

REVIEW PLAN

**MOUNT SAINT HELENS SEDIMENT MANAGMENT
PROJECT DOCUMENTS FOR LIMITED REEVALUATION REPORT**

PORTLAND DISTRICT

November 2011

MSC Approval Date: Nov 11, 2011

Last Revision Date: None



**US Army Corps
of Engineers** ®

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1. PURPOSE AND REQUIREMENTS

- a. **Purpose.** This Review Plan (RP) defines the scope and level of peer review for the Mount Saint Helens (MSH) project documentation. This RP is a component of the MSH Project Management Plan (PMP). It will be referenced as an appendix to any updates to the MSH PMP. The necessary review steps are integrated into the overall development of the plan that will identify the least cost approach to maintaining flood risk reduction benefits through 2035.

There will be four key milestones in the development of this plan that will require specific reviews: a) when the baseline condition and alternative evaluation scope is determined; b) when the alternative formulation has been completed; c) when the draft report and environmental compliance documents have been completed and d) when the final report and environmental compliance documents have been completed. This RP outlines the anticipated required levels of review and model approvals.

It is important to understand that while the long-term sediment management plan is under development, interim actions will be required in order to maintain flood risk reduction benefits authorized by this project in the mid-1980s. Current data indicates that an interim action will be required in the summer of 2012.

b. References

- (1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 31 Jan 2010
- (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2010
- (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) Mount St. Helens Project Management Plan

- c. **Requirements.** This review plan was developed in accordance with EC 1165-2-209, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-209) and planning model certification/approval (per EC 1105-2-412).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is Flood Risk Management Planning Center of Expertise.

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. Because the project may include modifications to the existing sediment control structure the RMC will play a significant role during the design phase and assessment of life and safety issues.

3. STUDY INFORMATION

- a. **Decision Document.** The Mount Saint Helens Sediment Management Project (MSH Project) is located in southwest Washington State. The study area encompasses 1,200 square miles in southwest Washington, reaching north from the Columbia River to the headwaters of the Toutle River at Mount St. Helens. The Columbia River flows east to west through a broad trough between the Cascade and Olympic mountain ranges. The Cowlitz River and its principal tributary, the Toutle River, are typical of rivers draining the west slopes of the Cascade Range. The terrain is mountainous and except for clearcuts and areas devastated by the 1980 eruption, heavily forested. The Cowlitz River drains an area of 2,480 square miles including the Toutle river drainage area. Below its confluence with the Toutle, the lower 20 miles of the Cowlitz River passes by the cities of Kelso, Longview, Castle Rock and Lexington, Washington, before entering the Columbia River at river mile 67.8.

The MSH Project was initiated after the eruption of Mount Saint Helens on May 18th, 1980. The MSH Project was authorized under Supplemental Appropriations Act, 1985, Public Law 99-88. A Feasibility study and Environmental Impact Statement were completed in the mid-1980s that described the flood risks to the communities of Kelso, Longview, Castle Rock and Lexington, Washington. As a result of that study the Corps built a large sediment retention structure (SRS) and completed dredging and levee work to manage the sediment flow, reduce flood risks to the communities of Kelso, Longview, Castle Rock and Lexington, Washington. The original plan recognized the necessity of future actions such as dredging. Current analyses show that if no further actions are taken, it is expected that sediment will continue to deposit in the Cowlitz River and congressionally authorized levels of flood risk reduction benefits will not be maintained through 2035.

The current team is in the process of developing a long-term strategy to maintain flood risk reduction benefits through 2035 and will be described in a Limited Reevaluation Report (LRR), an Environmental Assessment and Biological Assessment. It is anticipated that approval for the LRR will be at the Northwest Division level. All future construction work will be implemented under the original authority and the Local Cooperation Agreement in which the State of Washington is required to provide all real estate needs. Types of potential actions to maintain flood risk reduction benefits are diverse and include raising the SRS, dredging, developing additional sediment storage and stabilizing sediment at its source.

