PEER REVIEW PLAN
FOR
SKAGIT RIVER, WASHINGTON
Flood Damage Reduction/Ecosystem Restoration
FEASIBILITY STUDY

Final PEER REVIEW PLAN

December 27, 2007

1. PURPOSE

Recent Corps of Engineers guidance (EC 1105-2-408 Peer Review of Decision Documents 31 May 2005)) supplements existing independent technical review and policy review procedures to ensure quality and credibility of Corps decision documents. External Peer review (EPR) has been added to the Corps existing review process in special cases where the risk and magnitude of the proposed project are such that a critical examination by a qualified person or team outside of the Corps and not involved in the day-to-day production of a technical product is necessary. EPR will similarly be added in cases of high complexity or precedent-setting approaches.

This Peer Review Plan (PRP) presents an updated quality control plan, to ensure credible, quality products for the Skagit River Flood Damage Reduction and Ecosystem Restoration Project Feasibility Study, WA (authorized under Section 209 of the 1962 Flood Control Act for Puget Sound and Adjacent Waters). The Review Plan is compliant with EC 1105-2-408 *Peer Review of Decision Documents,* 31 May 2005, section 6, parts a. through j and with the 20 April 2007 USACE Northwestern Division memorandum *Peer Review Process.*
The plan outlines (1) areas of risk and (2) assigns the appropriate level of review, (3) documents procedures, and (4) assigns responsibilities for conducting the independent technical reviews (ITRs) of all applicable decision documents to ensure the quality and credibility of all products developed during the investigation. Once this PRP is approved by the MSC it will be posted on the District web site with links to the Center of Expertise (PCX)

2. Project Background

a. Study Area

The Skagit River basin is located in northwest Washington State and has a total drainage area of 3,115 square miles. The Skagit River originates near the 8,000-foot level of the Cascades Mountains in British Columbia, Canada and flows south and then west to the Skagit delta where it discharges through two distributaries – the North Fork and South Fork – to Skagit Bay. The major cities on the Skagit River delta – Mount Vernon, Burlington and Sedro Woolley – lie about 60 miles north of Seattle, Washington. The entire American portion of the basin is within Washington Congressional District No. 2. The basin extends about 110 miles in a north-south direction, reaching 28 miles into British Columbia, and approximately 90 miles in an east-west direction between the crest of the Cascade Mountains and Puget Sound. The project area for the feasibility study encompasses the Skagit River watershed from Ross Dam reservoir to Skagit Bay. The Skagit River floodplain contains about 22,000 acres east (upstream) of Sedro-Woolley (RM 22.4) and 74,000 acres west (downstream) of Sedro-Woolley. Principal tributaries of the Skagit River are the Sauk, Baker, and Cascade Rivers. Seattle City Light operates three hydroelectric dams on the Upper Skagit River (Ross, Diablo, and Gorge), and Puget

Sound Energy operates two hydroelectric dams on the Baker River (Upper Baker and Lower Baker).

b. Project Authority & Background

Authority for the Skagit River, Washington, General Investigation is contained in Section 209 of the 1962 Flood Control Act, Public Law 87-874. That Section authorized a comprehensive study of Puget Sound and adjacent waters in the interest of flood control, navigation and other water uses and related land resources. The current study is a follow-on effort to that comprehensive study. A Corps Reconnaissance Report was prepared in May 1993, identifying a Federal interest in pursuing the feasibility phase study to investigate, in detail, flood damage reduction measures in the Skagit River basin. The preliminary project plan described in the report included the following: improving the existing levee system along the lower river to provide a high level of protection (100-year) for urban areas of the Skagit River delta, with lesser protection for rural areas, providing levee overflow sections or control structures at critical locations in rural areas designed to permit levee overtopping without catastrophic failure, and constructing new off-river levees or dikes to channel overflow water away from developed urban areas. Recently, focus has shifted to the upper basin and the desire to determine the extent to which existing hydroelectric dams in the upper basin could provide additional flood control storage, thereby reducing flood damages in the floodplain. This interest and awareness was initially triggered by pending Federal Energy Regulatory Commission relicensing of the Puget Sound Energy Baker River Hydroelectric Project dams located in the upper basin. The Governor of the State of Washington has also requested an evaluation of relocating the town of Hamilton in the upper basin, which is located predominately in the floodway and experiences the most frequent flood damages in the state.

