CITY *of* SULTAN

Comprehensive Flood Hazard Management Plan, Chapters

(Chapters 1 and 2, Chapter 3 continued different file.
Figures not included with this text; need to be accessed separately due to the size of the file.)

1.0 INTRODUCTION

The City of Sultan (herein referred as the City) has been identified by the Federal Emergency Management Agency (FEMA) as having a flood loss damage with multiple repetitive loss properties (Community No. 530173). A repetitive loss property is one for which two or more claims of $1,000 or more have been paid by the National Flood Insurance Program (NFIP) within any given 10-year period since 1978.

At the request of the City, Earth Tech, in conjunction with the City of Sultan, has prepared a Comprehensive Flood Hazard Management Plan (CFHMP). The CFHMP is an expansion to a recently adopted Repetitive Flood Loss Mitigation Plan (RFLMP). This RFLMP recognizes the repetitive flood loss properties as identified by the Federal Emergency Management Agency (FEMA), source of flooding problems, and a review of mitigation approaches to minimize flood loss damage for the flood hazard area and in particular the repetitive loss properties. The CFHMP was developed to provide further guidance to the City for future flood prevention and mitigation decisions.

1.1 GOALS AND OBJECTIVES

The project objective was to prevent flooding and its adverse impact to the community by documenting known problems and prescribing measures to alleviate those problems. The measures have been evaluated and narrowed down to a few final recommendations based on cost effectiveness, benefit/cost ratio, engineering and institutional feasibility, and environmental impact. The process was driven with help from a citizen-based flood hazard advisory committee and local agencies including the Department of Ecology, Emergency Management Division, and Snohomish County. Other beneficial uses such as improving salmonid spawning and rearing habitat and the development of new environmental education and recreation areas will be incorporated, where possible, into the final recommendations.

Project goals were both short- and long-term. Short term goals focused on preventing damages to two distinct areas within the City; the City's central business district and a residential district south of State Highway 2 (referred to as the Skywall district). Both areas contain the majority of the City's repetitive flood loss properties. Long-term goals focus on flood mitigation approaches that reduce flooding and associated damages within the context of the entire City.

1.2 BACKGROUND

Sultan is located in the foothills of the Cascade Mountain range at the confluence of the Sultan and Skykomish Rivers approximately eight miles east of the City of Monroe and is surrounded by unincorporated Snohomish County land (see **Figure 1**). Sultan is predominately a rural environment with a population of about 3,775 in 2000 (U.S. Bureau of the Census). Major types of land use in the City is agriculture, commercial, and rural residential. Transportation facilities include U.S. Highway 2 and the Burlington Northern Railroad.

The Sultan River to the west and Skykomish River to the south represent the major flooding sources of the community. Wagleys Creek and the Wallace River, located in east Sultan, do not represent a flooding source to the Sultan area. The Sultan River floodplain includes residential and business structures. The Skykomish and Wallace River floodplain includes both residential and business structures with some farmland.

U.S. Highway 2 bridge that crosses over the Sultan River is approximately 0.1 miles from the mouth of the Sultan River with a drainage area above this point of 106 square miles

(FEMA, Flood Insurance Study, 1983). The Fifth Street Bridge that crosses over the Skykomish River is approximately 35 miles from the mouth of the Skykomish River, and the drainage area above this point is approximately 618 square miles (Pacific Northwest River Basins Commission, May, 1969).

Soils that underlie the City range from silt loam to gravelly loam (U.S. Department of Agriculture, 1981). Most of the land within the corporate limits is cleared. Forested areas consist of mixed deciduous and conifer species occur in the eastern and western City boundaries and along the Sultan and Skykomish Rivers (FEMA Flood Insurance Study, 1999). Agricultural operations and urbanization have nearly depleted the native vegetation. Vegetation in the area consists of bushes, grasses, and shrubs.