- b. **Study/Project Description.** The purpose of the MSH Long-term Sediment Management LRR is to develop a plan for managing MSH sediment through 2035 under the existing project authority. The MSH Project was authorized under Supplemental Appropriations Act, 1985, Public Law 99-88, with the State of Washington as the non-Federal sponsor. The plan will be based on considerations of congressionally authorized levels of flood risk reduction on the Cowlitz River, cost-effectiveness, and environmental impacts. The existing sediment retention structure (SRS) has been operating as run-of-river since 1998 and is now less efficient at trapping sediment. The *Mount St. Helens*,

Washington, Decision Document, Toutle, Cowlitz and Columbia Rivers (Corps 1985) identified dredging in the Cowlitz River as a means to maintain flood risk reduction levels once the SRS became a run-of-river project, and provided the option for assessing other long-term alternatives. The conditions in and around the Cowlitz River are different now from what they were in 1985. Endangered Species Act (ESA) issues and a lack of readily available dredge disposal sites make dredging the river difficult and expensive. Consequently, a new analysis was initiated in 2009 to find the best long-term plan for managing sediment from MSH. As the MSH project is an open construction project, a traditional feasibility study will not occur and project benefits will not be reformulated.

A LRR will describe the least-cost analysis and identify a recommended long-term sediment management strategy. The goal is to combine measures into alternatives that result in a reasonable assurance that the authorized levels of flood damage risk reduction benefits will be maintained throughout the project life. The types of measures under consideration include modifications to the existing sediment retention structure, construction of new sediment retention structures and dredging. These measures will be combined into alternatives will be evaluated in terms of least cost, environmental impact, and public acceptability. The final LRR will describe the remaining construction actions necessary to complete this project. It is anticipated that an Environmental Assessment (EA) will be completed. Total project cost could exceed \$90 million. Appropriate reviews as described in this document will be completed throughout the planning process. Upon approval of the study, detailed design documentation will be prepared for the implementation of the long-term plan measures. The document will provide planning, engineering, and implementation details to allow final design and construction to proceed subsequent to Northwest Division and as needed HQUSACE approval.

While the long-term sediment management plan is under development, interim actions will be required in order to maintain the authorized flood risk reduction benefits. These interim actions may include dredging, small sediment storage structures upstream of the Sediment Retention Structure (SRS) and modifications to the SRS. Specific requirements are currently under analysis.

This phased approach (maintain flood risk reduction benefits with interim actions while developing the long-term strategy) has been vetted during the Feasibility Scoping Meeting.

- c. **Factors Affecting the Scope and Level of Review.** The eruption of Mount St. Helens in 1980 was a major natural disaster in the Pacific Northwest. Actions by the Corps have provided flood risk reduction benefits to the area. The original construction plan developed in the 1980s to manage the sediment from the eruption envisioned that future actions would be required at some point after year 2000. The Corps is currently developing the sediment management strategy through year 2035. Because of the unusual conditions that the MSH eruption has created, several factors influence the evaluation and scope of the review.
 - There is significant uncertainty in the volume and timing of the transport of sediment from MSH down into the lower Cowlitz River, thereby making the selection of the least cost long term plan challenging. Recent analyses by independent sediment transport specialists indicate actual volume of material affecting the lower Cowlitz River could vary significantly. This uncertainty in the volume of sediment cannot be reduced with further analysis. Therefore, any recommended plan must be adaptable and scalable to actual sediment deposition conditions.

