

evaluation of alternatives that address long-term sustainability of the navigation system while investigating opportunities for ecosystem restoration in the Three Rivers area. The integrated FR/EIS will require approval from the Southwestern Division Major Subordinate Command (MSC), USACE Headquarters (HQUSACE), the Chief of Engineers, as well as congressional authorization. The EIS will satisfy all requirements under the NEPA.

b. Study/Project Description. The Federally authorized Three Rivers Feasibility Study area (Figure 1) is located at the confluence of the Mississippi, White, and Arkansas rivers in Desha and Arkansas counties, in southeast Arkansas, along the McClellan-Kerr Arkansas River Navigation System (MKARNS). The feasibility study will analyze alternatives that would inhibit cutoff development and recommend a long-term solution that allows for continued, safe, and economic use of the MKARNS and is environmentally sustainable. The cost-sharing, non-Federal sponsor is the Arkansas Waterways Commission.



Figure 1. Three Rivers Study Area

c. Factors Affecting the Scope and Level of Review.

- There are challenging aspects of this study. It consists of development of a unique solution of a very complex hydrologic system in an environmentally sensitive area. Therefore an EIS is being prepared.
- The study is controversial as it may consist of construction of significant infrastructure in or affecting a large, Federal wildlife refuge and State wildlife management area.
- The study will have significant interagency interest. The study will require close coordination with the U.S. Fish and Wildlife Service and multiple, Arkansas state water resource agencies, as wildlife refuge and wildlife management areas lie within and adjacent to the proposed study area.
- Public and stakeholder interest is expected to be diverse and complex.
- The project is for navigation and modifications will not be justified by life safety and does not involve significant threat to human life/safety assurance.
- The Governor of Arkansas has not requested a peer review by independent experts.

- The final Feasibility Report/EIS and supporting documentation will contain standard engineering, economic, and environmental analyses and information.

d. In-Kind Contributions. The non-federal sponsor is providing their 50% cost share in cash.

4. DISTRICT QUALITY CONTROL

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) and in-kind products shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

a. Documentation of DQC. DrChecks™ review software will be used to document all DQC comments, responses, and associated resolutions accomplished throughout the review process. DQC records will be provided to the ATR team for each ATR event and the ATR team will provide comments as to the adequacy of the DQC effort for the associated product.

b. Products to Undergo DQC. The draft and final FR/EIS (decision document) including feasibility-level design of the recommended plan and all technical appendices will undergo DQC prior to release from the District for external reviews (e.g., ATR and Type I IEPR). All DQC reviews will be complete and closed out before external reviews are initiated.

c. Required DQC Expertise. Required expertise for DQC includes individuals from Plan Formulation, Economics, Environmental and Cultural Resources, Operations, Hydraulic Engineering, Hydrology, Civil Engineering, Geotechnical Engineering, Cost Engineering, and Real Estate.

DQC Team	Expertise Required
DQC Lead / Planning	The DQC Lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting DQC. The lead should also have the necessary skills and experience to lead a team through the DQC process. The DQC lead should also be a senior water resources planner with experience in formulation, evaluation, and selection of alternatives for inland navigation projects. The DQC lead should also have experience in ecosystem restoration planning.
Economics	The reviewer review shall have extensive knowledge of the principles and guidelines of economic analysis as it relates to navigation systems and environmental restoration inland navigation systems.

