Federal Emergency Management Agency

Region X
Federal Regional Center
130 228th Street Southwest
Bothell, Washington 98021-9796

DEC 18 2009

Mr. Tim Holloran
County Administrator, Skagit County
1800 Continental Place
Mount Vernon, WA 98273

RE: Correction to the Skagit County, Washington and Incorporated Areas FIS Report dated December 15, 2009

Dear Mr. Holloran:

On December 15, 2009, we sent you the Skagit County, Washington and Incorporated Areas Flood Insurance Report (FIS). A recent review of the report has determined that Tables 4, 5 and 8 were incorrect. The following changes have been made:

- Table 4 – Observed and Historic Floods in Skagit County. – The table included outdated data, and has been corrected with more recent data about the flood discharges.
- Table 5 – Storage Characteristics of Existing Reservoirs. – The table did not include the most recent information about the Baker River reservoirs. This table has been updated with information provided by Puget Sound Energy.
- Table 8 – Summary of Discharges. – The wrong discharge values were inadvertently listed for the Skagit River and have been corrected to the recent hydrologic analysis results.

The corrected tables have been enclosed for your review and comment. Please disregard the tables that were included with the December 15, 2009 FIS report. Your community's comments on the FIS report are an important part of our review process, and we will consider them carefully before we publish the FIS report in its final form. If you are interested in discussing the enclosed document, please contact the Consultation Coordination Officer, John Graves, at (425) 487-4737.

Sincerely,

Mark R. Carey

Mark Carey
Director, Mitigation Division

List of Enclosures:
Pages 20, 23 and 31 of the FIS Report

cc: Mr. Tim DeVries
Building Official, Skagit County

Mr. Daniel Sokol
Washington Department of Ecology

fan with an east-west width of approximately 11 miles and a north-south width of 19 miles.

Five severe floods and the corresponding peak discharges near Sedro Woolley since 1908, when stream gaging in the Skagit River basin began, are listed below in Table 3.

Table 3. Peak Discharges on the Skagit River near Sedro Woolley

Date	Discharge (cfs)
November 1909	220,000
December 1917	195,000
December 1921	210,000
November 1949	140,000[1]
February 1951	150,000[1]

[1]Estimated by the USACE

Prior to the period of record, two floods occurred that far exceeded any of the floods on record. In 1923, J. E. Stewart of the United States Geological Survey (USGS) collected data for and partially completed a report on floods in the Skagit River basin. The data collected and conclusions reached, along with information concerning floods on record through 1957, are published in the USGS Water Supply Paper 1527 (Reference 29). After careful study and analysis of all data available, Stewart reached the conclusion that two great floods occurred prior to the arrival of white settlers and that the earlier and greater of these two floods was probably as large or nearly as large as the greatest flood that has occurred here within the last several hundred years. This flood is estimated to have occurred around 1815. Flood discharges as determined by Stewart for a number of historical floods, along with the maximum floods on record, are presented for various stream gage locations, in Table 4.

Table 4. Observed and Historic Floods in Skagit County

Location	Record Flows		Historic Flows	
	Discharge (cfs)	Date	Discharge (cfs)	Date
Cascade River at Marblemount	28,400	Nov. 7, 2006	46,000	1815
Suiattle River above Big Creek near Darrington	29,700	Dec. 4, 1975		
Suiattle River near Mansford	30,700	Nov. 27, 1949		
Sauk River near Sauk	106,000	Oct. 21, 2003		
Skagit River near Concrete	166,000	Oct. 21, 2003	500,000	1815
Skagit River near Sedro-Woolley	220,000	Nov. 30, 1909	400,000	1815
Skagit River Mount Vernon	152,000	Nov. 25, 1990	180,000	1906
Samish River near Burlington	8,440	Jan. 10, 1983		

Another significant flood occurred in December of 1975. Heavy rain began over western Washington State late on November 29 and early on November 30. It did not moderate at most precipitation stations until midnight on November 30. Snow had begun falling over the Cascades late on November 24 and the rate of fall became increasingly heavy as the warmer air arrived. By the afternoon of November 30, the snow had changed to heavy rain. Precipitation continued throughout the next three days, surging between moderate and heavy. The total storm period of late evening on November 29 to early morning on December 4 included three distinct storms following each other in close succession.