- A significant effort was made to predict future sediment loadings from the debris avalanche. Future yields are still the most important factor in sizing the sediment management approach and uncertainty in future yields is still high. A relatively high degree of uncertainty still exists regarding future sediment yield from the debris avalanche, both in terms of total yield and variability of yield. Credible studies argue two radically different sediment yield conditions in the future: significant decay in the sediment yield and none or minimal decay in sediment yield. To apply a measure of conservatism in the estimate of future sediment loading, the no-decay assumption was applied to create the data set. Years of coupled data (sediment and hydrologic) were randomly selected from the pool of data in the Sediment Budget. These years were compiled into a series starting in 2008 and extending through 2035. This was done thousands of times until full statistics of random selection were known. A single series of years was selected that represented the median condition for both sediment and hydrologic metrics. That series of years was developed into daily flows and sediment loads using observed data and used as the future condition. Many series were available that met the median requirement; in selection a series was selected that showed a similar distribution of peak events to the observed series. This prevented selection of a series dominated by only very high and very low datasets. Since a median series was selected, no additional conservatism was added to the assumption of no decay in debris avalanche sediment yield.
- In order to respond to this inherent uncertainty in the primary driver of sedimentation in the Cowlitz River (sediment yield from the debris avalanche) an adaptive approach is desirable. Any feasible management strategy should be able to accommodate the conservative sediment input of the adopted approach but would preferentially be scalable if significant decay does occur. It is expected that an adaptable approach would be less costly if decay occurs and later components are not constructed. Additionally, an adaptable design is positioned to provide the best-fit project and potentially the least impacts.
- Components of the HEC-FDA tool were used to comply with ER 1105-2-101 (Risk Analysis for Flood Damage Reduction Studies). Specifically, HEC was used to assess the hydrologic, hydraulic and levee fragility information and calculate the conditional non-exceedance probability for each levee named in the authorization for 5 year increments in time through the end of the current planning period.
- The requirement for adaptability of the project introduces challenges because it is not possible to explicitly predict the timing of construction of project components. The proposed measures will likely need to be implemented over time, depending on the timing of sediment deposition events. Although the team is confident that it can identify the specific actions needed and where they are needed, nature will determine when they are needed. This creates challenges in the timing of preparing designs and acquiring the necessary funds from Congress to construct.
- There is wide regional interest in the MSH project as it potentially affects over 50,000 people and encompasses an area of significant environmental values (particularly ESA listed salmon). Balancing the requirement to provide flood risk reduction benefits and meet the ESA listed species requirements will be challenging. This project is of great interest to the State of

Washington governor's office, various state agencies, Cowlitz County, local diking districts, communities of Kelso, Longview, Castle Rock, Lexington, and the Cowlitz tribe. In general, interest groups associated with the upper watershed are primarily concerned with preserving and restoring habitat conditions while interest groups in the lower basin (floodplain) are most interested with flood risk reduction efforts. Although the MSH Project is a single purpose flood risk reduction project, plan development must take into consideration all points of view to be successful. The original plan was developed under emergency conditions and there were no endangered/listed species. Today, there are ESA listed species and regional interest in flood risk reduction as well as environmental restoration. Developing the plan to maintain flood risk reduction benefits while minimizing environmental impacts is challenging.

- A full assessment of the threat to human safety with project actions will be completed. It is anticipated that the consequences of non-performance of project actions will be minimal but the proposed actions due include modifications to an existing sediment retention structure and therefore does introduce some public safety risk. Potential components of the plan include raising the elevation of water/sediment behind the existing sediment retention structure as much as 30 feet. The closest population center downstream of the structure is over 20 miles and likely not within the impact reach; but an analysis of potential impacts to downstream roads and bridges will be completed. District Chief of Engineer recognizes there is enough threat to human safety with project actions that a full engineering assessment and analysis of consequences of raising structure 30 feet will be performed.
- There has been no request by the Governor of Washington state for a peer review by independent experts.

In order to successfully develop a sediment management strategy for the MSH Project the plan must: be adaptable to uncertain physical conditions over time (actions scaled to actual sediment deposition in lower Cowlitz); reach regional consent from the diverse range of interest groups that the recommended sediment management plan is reasonable (will work and won't cause great environmental damage); consider and address any life safety risks identified in the analyses; be responsive to changing conditions and able to be designed and funded in a timely manner.