Environmental	The reviewer shall be an expert in the NEPA process. The reviewer shall be familiar with the impacts to inland navigation systems. The reviewer should also have experience in ecosystem restoration planning.
Operations – Navigation	The reviewer shall have extensive knowledge and experience with operation and maintenance of inland navigation systems. The individual will not be part of the PDT to ensure an unbiased review.
Hydrology and Hydraulic Engineering	The reviewer should be an expert in hydrology and hydraulics related to inland navigation systems and the use of HEC computer modeling. A registered professional engineer (PE) is preferred. The individual will not be part of the PDT to ensure an unbiased review.
Civil Engineer/Geotechnical Engineer	The reviewer(s) should be a subject matter expert and should have extensive experience in the design of hydraulic control structures related to inland navigation systems. A registered professional engineer (PE) is preferred. The individual will not be part of the PDT to ensure an unbiased review.
Cost Engineering	The reviewer should be familiar with cost estimating for civil works construction and ecosystem restoration projects in MCACES. Review includes construction schedules and contingencies for any document that requires Congressional authorization. The reviewer will be a Certified Cost Technician, Certified Cost Consultant, or Certified Cost Engineer. The Cost Engineering Directory of Expertise will assign this team member as part of a separate effort coordinated by the DQC team lead in conjunction with the District Project Manager. The individual will not be part of the PDT to ensure an unbiased review.
Real Estate	The reviewer should have experience with similar civil works projects and should also be familiar with preparing, processing, and reviewing Real Estate Plans. The reviewer must be selected from the approved list of RE DQC reviewers. The individual will not be part of the PDT to ensure an unbiased review.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.) and any in-kind products. 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. 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 assigned by the RMO, 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.** The ATR team will review the draft and final FR/EIS (decision document) including feasibility-level design of the recommended plan, technical appendixes, and any supporting documentation that is not contained in the technical appendices. This review will occur following completion of DQC. The ATR team will also be informally engaged throughout the feasibility phase and will complete interim reviews on specific products as necessary.

- b. **Required ATR Team Expertise.** Below is a list of anticipated disciplines for the ATR team. This list will be revised if the expertise needed for the review changes as the study progresses. The expertise represented on the ATR team reflects the significant expertise involved in the work effort and generally mirrors the expertise on the PDT. The PDT made the initial assessment of expertise needed based on the PMP and the factors affecting the scope and level of review outlined in Section 3 of the review plan. In addition to the expertise outlined below, ATR reviewers should be experienced in reviewing products resulting from risk-informed decision-making following SMART Planning processes. The RMO will determine the final make-up of the ATR team. The names, organizations, contact information, credentials, and years of experience of the ATR members will be included in Attachment 1 once the ATR team is established.

ATR Team	Expertise Required
ATR Lead / Planning	The ATR Lead should be a senior professional 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 should also be a senior water resources planner with experience in formulation, evaluation, and selection of alternatives for inland navigation projects. The ATR Lead should also have experience in ecosystem restoration planning.
Economics	The reviewer review shall have extensive knowledge of the principles and guidelines of economic analysis as it relates to navigation systems and environmental restoration inland navigation systems.
Environmental	The reviewer shall be an expert in the NEPA process. The reviewer shall be familiar with the impacts to inland navigation systems. The reviewer should also have experience in ecosystem restoration planning.
Hydrology and Hydraulic Engineering	The reviewer should be an expert in hydrology and hydraulics related to inland navigation systems and the use of HEC computer modeling. A registered professional engineer (PE) is preferred.

Civil Engineer/Geotechnical Engineer	The reviewer(s) should be a subject matter expert and should have extensive experience in the design of hydraulic control structures related to inland navigation systems. A registered professional engineer (PE) is preferred.
Cost Engineering	The reviewer should be familiar with cost estimating for civil works construction and ecosystem restoration projects in MCACES. Review includes construction schedules and contingencies for any document that requires Congressional authorization. The reviewer will be a Certified Cost Technician, Certified Cost Consultant, or Certified Cost Engineer. The Cost Engineering Directory of Expertise will assign this team member as part of a separate effort coordinated by the ATR team lead in conjunction with the District Project Manager.
Real Estate	The reviewer should have experience with similar civil works projects and should also be familiar with preparing, processing, and reviewing Real Estate Plans.
Operations – Navigation	The reviewer shall have extensive knowledge and experience with operation and maintenance of inland navigation systems.

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 include:

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

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist.