Table 8. Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharge (cfs) 10% Annual Chance Flood	2% Annual Chance Flood	1% Annual Chance Flood	0.2% Annual Chance Flood
Baker River					
At Concrete	297	31,500	44,500	51,000	67,000
Cascade River					
At Marblemount	172	14,300	23,800	28,500	41,700
Samish River					
Near Burlington	87.8	4,670	7,100	8,300	11,500
Sauk River					
Near Sauk	714	52,500	81,000	94,000	129,000
Skagit River					
Downstream of confluence with Baker River (near Concrete)	2,737	116,300	180,260	209,490	316,530
Downstream of Highway 20 (near Sedro-Woolley)	3,015	123,610	183,780	215,270	322,900
Suiattle River					
At Mouth	346	25,800	46,600	58,800	92,000

Please note: This table (dated December 18, 2009) should replace the Table 8 Summary of Discharges included in the December 15, 2009 Flood Insurance Study report.

Baker Dams and Reservoirs located at RM 1.12 and 9.29, respectively. Baker River streamflows have been subject to varying degrees of flood control regulation since completion of the Lower Baker Dam Project in 1927 and the Upper Baker Dam Project in 1959. Flood control storage was increased in 1977 from 16,000 to 74,000 acre-feet at the Upper Baker Project to more effectively regulate Skagit River flows west of Concrete.

During the spring snowmelt period, and to a lesser extent during the winter, the Skagit River flows less than 90,000 cfs at Concrete. Varying degrees of incidental flow regulation occur on the Baker and Skagit Rivers due to hydropower operation of existing reservoirs on both rivers. The amount of water in excess of that required for power generation is either passed through the system or stored for future use. This is especially true during the spring, when the reservoir stage is raised from low winter levels to the normal full pool elevation. Raising the pool in this manner tends to decrease the peak flow downstream.

During the November through March flood season, flood control regulation commences when the Skagit River discharges near Concrete is forecasted to reach or exceed 90,000 cfs. The USACE then directs flood control operations for the Ross and Baker projects. Project releases are selected with reference to formal operating plans which consider flows at Concrete, reservoir pool elevations, and observe and forecast reservoir inflows. Releases from both projects are regulated to minimum levels until the flood peak has passed and the Skagit River has begun to recede at Concrete. Subsequently, project discharge is increased to draft storage from the reservoirs so that flood control storage space is regained.

Storage at the hydropower installations has partially regulated flows on the Skagit River near Hamilton: the Diablo Reservoir since 1930, the Gorge Reservoir since 1960, the Ross Reservoir on the Upper Skagit River since 1940, Lake Shannon since 1926, and Baker Lake on the Baker River since 1959 (Reference 17). Additional flood control storage was established in the Puget Power Upper Baker River Project in 1977.

Although the Upper Baker Dam Project would be regulated during this time to avoid causing another rise in the Skagit River discharge at Concrete, the release from the Upper Baker Reservoir will nearly equal natural peak inflow to the project. In this manner, the net effect of flood control operations on the Baker River is to delay flood runoff, and peak discharges are not significantly reduced except by incidental control for power generation.

Storage data for the major dams within the basin are listed in Table 5.

Table 5. Storage Characteristics of Existing Reservoirs

Reservoir	Flood-Control Storage (Acre-Feet)	Maximum Storage (Acre-Feet)	Maximum Usable Storage (Acre-Feet)	Storage Began
Ross	120,000	1,434,800	1,052,300	March 1940
Diablo	0	90,140	76,220	October 1929
Gorge	0	8,485	6,770	June 1960
Upper Baker (Baker Lake)	58,000	274,213	180,128	July 1959
Lower Baker (Lake Shannon)	0	146,279	116,700	November 1925

Please note: This page (dated December 18, 2009) should replace page 23 included in the December 15, 2009 Flood Insurance Study report.