- d. In-Kind Contributions.** Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. The in-kind products and analyses to be provided by the non-Federal sponsor include real estate for all project components.

4. DISTRICT QUALITY CONTROL (DQC)

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC.

- a. Documentation of DQC.** DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). It is managed in the home district and may be conducted by staff in the home district as long as they are not doing the work involved in the study, including contracted work that is being reviewed. Basic

quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc. Additionally, the PDT is responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before approval by the District Commander. DQC is documented through DrChecks so that there is a permanent record of comments and responses. The DQC documentation in DrChecks will include the text of each DQC concern, the PDT response, a brief summary of the pertinent points in any discussion, and the agreed upon resolution. The DQC comments, responses, and resolution of comments will be provided to the ATR team at each review.

- b. Products to Undergo DQC.** At a minimum DQC will be completed on all decision documents including the draft LRR, draft EA and BA and all design documents.
- c. Required DQC Expertise.** At a minimum DQC expertise will include plan formulator, economist, hydraulic engineer, geotechnical engineer, cost engineer, structural and mechanical engineer, real estate specialist, fish and wildlife biologist.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

- a. Products to Undergo ATR.** ATR is performed for the key products associated with the Long-term Alternatives Study (including EA documentation and technical appendixes). Examples of such products that will require ATR review are: a) when the baseline condition and preliminary measure evaluation is complete; b) when the alternative formulation and recommended plan has been identified c) when the draft report and environmental compliance documents have been completed and d) when the final report and environmental compliance documents have been completed. ATR will also be performed in accordance with EC 1165-2-209 for any design documentation produced. This review plan will be updated prior to completion of the decision document phase and as needed.
- b. Required ATR Team Expertise.**

ATR Team Members/Disciplines	Expertise Required
ATR Lead	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 may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Planning	The Planning reviewer should be a senior water resources planner with experience in use and application of ER-1105-100. Specific

	experience with flood risk management studies is critical.
Economics	The Economist should be experienced in use and application of ER-1105-100 as it pertains to economics. Specific experience with flood risk management and cost effectiveness analyses is critical.
Environmental Resources	Environmental compliance requirements pursuant to the “Procedures for Implementing NEPA” (ER 200-2-2), national environmental statutes, applicable executive orders, and other Federal planning requirements, into the planning of Civil Works projects. Biologist familiar with non-native and native species in the Pacific Northwest
Cultural Resources	Archaeologist familiar with records searches, cultural resource survey methodology, area of potential effects, Section 106 of the National Historic Preservation Act, and state and Federal laws/executive orders pertaining to American Indian Tribes.
Hydraulic Engineering	Hydraulic engineer will be proficient with river hydraulics, and associated tools, hydrologic statistics, sediment transport analysis, risk and uncertainty analysis, and other closely associated technical subjects as these relate to sediment transport.
Geotechnical Engineering	Geotechnical engineer familiar with sampling and laboratory testing, embankment stability and seepage analyses, planning analysis, and a number of other closely associated technical subjects.
Civil Engineering	Civil engineer with experience in design and construction of large and small sediment management measures.
Structural Engineering	Structural engineer with experience in dam design and construction and ability to assess structural components of possible modifications to an existing structure and construction of a new dam.
Cost Engineering	Cost estimating specialist competent in cost estimating for construction using M2 (2 nd generation of MCACES); working knowledge of construction; capable of making professional determinations based on experience. Coordination with the USACE Cost Engineering Directory of Expertise (DX) located in the Walla Walla District will be conducted as required.
Real Estate	Real estate specialist familiar with real estate valuation, gross appraisal, utility relocations as needed for implementation of Civil Works projects.

c. Documentation of ATR. DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

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

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

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

The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

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

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

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

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-209, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the

USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR:

- **Type I IEPR.** Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-209.
- **Type II IEPR.** Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

a. Decision on IEPR.