The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in

either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

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

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

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the draft report and final report. A sample Statement of Technical Review is included in Attachment 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

a. Decision on IEPR. Based on a risk-informed decision process, Type I IEPR will be required. Details of the Type I IEPR risk informed decision summary is provided below:

- The project does not involve significant threat to human life.
- Based on previous studies in the area, the cost of one or more of the alternatives to be studied will likely exceed approximately the \$200 million threshold in EC 1165-2-214.
- The NEPA document will likely be an EIS.
- Evaluation of alternatives and arriving at the tentatively selected plan will involve complex hydraulic modeling and assessment of impacts to the area's ecosystems.
- There will be significant Federal and State agency interest.
- There is a diverse and complex set of stakeholder concerns (i.e. commercial navigation, environmental, etc.)
- The Governor of Arkansas has not requested an independent peer review.
- Type II IEPR is not anticipated as the project does not involve hurricane and storm risk management and flood risk components.

b. Products to Undergo Type I IEPR. The draft integrated Feasibility Report / EIS and supporting documentation will undergo Type I IEPR. Public comments will also be reviewed by the Panel for information purposes. The intent is to ensure that the Panel is aware of the public's concerns and determine whether there are any technical

issues that were raised by the public that they had not previously considered.

- c. Required Type I IEPR Panel Expertise.** The following provides a description of the proposed panel members and expertise. The proposed four member panel includes the necessary expertise to assess engineering, environmental, and economic adequacy of the decision document, as required by EC 1165-2-214, Appendix D. Reviewers will be selected by an Outside Eligible Organization. The likely disciplines and expertise required for IEPR are presented below. Each discipline will review products related to their area of expertise and focus their review on the previously listed items. Additional technical areas requiring IEPR may be identified during the study/review process.

IEPR Panel	Expertise Required
Plan Formulation	The panel member should be an expert in the USACE plan formulation process, procedures, and standards with experience in the evaluation of alternative plans for inland navigation and environmental restoration studies.
Economics	The economics panel member should have experience/credentials in multipurpose planning. Additional experience in applying Cost Effectiveness/ Incremental Cost Analysis for quantification of ecosystem restoration benefits and alternative plans evaluations and in development of combination NED/NER plans.
Environmental	The panel member should be an expert in bottomland hardwood ecosystem biology and with USACE environmental analyses, Ecosystem Restoration studies, and feasibility reports.
Hydrology and Hydraulic Engineering	The panel member should be an expert in the field of hydrology and hydraulics with extensive experience designing channel improvement and stabilization projects on an inland navigation system and be familiar with USACE hydraulic modeling methods.
Civil Engineer/Geotechnical Engineer	The reviewer(s) should be a subject matter expert and should have extensive experience in the design of hydraulic control structures related to inland navigation systems. A registered professional engineer (PE) is preferred.

- d. Documentation of Type I IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, Appendix D. The IEPR documentation in DrChecks will include the text of each IEPR concern, the PDT response, a brief summary of the pertinent points in any discussion, and the agreed upon resolution. 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 will 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 AGENCY TECHNICAL REVIEW AND MANDATORY CENTER OF EXPERTISE REVIEW AND CERTIFICATION

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

9. MODEL CERTIFICATION AND APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate

potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

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 (if required).

- a. **Planning Formulation/ Economic Models.** The following planning 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	Certification / Approval Status
Ark-White Cutoff Probability and Cost Benefit Estimate Model/Method	Economics and H&H – Model developed as part of the Ark-White Cutoff Study (2009) used to estimate the probability of a breach occurring in the project area, and the benefit and costs of the with and without project condition. This is a joint probability (Bayesian) approach using expert elicitation. Combination of economics/statistical and H&H analysis. This model was developed specifically for application to the study area.	This is not certified for one time use. This is what the PDT proposes to do.
IWR Planning Suite	Economics – Used to conduct incremental cost analysis for NER benefits, and select multi-objective (NER and NED) combined plan via multi-criteria decision analysis.	Certified