1.3 PUBLIC INVOLVEMENT

A flood hazard advisory committee, consisting of affected property owners and concerned citizens, was formed to discuss and review approaches and necessary strategies outlined in the City of Sultan Comprehensive Flood Hazard Management Plan. Three public meetings at critical points in the project (June 13, 2000, and August 8, 2000, and July 24, 2001) were conducted to discuss the scope and goals of the project, the extent of historic flood loss and their impacts, alternative approaches being considered to reduce future losses, and preliminary criteria for evaluating alternative measures. Citizen's concerns, suggestions and recommendations have been documented and incorporated into this plan. See Appendix A for notes from these meetings.

1.4 AGENCY COORDINATION

In addition to the flood hazard advisory group meetings, two subcommittee meetings were held to discuss project goals, mitigation approaches, and funding opportunities. The subcommittee included representatives from the State Department of Ecology, the State (**Figure 1)** Emergency Management Division, and Snohomish County. Recommendations from these meetings have also been incorporated into the plan.

2.0 HAZARD ASSESSMENT

Floodplain lands are subject to flood hazards although the degree of hazard varies as a result of differences in flood depths, duration, and frequency. Wave action, stream velocity, chemical composition, and the presence of debris or sediment also affect flood hazard severity. Flooding rivers undercut riverbanks and may remove topsoil (sediment) from agricultural lands that adds to flood damage. Floodwaters may cause septic systems to fail resulting in health hazards and pollution of nearby waters.

2.1 SOURCE OF PROBLEM

The Sultan River, a tributary to the Skykomish River, trends in a general north-south direction and is located west of the City. The City of Sultan boundary limits on the Sultan River are from 0.09 (at the U.S. Highway 2 bridge) to approximately 1.15 miles from the mouth of the confluence of the Sultan and Skykomish Rivers. The Skykomish River trends in an east-west direction just south of the City.

Major floods of the Skykomish River and its tributaries are produced by winter storms (rain and snow melt) that are characterized by sharply rising river flows, high magnitude peaks, and flood duration from several hours to days. Floodwaters also enter the City when high flows on the Skykomish River back up into the Sultan River and go over banks on both sides of the lower Sultan River (FEMA, Flood Insurance Study, 1983). See photos in **Figures 2 (*Flooding in Repetitive Flood Loss Area, Thanksgiving Weekend, 1990)* and Figure 3** (***December 26, 1980, Flooding from Skykomish and Sultan Rivers at Sultan, Looking West)*** for examples.

Historic Channel Modifications

Over the years, Snohomish County, the U.S. Army Corp of Engineers and to a limited extent Burlington Northern have implemented modifications to the hydraulic system that appear to have adversely affected the hydraulic flow at the confluence of the Sultan and Skykomish Rivers.

In 1978, Snohomish County Planning Department requested an additional study of the Sultan River to narrow the floodway between River Miles (RM) 1.76 and 2.05. The narrowing of the floodway in this area was accomplished by widening the floodway for approximately one-mile downstream. The new floodway generates a significant increase in velocity than the previous floodway (FEMA, Flood Insurance Study – Town of Sultan, 1983).

In 1979, the Town of Sultan requested an additional study of the Skykomish River to narrow the floodway between River Miles 35.40 and 35.85. A new cross section was surveyed at River Mile 35.74, upstream of the confluence with the Wallace River. Following a review of the new cross section, the desired shift would be permitted without affecting the floodway boundary on the opposite (left) bank (FEMA, Flood Insurance Study, 1983).

In 1965, Snohomish County Department of Public Works constructed the Fifth Street Bridge overpass that traverses over the Skykomish River off U.S. Highway 2. Prior to installing the Fifth Street Bridge overpass, several overflow channels existed on the south side of the Skykomish River (shown on **Figure 1**). These channels helped regulate flow during peak flood discharges. The construction of the bridge removed the channels, which subsequently created deposition of material (primarily sandy gravel) on the south side of the Skykomish River. The deposited material redirected the hydraulic flow into the primary hydraulic system of the Skykomish River, thus decreasing the overall hydraulic flow area, affecting the upstream flood elevations.