EC 1165-2-209 identifies thresholds that trigger IEPR: In cases where there are public safety concerns, a high level of complexity, novel or precedent-setting approaches; where the project is controversial, has significant interagency interest, has a total project cost greater than \$45 million will trigger Type I IEPR to be conducted.

Type I IEPR will be conducted for this project because of the potential for life safety concerns and the total project cost will likely be greater than \$45 million. Type I will be completed as part of the LRR effort.

It is estimated that the Type I IEPR will cost \$300,000. IEPR is a project cost, while the IEPR panel review cost is currently 100% federally funded. It is not anticipated that the public, including scientific or professional societies, will be asked to nominate potential external peer reviewers.

Based on discussions with the District Engineer and MSH Project risk to human safety a Type II IEPR is anticipated to be required. The Safety Assurance will be addressed during the Type I IEPR.

b. Products to Undergo Type I IEPR. The full Type I IEPR panel will receive the draft Long-term alternatives report (including EA and BA documentation) and all technical appendices.

c. Required Type I IEPR Panel Expertise. It is anticipated that the IEPR Panel will consist of approximately Three (3) reviewers. Disciplines that are anticipated to undergo IEPR are and experience needed for IEPR is provided in the following table. Reviewers for the disciplines noted

should be proficient with flood risk reduction and sedimentation issues associated with a natural disaster (eruption of Mount St Helens).

IEPR Panel Members/Disciplines	Expertise Required
Economics (flood risk management)	Economic justification of projects in accordance with current USACE policy.
Environmental (NEPA compliance/fish biologist)	Environmental compliance requirements pursuant to the “Procedures for Implementing NEPA” (ER 200-2-2), national environmental statutes, applicable executive orders, and other Federal planning requirements, into the planning of Civil Works projects. Fisheries biologist familiar with non-native and native species in the Pacific Northwest.
Hydraulic/Geotechnical Engineering (sedimentation experience)	Engineer proficient with river hydraulics, and associated tools, sediment transport analysis, risk and uncertainty analysis, and other closely associated technical subjects as these relate to sediment transport.

d. Documentation of Type I IEPR. The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-209, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 4.d above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

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

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

7. POLICY AND LEGAL COMPLIANCE REVIEW

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and

complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

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

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

9. MODEL CERTIFICATION AND APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (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 Models.** It is anticipated that no planning models will be used. This project is an open construction project and the current evaluations are to determine the least cost approach to maintain the authorized level of flood reduction benefits. Models such as HEC-FDA will be used but only for the hydrologic, hydraulic and levee fragility information. Benefits are not being reevaluated. There is significant uncertainty in how much additional sediment will be delivered from the volcano to the lower Cowlitz River. As a result, the major uncertainty parameters are incorporated in the sediment transport evaluations. Because of the significant uncertainty around the expected volume of material, the recommended actions are formulated based on expected values with the added requirement being that they can be adaptively implemented. A sensitivity analysis of potential variability in the quantity of material impacting the lower Cowlitz will be completed to demonstrate how different conditions would influence selection of the recommended plan.

Any additional mitigation requirements associated with the existing project will be determined through negotiations with the appropriate resource agencies and interest groups.