The original focus of the feasibility study, as scoped in the June 1997 PMP, was to formulate solutions to severe flooding problems in the study area. During execution of the technical studies, the need for ecosystem restoration planning was identified to address new environmental challenges including recent listings of endangered species such as Puget Sound Chinook salmon and bull trout, and the potential listing of coho salmon in the near future. The Corps and Skagit County determined that the incorporation of ecosystem restoration features into the design of a flood damage reduction solution was desirable to developing an acceptable and responsible plan. The addition of ecosystem restoration as a project purpose is consistent with Corps policy. A revised FCSA and supporting PMP was executed 17 October 2007 reflecting the dual project purpose.

c. Study Purpose

The purpose of the feasibility study is to formulate and recommend a comprehensive flood damage reduction plan for the Skagit River floodplain that will reduce flood hazards and damages in the project area. The feasibility study will also investigate

measures to restore ecosystem functions and processes to benefit fish and wildlife in the project area. As a watershed study, projects proposed for implementation will be on a reach scale addressing deficiencies for the particular location. There are no anticipated system wide measures but more localized measures tied to the flood damage reduction measures. The restoration components together will assist in restoring the watershed.

The feasibility phase of project development involves technical studies to assess the effectiveness, efficiency, acceptability, and completeness of a range of alternative solutions to serious flooding problems, potential early action flood damage reduction measures, and ecosystem restoration opportunities in the study area. The implicit intent is that the recommended plan will have broad federal and non-federal support, will provide critically needed flood damage reduction benefits at an affordable cost in a reasonable time frame, will provide cost-effective ecosystem restoration benefits in the project area, and will subsequently be authorized and implemented.

d. Center of Expertise Support.

In terms of PCX support, the project will require coordination with both the Ecosystem Restoration and Flood Control PCX; however the Flood Damage Reduction PCX will be primary PCX with Ecosystem PCX providing support. Contact information for each PCS is provided below:

Flood Damage Reduction PCX:

http://www.iwr.usace.army.mil/floodweb/

Ecosystem Restoration PCX:

E-mail Address

MVD ERD Planning PCX - MVDERDPCX@usace.army.mil

Physical Address

U.S. Army Corps of Engineers
Mississippi Valley Division
1400 Walnut St., P.O. Box 80
Vicksburg, MS 39180

The following table outlines the type of measures to be evaluated during the feasibility phase. The purpose of the table is to assist in identification of review expertise required.

Measures to be Evaluated– by Type

Modifications of Existing Dams operational and structural changes		**Description**
1	Addt'l storage at Upper Baker Dam	Evaluating 85K, 100K storage, 110K storage, altered timing of rule curve release during at Upper Baker Dam during flood. Assuming operational changes to the dams, or use of PSE provided data for physical dam modifications. Changes to Ross Dam would be operational only.
2	Addt'l storage at Lower Baker Dam	
3	Addt'l storage at Ross Dam	
Additional Storage (non-dam related)		**Description**
4	Nookachamps storage	Levees/weir to store peak flow in Nookachamps Creek
5	Hart's Slough Storage	Off-channel storage, levees and gate
Levees – Modifications, setbacks and flood walls		**Description**
6	Sterling Levee	Evaluating alignments to eliminate flooding upstream of Burlington.
7	Setback levees downstream of 3-br. Corridor	Setback levees on main-stem Skagit River and North and South Forks. May entail modification of Division Street bridge and North Fork and South Fork bridges.
8	Three bridge corridor – Setback levees	Setback levees in transportation corridor.
9	Overtopping levees (Swinomish Diversion, Fir Island, Mount Vernon)	Allow controlled overtopping of levees
10	Setback Main stem and North fork only	Setback levees on main stem Skagit and North Fork
11	Raise and strengthen existing levees	Keep existing levee alignments, raise levees
12	Setback Levees with Excavation	Setback levees, excavate material riverward of levee
13	Setback Levees w/o excavation	Setback levees from 3 bridge corridor, for left bank, right bank, and left and right banks of N. and S. Forks
14	Improve levee system – Left bank	Left bank levee improvements only
15	Improve levee system – Right bank	Right bank levee improvements only
16	Mount Vernon Floodwall	To protect Mount Vernon business district, either as a stand-alone measure or in combination with setback levees.
Bypass Systems		**Description**
17	North Swinomish Diversion (Avon bypass)	Bypass from left bank of Skagit River to Padilla Bay or Swinomish Slough.
18	Fir Island Bypass	Bypass from north Fork Skagit River through to Skagit Bay
20	Mount Vernon Bypass	Right bank bypass through river bend downstream of Mount Vernon. An alternative to a floodwall and setback levee in this river reach.
Relocation/Ecosystem Restoration		**Description**
23	Cockreham Island	Removal of levee, restoration of riparian habitat
24	Estuarine restoration projects (misc)	Removal of agricultural dikes/tide gates, restoration of sloughs, marine shoreline