In 1991, The Army Corp of Engineers placed a training dike at a location on the north bank of the Skykomish River a few hundred yards south of the confluence of the Sultan and Skykomish Rivers. This training dike exacerbates deposition of sand and gravel at a location west of the training dike and pushes the main channel of Skykomish River to the south. This movement has decreased the flow area of the Skykomish River, creating potential backups into the Sultan River during periods of high flow.

Burlington Northern placed rip-rap on the north bank of the Skykomish River in an area just east of the confluence of the Sultan River. The rip-rap was placed at this location apparently to minimize the erosion effects encompassing the U.S. Highway 2 Bridge and Burlington Northern Rail support structures. The placement of the material has promoted deposition of sediments on each bank of the Sultan River at the bridge location. This sediment deposition has decreased the normal flow width of the Sultan River.

Reservoirs/Dams

Culmback Dam is a water supply and power component project on the Sultan River located approximately 23 miles from the confluence of the Sultan and Skykomish Rivers. Culmback Dam provides regulatory effects at low flow and is operated by the City of Everett and Snohomish County Public Utility District No.1. As of 1983, the ability of Culmback Dam to control large floods was categorized as uncertain. This was a result of limited storage capacity (FEMA Flood Insurance Study, 1983).

Culmback Dam was designed and completed in two stages. In 1965, Stage 1 water supply construction was completed as part of the Sultan River project that formed Spada Reservoir. Stage 2 construction (renamed the Henry M. Jackson Hydroelectric project) was completed in 1984 for the purposes of power generation (FEMA, Flood Insurance Study, 1983).

Completion of Stage 2 increased the storage capacity of Spada Reservoir, created a power source for the PUD, and modified the water supply system into a secondary reservoir (Chaplain Reservoir). Normal storage of Spada Reservoir is 153,260 acre feet, which converts to 50 billion gallons (U.S. EPA web page – www.epa.gov). The regulatory effects of the increased storage capacity of Spada Lake (Reservoir), however, they were not incorporated in the recent FEMA Flood Insurance Study of 1999. Limited outlet capacity and the uncertainty of the Reservoir to control large floods (FEMA, Flood Insurance Study, 1999) were the reasons. This increased capacity could allow for a more controlled regulatory effect that would subsequently control flooding on the Sultan River during potential peak flood discharge periods (*possibly additional CRS credit points*). This combined with the fact that Washington State's adopted Dam Safety Program has been accepted by FEMA could allow for additional CRS credit points under the CRS Manual Section 630.

Hydraulic Assessment

Following a review of the flood data history and data profiles, the primary source of the problem appears to be at the confluence of the Sultan and Skykomish Rivers. This is located near the southwest area of the City of Sultan (**Figure 1**). Backwater from the Skykomish River to the Sultan River produces flood elevations on the Sultan River sufficient to inundate Sultan's downtown area. This backwater effect is due to a combination of factors including elevated flood levels on the Skykomish River. Due to a decrease in flow area just downstream of the confluence; a rapid decline in the flood profile on the Sultan River just upstream of the Highway 2 bridge; and eddy losses at the confluence.

2.2 PHYSICAL CONDITIONS

Flood Zone Data

There is four Zone types as defined by FEMA within the Sultan City limits on the FIRM's Map Nos. 53061C1402E and 53061C1406, dated November 8, 1999. The four Zone types are:

- ***Zone AE*** – Base flood elevation determined.
- ***Zone A*** – No base flood elevation determined, and,
- ***Zone X – Other Flood Areas***. Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage area less than 1 square mile; and areas protected by levees from 100-year flood.
- ***Zone X – Other Areas***. Areas determined to be outside 500-year floodplain.

The elevation difference between a 100-year flood (1%) and a 500-year flood (0.2%) is 1.30 feet. NGVD (*Flood Insurance Study for Snohomish County, Revised – September 30, 1992*).