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

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
Micro-Computer Aided Cost Estimating System M2 (second generation MCACES), Version 4.1	This is the cost estimating model that was developed by Building Systems Design Inc. The U.S. Army Corps of Engineers began using this model in 1989. Cost estimates for this project will be developed using this tool. An assessment of cost uncertainties will be handled through the cost center of expertise.	US Army Corps of Engineers Mandated Software
Flood Damage Reduction Analysis (HEC-FDA) version 1.2.4	HEC-FDA in its full capacity performs an integrated hydrologic engineering and economic analysis during the formulation and evaluation of flood risk management plans. For the Mount St Helens long term plan, economics was not applied (because benefits were not reassessed) and only hydrologic, hydraulic and levee fragility information was used to calculate the conditional non-exceedance probability for each levee named in the authorization for 5 year increments in time through the end of the current planning period.	CoP Preferred
Hydrologic Engineering Centers River Analysis System (HEC-RAS) 4.1	The U.S. Army Corps of Engineers' River Analysis System (HEC-RAS) allows one-dimensional steady/unsteady flow river hydraulic calculations and sediment transport-mobile bed modeling. Designed to perform hydraulic calculation for full network of natural and constructed channels. Major capabilities used here: <ul style="list-style-type: none"> ▪ Hydraulic Analysis ▪ Sediment Transport Analysis ▪ Data storage and Management ▪ Graphics and reporting 	HH&C CoP Preferred Model
Mike21C version 2001 w/ service pack 2	MIKE 21C by Danish Hydraulics Institute is an integrated river morphology modeling tool based on a curvilinear version of the water model MIKE 21 and adjusted to river applications. MIKE-21C is a 2 dimensional hydraulic model used to simulate the aggradation and degradation of the sediment plane upstream of the SRS. This model was used in conjunction with HEC-RAS to predict the amount of sediment passing the SRS. Additional 2D models were compiled along the lower 3 miles of the Cowlitz River. The Lower Cowlitz 2D models were created to facilitate a feasibility level analysis of using pile dikes to increase the transport potential of the channel in this reach. The 2D model of the Lower Cowlitz extended from approximately RM 3 on the Cowlitz downstream to the Columbia River.	HH&C CoP Allowed for Use Model
ADH 3.2.1-Particle Tracking Model	A particle tracking model was compiled to model how sediment loads from the Cowlitz River get distributed as they	HH&C CoP Allowed for

2.0	migrate into the Columbia system. This model uses ADH, an adaptive 2D hydraulic model, to support a simulation of the movement of discrete particles from the mouth of the Cowlitz River to a point where they are deposited on the surface of the Columbia channel. Ultimately this model quantifies the location and volume of sediment deposition in the Columbia caused from sediment loads from the Cowlitz River.	Use

10. REVIEW SCHEDULES AND COSTS

a. ATR Schedule and Cost.

Since the Long Term Sediment Management study began in 2009 before completing the Review Plan, past reviews were conducted in accordance with the Northwest Division (NWD) Quality Management Plan. All future reviews will adhere to this Review Plan. Long term plan development and interim actions will be required for the MSH Project. Interim actions are necessary because the authorized level of flood risk reduction benefits will be compromised before the long term plan is completed. The schedule information below shows long term plan items and interim actions in two separate tables.

The review process for the Long-term Sediment management study, including ATR team involvement is summarized in the following timeline. Based on historical cost of \$25,000 to complete an ATR the total remaining ATR cost is estimated at \$125,000.

Long Term Plan Review Milestone	ATR Team Involvement(1)	Proposed Schedule/Actual Date
Complete ATR of Draft Progress Report	X	May 2010
Public Scoping Meeting		Jun 2010
Environmental Agency Scoping Meeting		Jan 2011
ATR (baseline sediment condition/preliminary measure screening complete for FSM)	X	Feb 2011
Vertical Team FSM & IPR-baseline conditions		Jul 2011
Value Engineering initiated		Sep 2011
Complete Cost Engineering Certification	X	Feb 2012
ATR (Alternatives Formulation for AFB)	X	Feb 2012
Vertical Team AFB Meeting & IPR-alternatives formulated		Mar 2012
Complete ATR of Draft Report/EA	X	Jun 2012
Initiate Public Review of Draft Report/EA		Sep 2012
Initiate Type I IEPR Process of Draft Report/EA		Sep 2012
Complete Type I IEPR of Draft Report/EA		May 2013

Complete ATR of Final Report/EA	X	Jun 2013
Civil Works Review Board (CWRB)		TBD
Policy & Legal Compliance Review		Ongoing
Final Report Submission		TBD

(1) DQC occurs before initiation of each ATR.