- b. **Plan Formulation/ Ecosystem Restoration Models.**

Ecosystem Restoration: Models will be used in this study to quantify effects of hydrologic changes on the nationally significant ecological features of the ecosystem, *unless* the hydrologic changes across the planning alternatives are so minimal that they are below scientifically-sound thresholds for causing changes in the ecosystem. The PDT will choose, in coordination with the National Ecosystem Restoration Planning Center of Expertise (ECO-PCX), which models to use. The decision will be based on the following criteria: model’s ability to quantify changes in the features of the ecosystem that are

nationally significant, model's ability to quantify changes in the features of the ecosystem that are indicators of the ecological health of the ecosystem, the level of detail needed to choose among planning alternatives (fidelity of the model compared to the fidelity needed to make the planning decision), reliability of the models as shown in past similar studies, readiness of the model for ECO-PCX approval.

The following models are being discussed with the ECO-PCX (**Table 9 a, b, c**). The list has been narrowed from more than 85 models by using the team's criteria. If the planning alternatives will cause hydrologic changes in the ecosystem that will trigger ecological changes, the team will choose models from the list below. The team will need a model to quantify bottomland forest changes, another to quantify changes in oxbow lakes and wetlands, and a tool to translate the environmental benefits into habitat units. Once the team chooses the models, the review plan will proceed as appropriate for each. See third column in Table 9 a,b,c for notes on review needs.

Table 9 a, b, c. List of models under final consideration to quantify ecosystem restoration benefits for the Three Rivers Study. If hydrologic modeling shows that there will not be significant hydrologic changes in the Three Rivers ecosystem, then the team may not need to proceed with modeling ecological changes for the study. Table 9-a lists models that quantify changes in bottomland hardwood (BLH) ecosystem. Table 9-b lists model that quantifies benefits in oxbow lakes and wetlands. Table 9-c lists models that focus on indicator wildlife species and translation of species benefits to Habitat Units.

Table 9-a.

Model	Use	Approval Status, Review Needs
HEC-EFM	<u>Quantifies effects of hydroperiod changes on bottomland hardwood forest.</u> Uses HEC-RAS inputs. GIS based hydrodynamic model. HEC-EFM looks at water inundation duration and its effect on forest. It tells the team the elevation to build to stay within inundation tolerance limits of forest tree species.	Certified for regional use. Developer (John Hickey) is available to assist with use of the model.
HGM	<u>Quantifies effects of hydrology and other factors on survival and composition of bottomland hardwood habitats and wetland functions.</u> HGM considers geology and geomorphology, soils, topography and elevation, hydrology, aerial photographs and maps, land cover and ecological communities, and physical and anthropological features in the ecosystem.	Certified for regional use.
Topographic Diversity Index (TDI)	<u>Quantifies hydrology effects on bottomland hardwood species of interest.</u> Like a simplified version of HGM that looks only at hydrology. It is a spreadsheet that allows team to look at # of acres of pre-project and post-project habitat. The spreadsheet <u>translates results to habitat units.</u>	Approved for single use for Upper Miss. It is not in HEC right now but can be used with HEC-EFM to compare scenarios to show acres of change across scenarios. Chuck Theiling is available to support.
Regression analysis	<u>Estimates effects of hydrological changes on tree species of interest.</u> This analysis is simple compared to HEC-EFM or HGM. However, team would need species-specific data to create the regression curves.	Regression curves would need to be created. Would need ECO-PCX review. May be relatively simple, if data and statistician are available.

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Table 9-b.

Connectivity analysis	<u>Quantifies hydrologic changes in oxbow lakes and wetlands.</u> Model available that was developed in Three Rivers region. Jack Kilgore developed the model.	Not certified but has been used in published study and USACE planning (see Kilgor et al. 2008). The PDT has VT and ECO-PCX agreement to use connectivity analysis.
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Table 9-c.