25	Riparian restoration projects (misc.)	Removal of levees, restoration of riparian vegetation, off-channel habitat.
Non-structural		**Description**
26	Non-structural measures	May include flood proofing, relocation, and purchase of floodway easements, flood warning and the establishment of evacuation routes. May be combined with other measures.
28	City of Hamilton	Relocation/floodproofing of town
Ring Dikes		**Description**
29	Sedro Woolley	Levee system to protect Sedro-Woolley
30	Sedro Woolley STP	Ring dike to protect treatment plant.
31	Sedro Woolley Hospital	Ring dike to protect hospital
32	Burlington	Ring dike to protect city of Burlington
33	North Mount. Vernon	Ring dike to protect north Mount Vernon
34	West Mount Vernon	Ring dike to protect West Mount Vernon
35	East Mount Vernon	Ring dike to protect East Mount Vernon
36	La Conner	Ring dike to protect La Conner
37	Clear Lake	Ring dike to protect Clear Lake
38	Anacortes Water Treatment Plant	Ring dike to protect Water treatment facility
	3 Bridge Corridor	**Description**
39	Modify bridges	Widen bridge spans (I-5, RR, State) or modify piers. (w, w/o setback levees)
40	Setback levees	Setback levees in 3 bridge corridor area, w, w/o excavation

e. Project Delivery Team

The project delivery team is presented in Table 1. The project manager, Linda Smith, is the main point of contact at Seattle District for more information about this project and the peer review plan.

TABLE 1.
FEASIBILITY PHASE PROJECT DELIVERY TEAM

Discipline	**Office/Agency**
Project Manager	CENWS-PM-PL-PF
Program Manager (GI)	CENWS-PM-PL-PF
Program Analyst	CENWS-PM-CU
Plan Formulation	CENWS-PM-PL-PF
Environmental Coordinator	CENWS-PM-PL-ER
Cultural Resources	CENWS-PM-PL-ER
Environmental Eng/HTRW	CENWS-EC-TB-ET

Civil Design	CENWS-EC-DB-CS
Survey/ CADD Mapping/GIS	CENWS-EC-TB-SY
GIS	CENWS-IM-PI
Geotechnical	
Hydraulics & Hydrology	CENWS-EC-TB-HE
Hydraulics & Hydrology	CENWS-ED-TB-HE
Economic Evaluation	CENWS-PM-PL
Cost Engineering	CENWS-EC-CO-C
Real Estate	CENWS-RE-RS
Public Affairs Office	CENWS-PA
Office of Counsel	CENWS-OC
Sponsor PM	Skagit County
Sponsor PM	Skagit County

3. PROJECT SIGNIFICANCE

The GI Feasibility Report (FR)/ Environmental Impact Statement (EIS) will include data and models that are controversial and have significant interagency interest.

- The technical results of the Corps hydrologic and hydraulic studies have been challenged by Skagit County and various basin cities and their consultants.
- The Skagit River supports a number of ESA threatened species, and the potential environmental impacts of recommended projects is of great concern to three Indian nations in the basin.
- In May 2007, the Skagit River Impact Partnership, composed of elected representatives from basin cities and the diking districts, requested that the Corps have external peer review of the final feasibility report/EIS prior to approval by the Chief of Engineers.
- Further, the recommended plan for the Skagit Basin is likely to contain structural solutions that leave urban areas with a residual flooding risk for events exceeding the 100-year recurrence interval event and with limited protection to rural areas. It is anticipated the overall construction costs for a basinwide flood damage reduction system will be significant. Therefore, it is recommended that the draft final feasibility report/EIS is reviewed by an external panel of experts prior to final approval.

4. Quality Control Plan

The four key elements of the quality control plan are internal review, Independent Technical Review (ITR), External Peer Review, and Planning Model Certification. Policy review of the feasibility report/EIS will be conducted primarily at the Division and Headquarters level, with input from the Center of Expertise. External Peer review is for technical matters only, and is not used to resolve policy issues.

The following sections provide details on each of these elements.

a. Internal Review

All draft products and deliverables shall be reviewed, as they are developed to ensure they meet project and customer objectives, comply with regulatory and engineering guidance, and meet customer expectations of quality. Informal reviews, consisting of presentations and discussions of interim documents, shall be documented with meeting minutes.