The review process for the Interim Actions, including ATR team involvement and a SAR assessment is summarized in the following timeline. Based on historical cost of \$25,000 to complete an ATR total remaining ATR/other review cost is estimated at \$75,000.

Interim Actions Plan Review Milestone	ATR Team Involvement(1)	Proposed Schedule/Actual Date
Environmental Agency Scoping Meeting		Jul 2011
Complete ATR of 10 foot Spillway Raise Design Documents	X	Feb 2012
Safety Assurance Review completed		March 2012
Draft Interim Action Design report/EA		Apr 2012
Complete ATR of Draft Interim Action Design Report/EA	X	May 2012
Construct Interim Action		Jul 2012

(1) DQC occurs before initiation of each ATR.

Type I IEPR Schedule and Cost. The IEPR will be conducted for the long-term plan after ATR and concurrently with the public and agency review of the draft report and Environmental Assessment. The IEPR will be scheduled when the draft long-term plan and Environmental Assessment is completed. Per guidance, a Safety Assurance Review will be addressed during the Type I IEPR. Estimated date of completion of IEPR is May 2013. Cost for the IEPR is estimated at a maximum of \$300,000. Following is the draft schedule for the IEPR:

Task	Schedule
PCX Prepares Type I IEPR Scope of Work	Jul 2012
Type I IEPR Contract Awarded	Aug 2012
Type I IEPR Review Initiated	Sep 2012
Final Type I IEPR Report Submitted	TBD
PDT Submits Clarifying Questions to Contractor	TBD
Contractor Submits Responses to Clarifying Questions	TBD

b. Model Certification/Approval Schedule and Cost. The engineering computational models to be employed in the MSH Long-Term Sediment Management Plan for Flood Risk Reduction have either been developed by or for the Corps or other Federal agency and are approved for use. ATR will still be required to assess the appropriateness of how the models were used and the results. Therefore, no model approval cost is anticipated.

11. PUBLIC PARTICIPATION

The public will be invited to comment directly to the PDT through public scoping meetings and public review periods programmed into the planning schedule (see schedule in ATR Review section). In addition, draft LRR and environmental documents will be made available for public review on the Portland District public web page.

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

Meeting minutes and significant and relevant public comments from the NEPA workshops and public scoping meeting(s) will be made available to the ATR team to ensure that public comments have been considered in the development of the final document. Because the draft LRR will be independently reviewed prior to the conclusion of the public comment period, these comments will not be available to the ATR members. However, ATR of the final Report/EA will be scheduled so that public comments on the draft will be available to the reviewers.

The final LRR, associated environmental documents, and review process comments and responses will be made available to the public via Portland District public web page.

12. REVIEW PLAN APPROVAL AND UPDATES

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

13. REVIEW PLAN POINTS OF CONTACT

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

Name	Title	Phone Number
Eric Thaut	PCX Program Manager	(415)-503-6852
Valerie Ringold	NWD Planning	503-808-3984
Gene Sturm	NWD PCX POC	(402)-995-2691
Tim Kuhn	Project Manager, NWP	(503) 808-4752
Laura Hicks	Chief of Project Management and Planning Branch, NWP	(503) 808-4703

ATTACHMENT 1: TEAM ROSTERS

PROJECT DELIVERY TEAM

Name	Discipline	Phone	Email
Tim Kuhn(1)	Project Manager	(503) 808-4752	Timothy.S.Kuhn@usace.army.mil
Jeremy Britton	Technical Lead	(503) 808-4851	Jeremy.P.Britton@usace.army.mil
Jim Stengle	Environmental/Biology	(503) 808-4767	James.B.Stengle@usace.army.mil
Chris Nygaard	Hydraulic Engineer/Sediment	(503) 808-4839	Christopher.j.Nygaard@usace.army.mil
Stephen Eagar	Civil Engineer	(503) 808-4910	Stephen.j.Eagar@usace.army.mil
TBD	Structural Engineer	(503) 808-4988	@usace.army.mil
Louie Landre	Economics	(503) 808-4758	Louie.landre@usace.army.mil
Phil Onstead	Cost Engineering	(503) 808-4429	Phillip.onstead@usace.army.mil
John Nicholson	Real Estate/Lands	(503) 808-4671	John.c.nicholson@usace.army.mil
TBD	Cultural Resources	(503) 808-4771	TBD@usace.army.mil
John Breiling	Legal	(503) 808-4522	John.J.Breiling@usace.army.mil
Nels Rurey	Budget	(503) 808-4715	Nels.M.Rurey@usace.army.mil
Nik Fernandez	P2 Controller	(503) 808-4729	Nik.fernandez@usace.army.mil