Duck-use Days	<u>Quantifies ecosystem health by how well the ecosystem can support ecological indicator waterfowl species.</u> Developed for the Mississippi Alluvial Valley (MAV). Estimates duck use days based on daily energy requirements of waterfowl species to determine benefits and impacts of projects on their habitats and populations.	Certified for regional use. Used for several Mississippi restoration projects.
Several species-specific HSI models available	<u>HSIs quantify relative change in the ability of an ecosystem to support species of interest.</u> There are HSIs for black bear, bull frog, barred owl, and other species that indicate the structure and functional quality of the ecosystems.	Certified for regional use. Would need to combine index scores to translate them to habitat units. The HEAT model can do this (next row).
Habitat Evaluation Assessment Tool (HEAT)	<u>Translates species-specific ecological restoration benefits into Habitat Units.</u> User-friendly, flexible, efficient means to quantify benefits and impacts to species, communities and ecosystem functions.	Certified for regional use. Developer Kelly Burks-Copes is available to support.

c. 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	Certification / Approval Status
HEC-RAS	One-dimensional unsteady state backwater model	Enterprise
HEC-GeoRAS	Used to extract geometry data from LiDAR or other DEM data to be used in HEC-GeoRAS	Enterprise
ADH	Two-dimensional quasi-steady hydraulic model: Numerical Hydraulic Model Investigation. Models flow distribution across the floodplain. This model was used in the previous Ark-White Study	Approved

CCHE2D	Two-dimensional bed form erosion model. Estimates the sediment discharge through proposed White River diversion structures. This model was used in the previous Ark-White Study	Approved
SIAM HEC-RAS	One-dimensional quasi-unsteady bed stability model. Is a reach based sediment accounting model that has been embedded in the Hydraulic Design module of HEC-RAS.	Approved

d. Design Methodology. The following engineering methodologies are anticipated to be used in the development of the decision document:

Ship Tow Simulation (TBD)	Simulation of ports, harbors, inland waterways, and other maritime environments. <i>Note: Coordination is ongoing to determine if this model will be run during the feasibility phase. This Review Plan will be updated once use of this model is confirmed.</i>	Approved
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10. REVIEW SCHEDULES AND COSTS

NOTE: Need fee proposal from PCXIN for ATR

a. ATR Schedule and Cost. The ATR schedule and cost estimate is presented below.

Task	Date	Estimated Cost
Limited ATR of preliminary economics technical documentation (Prior to TSP Milestone)	Apr-16 for FWOP NED portions Targeted Sep-16	\$10-15K
ATR of draft FR/EIS (Prior to Agency Decision Milestone)	Feb-17 to Mar-17	\$45-50K
ATR of final FR/EIS (After ADM and at conclusion of Feasibility Level Design)	Feb-18 to Mar-18	\$10-15
Total:		\$65-80

b. **Type I IEPR Schedule and Cost.** The IEPR schedule and cost estimate is presented below.

Task	Date	Estimated Cost
RMO Initial Coordination of IEPR	Sep-16	\$10
RMO Management of IEPR	Sep-16 to Jun- 17	\$5
Type I IEPR of draft FR/EIS (Prior to Agency Decision Milestone) *	Mar-17 to Jun 17	\$200 K
Total:		\$215 K

*Estimated contract for 4 reviewers

c. **Model Certification/Approval Cost.** During plan formulation, the PDT used a model was not certified for preliminary screening. As the PDT moves towards the TSP, all models listed for use are certified or will only require approval for use in this feasibility study.

Model	Use	Approval Status, Review Needs	Funding Estimate for Reviews and Technical Support
Topographic Diversity Index (TDI)	Quantifies hydrology effects on bottomland hardwood species of interest. This model may be thought of as a simplified version of HGM that looks only at hydrology effects. It is a spreadsheet that allows team to look at # of acres of pre-project and post-project habitat. The spreadsheet translates results to habitat units.	Approved for single use for Upper Miss. The team needs approval of TDI for single use for the Three Rivers Study. Chuck Theiling is available to support.	Review: \$50K for ECO-PCX review for one-time use approval. Support: \$100K for adjusting model with site-specific information (the model currently uses species information from a northern state – different species than our site).
Connectivity analysis	Quantifies hydrologic changes in oxbow lakes and wetlands. Model is available that was developed in Three Rivers region. Jack	Not certified but has been used in published study and USACE planning (see Kilgor et al. 2008). The PDT has VT and ECO-PCX	Review: \$50K for ECO-PCX review for one-time use approval. Support: \$75K for modeler support.