Flood Data

Streamflow in the Sultan and Skykomish Rivers originates primarily from rainfall and snowmelt during the respective seasons. Maximum annual peak discharges for various recurrence intervals for Sultan and Skykomish Rivers near the City of Sultan are listed in **Table 1**. Historic peak flows for the Sultan and Skykomish Rivers are also shown in **Table 1**.

Table 1: Flood Discharge Data

Flood Dates	Sultan River Below Chaplain Creek (cfs)	Skykomish River Near Gold Bar (cfs)
Nov 1959	23,500	78,800
Dec 1975	24,600	76,600
Dec 1977	18,600	62,800
Dec 1980	26,600	90,100
1990	23,000[1]	102,000
1995	14,000[1]	80,400
10-Year Flow	29,000	72,000
50-Year Flow	42,000	107,000
100-Year Flow	48,000	124,000
500-Year Flow	62,000	164,000

[1]Sultan River below Power Plant, near Sultan

SOURCE: *FEMA Flood Insurance Study, Snohomish County, WA, 1999.*

Repetitive Flood Loss Properties

Mentioned earlier, a repetitive loss property is one for which two or more claims of $1,000 or more have been paid by the National Flood Insurance Program (NFIP) within any given 10-year period since 1978. Based on information obtained from the City and FEMA, 17 repetitive loss properties are identified on the FEMA list. Sultan is classified as a Category C repetitive loss community by FEMA since it has 10 or more repetitive loss properties. **Table 2** identifies the repetitive loss properties within the Sultan City limits.

Table 2: City of Sultan Repetitive Flood Loss Properties

No.	Assessed/ Estimated Value	No. of Claims	Repetitive Loss Dates	Repetitive Loss Costs Per Claim	Cumulative Repetitive Loss Costs

No.	Assessed/ Estimated Value	No. of Claims	Repetitive Loss Dates	Repetitive Loss Costs Per Claim	Cumulative Repetitive Loss Costs
1	***$141,200 / $190,620***	***3***	***11/24/9012/26/90 11/09/90***	***$ 6,320 $ 5,272 23,105***	***$34,697***
2	$35,000 / $47,250	4	11/29/9511/09/90 11/21/9011/23/86	11,252 6,693 29,784 13,750	61,479
3	$42,000 / $56,700*	8	11/29/9502/24/86 01/23/9012/03/82 11/09/9012/26/80 11/23/8612/29/98	13,867 1,626 11,648 6,291 5,618 24,646 20,240 6,994	90,930
4	$81,200 / $109,620	3	11/29/9511/25/90 11/09/95	39,314 19,711 5,866	64,891
5	$109,000 / $147,150	2	11/29/9511/24/90	1,656 7,462	9,118
6	$81,200 / $109,620	3	02/08/9611/09/95 11/29/95	2,370 2,240 33,519	38,129
7	$98/100 / $132,435	2	11/28/9511/21/90	7,449 11,022	18,471
8	$19,800 / $26,730*	2	11/28/9511/21/90	3,256 3,355	6,611
9	$114,100 / $154,035	2	11/29/9511/24/90	11, 121 16,046	27,167
10	$74,900 / $101,115	2	11/28/9511/21/90	2,637 7,472	10,109
11	$118,500 / $159,975**	2	11/29/9511/23/90	2,441 2,322	4,763
12	$167,100 / $225,585	2	11/24/9011/29/82	1,934 2,015	3,949
13	N/A	4	11/24/9011/23/86 11/10/9011/26/80	26,900 23,200 26,900 15,829	92,829
14	***N/A***	***3***	***02/09/9611/08/95 11/29/95***	***3,025 9,751 18,759***	***31,535***
15	N/A	3	02/09/9611/09/95 11/28/95	2,598 29,831 21,669	54,098
16		***3***	***11/09/9011/24/90 11/08/95***	***37,357 5,073 6,580***	***49,010***
17		***2***	***11/08/9511/28/95***	***8,297 1,029***	***9,326***

No.	Assessed/ Estimated Value	No. of Claims	Repetitive Loss Dates	Repetitive Loss Costs Per Claim	Cumulative Repetitive Loss Costs

NOTES:

Source: *FEMA Repetitive Flood Loss List*

- Repetitive loss properties that are ***bold and italicized*** have been elevated to or above the Base Flood Elevation (BFE)..
- Repetitive Loss Costs include claims paid for building and contents.