Within the Corps, internal review will consist of appropriate senior staff members from the organization completing the task reviewing all technical work before it is submitted forward to the ITR. The Corps will review all work performed by the local sponsor as part of the study and submitted for credit as in-kind work.

b. Independent Technical Review (ITR)

ITRs will be conducted for all major GI phase documents (i.e., without-project report, feasibility scoping documents, plan selection report, and Draft EIS/FR) and major engineering and scientific documents products (e.g., cultural resources overview, geomorphology report, and programmatic biological assessment). The Independent Technical Review Team will be selected on the basis of having the proper knowledge, skills, and experience necessary to perform the task and their lack of affiliation with the development of the feasibility report/EIS and associated appendixes. It is anticipated that the review team may be mainly from outside the MSC. The review team will be approved by the Center of Expertise for Flood Damage Reduction, in coordination with the Ecosystem Center of Expertise to ensure that the technical work and products from engineering, cost estimating, real estate, and H&H achieve a quality product. Funding of reviewers may include travel to Seattle District for the review conference. All ITRs will be completed through DRCHECKS where comments and comment resolution are captured.

Independent Technical review will use appropriate analytical methods for each technical area. Independent Technical review will rely on periodic technical review team meetings to discuss critical plan formulation or other project decisions, and on the review of the written feasibility report documentation and files. Independent Technical review will ensure that:

- the feasibility report/EIS is consistent with current criteria, procedures and policy
- clearly justified and valid assumptions that are in accordance with established guidance and policy have been utilized, with any deviations clearly identified and properly approved
- concepts, features, analytical methods, analyses, and details are appropriate, fully coordinated, and correct
- problems/issues are properly defined and scoped

- conclusions and recommendations are reasonable and justified.

I. Anticipated Number of Reviewers.

The current ITR plan is to include at least 10 independent reviewers. This number is based on the disciplines required to develop the feasibility products and the draft and final FR/EIS.

II. Primary Disciplines and Expertise Needed For the ITR

The disciplines and expertise required for the ITR team are presented in Table 2. This information will be updated as the study progresses.

TABLE 2.
INDEPENDENT TECHNICAL REVIEW TEAM

Discipline	Reviewer
Review Team Leader	TBD
Plan Formulation	CENWW-PM-PD-PF
Environmental NEPA, ESA, Freshwater & estuarine systems.	TBD
Cultural Resources	TBD
Geotechnical	TBD
Economic Evaluation - Urban and Agricultural Areas & CE/ICA	CENWK-PM-PF
Cost Engineering	TBD
Real Estate	TBD
Geomorphology	TBD
Civil Design	TBD
Structures	TBD
Hydraulics and Hydrology	TBD

c. External Peer Review

External Peer Review is conducted by nationally recognized technical experts outside of the Corps of Engineers. They may be from the National Academy of Sciences, universities, or other scientific institutions. Peer review is required when projects utilize new scientific methods, have high risk, are large in scale, or have significant controversy. The Skagit River Flood Damage Reduction study has experienced controversy over the

Corps hydrologic and hydraulic modeling. The Corps has performed internal and external technical review of the HH appendix. However, it is recommended that the draft feasibility report receives additional External Peer Review prior to final approval. A panel of External Peer Reviewers will be selected with input from the general public, Corps Centers of Expertise, stakeholders, and the sponsor. The MSC will have final approval of the panel. The Flood Damage External Peer review will use appropriate analytical methods for each technical area. The External Peer Review Panel will meet with the study PDT and the public to determine areas of controversy in the feasibility report, and will review the written feasibility report documentation and files, including the technical appendices. The panel will tour the study area (if determined to be necessary) and interview participants as needed. The External Peer Review team will ensure review the entire decision document addressing the underlying engineering, economics and environmental work specific focus areas include:

- Scientific data used in the hydrology/hydraulics study was accurate and complete.
- Modeling methods used were pertinent to the type of study results required, and sound modeling methodology was used
- The analysis contained clearly justified and valid assumptions
- concepts, features, analytical methods, analyses, and details are appropriate, fully coordinated, and correct
- problems/issues are properly defined and scoped
- conclusions and recommendations are reasonable and justified.

The public has requested an external peer review of the feasibility/EIS report prior to approval by the Chief of Engineers. This request will be coordinated with the MSC, HQ and the PCX. The District also recommends and an external peer review is recommended for the draft final feasibility report and EIS. This is because of the large geographical scale of the project, the potential for residual flooding risks in populated areas, high construction costs, environmental importance of the project area, and public/agency distrust of the Corps hydrologic and hydraulic modeling for the without-project condition. The disciplines and expertise required for the EPR panel team are presented in Table 3 below.