	Kilgore developed the model.	agreement to use connectivity analysis.	
HGM	Quantifies effects of hydrology and other factors on survival and composition of bottomland hardwood habitats and wetland functions. HGM considers geology and geomorphology, soils, topography and elevation, hydrology, aerial photographs and maps, land cover and ecological communities, and physical and anthropological features in the ecosystem.	The HGM Arkansas Delta Regional Guidebook was certified for regional use in 2011. The team will seek ECO-PCX review of the data and processing that the team will use to follow the HGM methods. One of the guidebook authors, Tom Foti, is on the 3 Rivers environmental team and is available to support.	Review: \$60K for ECO-PCX review of data and data processing to follow HGM methods and produce PNV maps. Support: \$120K per map, for 3-5 maps (max cost is \$600K)
Several species-specific HSI models are available that fit the team's criteria and metrics	HSIs quantify relative change in the ability of an ecosystem to support species of interest. There are HSIs for several species that indicate the structure and functional quality of the specific aquatic ecosystems of interest in this study. The team will delve into these models in more detail, if needed (as explained in the table caption).	Certified for regional use. Would need to combine index scores to translate them to habitat units. The HEAT model can do this (next row).	Review: \$0 (already certified) Support: \$0 (PDT team members can run these models)
Habitat Evaluation Assessment Tool (HEAT)	Translates species-specific ecological restoration benefits into Habitat Units. User-friendly, flexible, efficient means to quantify benefits and impacts to species, communities and ecosystem functions.	Certified for regional use. Developer Kelly Burks-Copes is available to support.	Review: \$0 (already certified) Support: \$75K for modeler support (Kelly Burks-Copes)

Ship Tow Simulation TBD)	The Ship/Tow Simulator features two bridges set up for real-time ship maneuvering, and were specifically developed for evaluating navigation channel designs, modifications, and safety issues.	Developed by ERDC.	\$70K
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11. PUBLIC PARTICIPATION

The public will be invited to comment directly to the PDT through a public review of the draft FR/EIS (public review occurs concurrently with ATR, IEPR, and HQ policy reviews). Public input will be available to the IEPR team to ensure public comments have been considered in development of the draft and final FR/EIS.

This RP and the accompanying PMP will be posted to the District web site for public review once it is approved by the MSC.

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. POCs

Review Plan POC’s

- District Contact, Project Manager: Karyn Adams, 501-340-1076
- District Contact, Study Manager: Amanda Lynch, 501-324-7338
- MSC Contact: Lanora Wright, 469-487-7032
- Review Management Organization: Karen Miller, 304-399-5859
- Review Management Organization: Marshall Plumley, 309-794-5774

ATTACHMENT 1: TEAM ROSTERS

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

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

SIGNATURE

Name

ATR Team Leader

Office Symbol/Company

Date

SIGNATURE

Name

Project Manager

Office Symbol

Date

SIGNATURE

Name

Architect Engineer Project Manager¹

Company, location

Date

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

Chief, Engineering Division

Office Symbol

Date

SIGNATURE

Name

Chief, Planning Division

Office Symbol

Date

¹ Only needed if some portion of the ATR was contracted

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
ASA(CW)	Assistant Secretary of the Army for Civil Works	OMRR&R	Operation, Maintenance, Repair, Renlacement and
ATR	Agency Technical Review	PCX	Planning Center of Expertise
DQC	District Quality Control/Quality	PDT	Project Delivery Team
Home District/M SC	The District or MSC responsible for the preparation of the decision document	RED	Regional Economic Development
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMC	Risk Management Center
IEPR	Independent External Peer	RMO	Review Management
MCX	Mandatory Center of Expertise	SAR	Safety Assurance Review
MSC	Major Subordinate Command	USACE	U.S. Army Corps of Engineers
NED	National Economic	WRDA	Water Resources Development
NEPA	National Environmental Policy		