* *Property value only* — Building Department will follow up with the tax assessor's office for more information. The estimated value figure was achieved by using the assessed value plus 35% of that value to arrive at the estimated value that was suggested by a local real estate agent (information obtained from Craig Bruner, City of Sultan).

** Basement flooding due to high groundwater, not from the Skykomish or Sultan Rivers.

Since 1978, the National Flood Insurance Program (NFIP) paid approximately $500,000 in claims to the 17 repetitive loss properties. The worst of the floods, which occurred in November of 1990, paid over $200,000 in claims. The second largest, which occurred in November 1995, also produced over $200,000 in claims for damages to the 17 repetitive loss properties.

Three of the repetitive loss properties (*800 Dyer Road, 1010 Dyer Road and 207 SR-2*) have been elevated to or above the FEMA-identified Base (100-year) Flood Elevation (BFE). Within the repetitive flood loss area there are 53 properties that have been damaged by recent floods, but were not covered by flood insurance. Flood damages for these properties cannot be accurately assessed; however, total damage to this area extends beyond the 17 repetitive flood loss properties listed in this report.

Based on the repetitive flood loss list, the City of Sultan has one major repetitive flood loss area that contains a majority of repetitive flood loss properties and is shown as Repetitive Flood Loss Area 1 in **Figure 4**. The BFE for this area ranges from 114 feet near the confluence of the Sultan and Skykomish Rivers and increases northward to approximately 116.6 feet NGVD (FEMA, Flood Insurance Rate Map, 1999) near the intersection of 1st and Cedar. The FEMA-defined flood zone for repetitive loss area is primarily Zone AE, with portions on the north side as Zone X. The remaining repetitive flood loss property is located in the Skywall district (shown on **Figure 4** as Repetitive Flood Loss Area 2).

Although the Skywall district has only two repetitive flood loss properties, it is at risk in incurring tremendous damage and loss. This area is within the channel migration zone of the Skykomish River. ***It is extremely susceptible to bank erosion and could be significantly damaged or even lost during a large flood***. Currently, there are no evacuation plans for this area in the event of a large flood.

National Flood Insurance Program

In response to increasing losses from flood hazards nationwide, the Congress of the United States passed the National Flood Insurance Act of 1968 which established the National Flood Insurance Program (NFIP). The 1968 Act provided for the availability of flood insurance within communities that were willing to adopt floodplain management programs to mitigate future flood losses. The act also required the identification of all floodplain areas within the United States and the establishment of flood-risk zones within those areas. The NFIP also added a mandatory flood insurance purchase requirement. The responsibility for administration of the NFIP falls with the Federal Insurance Administration of the Federal Emergency Management Agency (FEMA). The City of currently participates in the NFIP and is responsible for enforcing the rules set by the program.

Flood Insurance Studies and Flood Insurance Rate Maps

The risk data to identify floodplain areas, as required by the 1968 Act, are acquired through Flood Insurance Studies (FISs). FISs are hydrologic and hydraulic studies of flood risks developed by FEMA. Using the results of a FIS, FEMA prepares a Flood Insurance Rate Map (FIRM) that depicts the spatial extent of Special Flood Hazard Areas (SFHAs) and other thematic features related to flood risk assessment. SFHAs are areas subject to inundation by a flood having a one-percent or greater probability of being equaled or exceeded during any given year. This flood, which is referred to as the 1% annual chance flood (also called the 100-year flood or base flood), is the national standard on which the floodplain management and insurance requirements of the NFIP are based.