Table 3.
EXTERNAL PEER REVIEW PANEL

Discipline	**Reviewer**
Hydraulic Engineer	TBD
Hydrologic Engineer	TBD
Civil Design	TBD
Structures	TBD
Economics	TBD
Environmental	TBD

Cultural Resources	TBD
Real Estate	TBD
Geomorphology	TBD
Cost Engineering	TBD

d. Model Certification

Planning models to be used during the feasibility phase include those to quantify environmental outputs for the ecosystem restoration component and hydraulic models. Current EDT models are not adequate for assessing impacts. Models to be used will be developed in coordination with resource agencies and the Swinomish and Sauk Suaittle Tribes. The two hydraulic models that are being used are HEC-RAS and FLO-2D. Both are certified for use by FEMA. Economic evaluation will be based on the FDA model, Hydrologic Engineering Center's Flood Damage Analysis (HEC-FDA) computer program which is the standard model. The certification of the ecosystem restoration output and the hydraulic models will be in accordance with EC 1105-2-407 (Planning Models Improvement Program: Model Certification). Use of all models will be coordinated with the PCX for a determination on whether model certification is necessary or appropriate.

5. REVIEW SCHEDULE

The review schedule is included in the Project Management Plan file://Y:\Civil-Planning\107023_GISkagitRiver. and will be updated as reviews are scheduled. The composition of the independent technical review panel will be developed with public and agency input prior to the Alternative Formulation Briefing. The Flood Damage Reduction PCX will be the primary Center of Expertise (PCX) leading the review effort with the Ecosystem Restoration PCX providing support. Interim documents for the GI study (Without Project Condition Report, Plan Formulation Report) will receive independent technical review. The Hydrologic and Hydraulic Without-Project Condition Report has already received both internal and external peer review, including review by the Hydrologic Engineering Center, Puget Sound Energy, United States Geological Service, and consultants from Baker and Associates. Environmental documents will have extensive public and agency review as part of the scoping process for the GI, including the Skagit River Watershed Council, and the Skagit Cooperative. The Economics Without-Project-Condition Report was reviewed by Omaha District. Internal technical and external peer reviewers will be selected in accordance with recommendations from the Flood Damage Reduction Center of Expertise, and in coordination with the Ecosystem Center of Expertise.

The following are milestone dates related to ITR, EPR and Public Review:

Review Schedule	**Start**	**End**
Develop Draft Peer Review Plan	10 June 2007	13 July 2007
Revise Plan submit to MSC	13 November 2007	30 December 2007
MSC Approval of PRP		15 January 2008
Without Project Report – ITR H&H Economic Environmental Lower Basin Environmental Upper Basin Geomorphology Studies Lower Geomorphology Upper Basin OSC/RED	 June 04 Jan 06 Dec 07 Oct 07 Jan 08 March 08 March 02	 Oct 04 May 06 Jan 08 Dec 07 Jan 08 April 08 April 02
Model Certification (Approval if needed)	TBD	TBD
Feasibility Scoping Documents – ITR		
Public Review		
Plan Formulation & Selection Report – ITR	July 08	August 08
Cost Estimating Center of Expertise Review (and potential risk analysis)		
Draft EIS/FR – ITR & EPR	Jan 10	Feb 10
Final EIS/FR – ITR & EPR		

6. PUBLIC REVIEW OPPORTUNITIES

Basin stakeholders and governments will be provided with a draft copy of the PRP for review and comment in July concurrent with Division and PCX review. The public will be encouraged to continue to provide input to the review process through public scoping meetings and public review periods programmed into the feasibility schedule. The public will be asked to participate in the recommendation of a Peer Review Panel for the review of the feasibility report and EIS.

This review plan and the accompanying PMP will be posted the District web site once the PRP is approved by the MSC.

Workshops will be held in February 08 on evaluation of measures and in April 08 on alternatives. Environmental scoping meetings will be held through FY 08 & 09 which will include stakeholder agencies and tribes. An environmental advisory group will be formed in March 08 to guide project planning and mitigation. Workshops and public meetings will be held prior to finalization of the draft and final feasibility and EIS.

a) Availability of Public Comments to ITR Team

Public input from the NEPA workshops and the public scoping meetings will be available to the ITR and EPR members to ensure that public comments have been considered in the development of the without-project conditions report, plan formulation documents, and the draft FR/EIS. However, the draft FR/EIS will be independently reviewed prior to the conclusion of the public comment period, and, therefore, these comments will not be available to the ITR members. In the event that the final FR/EIS is significantly revised from the draft, another ITR will be scheduled and public comment on the draft will be available to the reviewers.

b) Public Selection of Peer Reviewers

The public will be allowed to participate in the recommending members of the External Peer Review Panel prior to the Alternative Formulation Briefing. The Corps headquarters will determine the final panel content. The public will have an opportunity to review and comment on the draft PMP and PRP prior to initial approval, and through out the study process.