(1)Primary contact for this Review Plan.

AGENCY TECHNICAL REVIEW TEAM (draft reports)

Name	Discipline	Phone	Email
Kim Gavigan(1)	ATR Manager (outside MSC)	602-230-6902	Kim.m.gavigan@usace.army.mil
TBD	Environmental Resources		
TBD	Cultural Resources		
TBD	Hydrology, Hydraulics/Geomorphology		
TBD	Engineering		
TBD	Planning/Economics		
TBD	Civil Design		
TBD	Cost Engineering ⁽²⁾		
TBD	Real Estate/Lands		

(1)The ATR Manager has already been identified by NWD for NWP because of ongoing ATR needs. If the PCX determines while reviewing the draft RP that a different person should be the ATR lead a change can be made.

(2) The cost engineering team member nomination will be coordinated with the NWW Cost Estimating Center of Expertise as required. That PCX will determine if the cost estimate will need to be reviewed by PCX staff.

INDEPENDENT EXTERNAL PEER REVIEW PANEL

Name	Discipline	Phone	Email
TBD	Environmental Resources		
TBD	Engineering		
TBD	Economics		

VERTICAL TEAM

Name	Discipline	Phone	Email
NWD	Various		

PLANNING CENTER OF EXPERTISE

Name	Discipline	Phone	Email
Eric Thaut	Program Manager	(415)503-6852	
Gene Sturm	Economist	(402) 995-2691	Gene.A.Sturm@usace.army.mil

COST ENGINEERING CERTIFICATION

Name	Discipline	Phone	Email
TBD	Engineering		

MODEL APPROVAL/CERTIFICATION

Name	Discipline	Phone	Email
N/A			

POLICY AND LEGAL COMPLIANCE REVIEW

Name	Discipline	Phone	Email
TBD			

SAFETY ASSURANCE REVIEW

Name	Discipline	Phone	Email
TBD			

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the <type of product> for <project name and location>. The ATR was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-209. 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
Review Management Office Representative
Office Symbol

Date

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
AFB	Alternative Formulation Briefing	NED	National Economic Development
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and maintenance
DPR	Detailed Project Report	OMB	Office and Management and Budget
DQC	District Quality Control/Quality Assurance	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DX	Directory of Expertise	OEO	Outside Eligible Organization
EA	Environmental Assessment	OSE	Other Social Effects
EC	Engineer Circular	PCX	Planning Center of Expertise
EIS	Environmental Impact Statement	PDT	Project Delivery Team
EO	Executive Order	PAC	Post Authorization Change
ER	Ecosystem Restoration	PMP	Project Management Plan
FDR	Flood Damage Reduction	PL	Public Law
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
FRM	Flood Risk Management	QA	Quality Assurance
FSM	Feasibility Scoping Meeting	QC	Quality Control
GRR	General Reevaluation Report	RED	Regional Economic Development
Home District/MSD	The District or MSD responsible for the preparation of the decision document	RMC	Risk Management Center
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMO	Review Management Organization
IEPR	Independent External Peer Review	RTS	Regional Technical Specialist
ITR	Independent Technical Review	SAR	Safety Assurance Review
LRR	Limited Reevaluation Report	USACE	U.S. Army Corps of Engineers
MSD	Major Subordinate Command	WRDA	Water Resources Development Act