FEMA publishes the FIRM and distributes it to a wide range of users: private citizens, community officials, insurance agents and brokers, lending institutions, and other Federal agencies. The FIRM is the basis for floodplain management, mitigation, and insurance activities of the NFIP. Uses of the FIRM for insurance activities include enforcement of the mandatory purchase requirement which requires the purchase of flood insurance by property owners who are being assisted by Federal programs or by Federally supervised, regulated, or insured agencies or institutions in the acquisition or improvement of land or facilities located or to be located in identified areas having special flood hazards. (FEMA, 1973). In addition to the identification of SFHAs, the risk zones shown on the FIRMs are the basis for the establishment of premium rates for flood coverage offered through the NFIP. ***(see Figure 4)*** FIRM Maps and FISs are kept at City Hall located on Main Street and at the Sultan Public Library, also on Main Street. FIRM Maps for the City are provided with this plan and can be found in Appendix B.

Letter of Map Amendment (LOMA)

The extent of a floodplain shown on a FIRM map can be incorrect, due to the limited data available at the time the floodplain was mapped. If this is the case, a property owner can request from FEMA a Letter of Map Amendment (LOMA). LOMAs have the effect of removing either a structure, a portion of a property, or an entire property from a Special Flood Hazard Area (SFHA), based on the

elevation of the ground. In effect, the applicant must prove to FEMA's satisfaction that their structure is located on ground high enough that the structure will be on its own little "island" during the so-called Base Flood.

The City of Sultan keeps records of all LOMAs approved by FEMA. **Figure 5** shows the location of each of the FEMA approved LOMAs in relation to the existing regulatory floodplain boundary.

Future Land Use and Economic Development Goals

The City of Sultan has developed and land use plan based on certain economic development goals. Due to its proximity in the floodplain, the City faces development challenges in the coming decades. Chief among them are strengthening and revitalizing the downtown area. This is difficult however due the fact that businesses are reluctant to locate within the downtown area because of the burden of flood insurance, risk of potential flood damage, and limited economic growth potential. The majority of the downtown area is zoned commercial. Studies however have shown that it is difficult to get shoppers to climb any appreciable height into a retail outlet (provided that a new commercial building is elevated above the Base Flood Elevation (BFE)). It may be that, for this reason, multi-family residences may be most appropriate at the western end of Main Street (City of Sultan Final Comprehensive Plan, 1994).

Fish and Wildlife Habitat

The streams within the area are vital habitat for numerous species of game fish and wildlife. Fish and wildlife habitats are aspects of the physical environment that affect the productivity of fish and wildlife. Streams and wetlands are those that are affected the most by floodwaters and flood control projects. Sultan has adopted an ordinance to protect and preserve the fish and wildlife in the area (*SMC 16.10.090)*. Riparian wildlife habitat is usually located within the 100-year floodplain limits, which serve as storage for floodwaters. Protecting these lands for wildlife habitat ensures that floodplain storage will be maintained in the future.

Critical Areas have been mapped as part of the City's 1994 Comprehensive Plan. Fish and wildlife habitat has been delineated from a number of different sources including the Fish and Wildlife Conservation, Department of Natural Resources, Washington ***(See Figure 5)*** Department of Wildlife, and Snohomish County. ***(see Figure 6)*** for Fish and Wildlife habitat areas.

Wetlands

Riparian wetlands intercept storm runoff and store floodwaters, changing sharp runoff peaks to slower discharges over longer periods of time. Because flooding, floodplains, and wetlands are often inextricably linked, decisions about flood control management will have an effect on wetland management decisions. All wetlands within the City limits, shown on **Figure 6**, come from National

Wetlands Inventory Maps created by the United States Department of the Interior and the Snohomish County Tomorrow Critical Areas project.

Steep Slopes

Areas with steep slopes have high erosion potential which can exacerbate flooding, degrade water quality and create land slides. Of particular concern are areas with slopes greater than 25%, which are mapped on **Figure 6**.

(Chapters 3 and 4 are continued in next file…)