

Section 4

Risk Assessment Requirements

Risk Assessment---Requirement §201.6(c)(2):

The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation activities to reduce losses from identified hazards.

Identifying Hazards---Requirement §201.6(c)(2)(i):

[The risk assessment **shall** include a] description of the type ... of all natural hazards that can affect the jurisdiction...

- Does the plan include a **description** of the types of **all natural hazards** that affect the jurisdiction?
- Does the plan describe the sources used to identify the hazard or does the plan indicate any data limitations?
- Does the plan provide an explanation for eliminating any hazards from consideration?

Profiling Hazard Events---Requirement §201.6(c)(2)(i):

[The risk assessment **shall** include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

- Does the risk assessment identify the **location** of each hazard being addressed in the plan?
- Does the risk assessment identify the **extent** of each hazard being addressed in the plan?
- Does the plan provide information on the **previous occurrences** of each natural hazard addressed in the plan?
- Does the plan include the **probability of future events** (i.e., chance of occurrence) for each hazard addressed?
- Is the location of the natural hazard specifically defined?

Assessing Vulnerability: Overview---Requirement §201.6(c)(2) (ii):

[The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.

- Does the plan include an **overall summary** description of the jurisdiction's **vulnerability** each hazard?
- Does the plan address the **impact** of each hazard on the jurisdiction?

Assessing Vulnerability: Identifying Structures---Requirement §201.6(c)(2) (ii)(A):

The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas...

- Does the plan describe vulnerability in terms of the **types and numbers** of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the plan describe vulnerability in terms of the **types and numbers** of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Assessing Vulnerability: Estimating Potential Losses---Requirement §201.6(c)(2) (ii)(B):

[The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate...

- Does the plan estimate **potential dollar losses** to vulnerable structures?
- Does the plan describe the **methodology** used to prepare the estimate?

Assessing Vulnerability: Analyzing Development Trends---Requirement §201.6(c)(2) (ii)(C):

[The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

- Does the plan describe land uses and development trends?

**PIERCE COUNTY
RISK ASSESSMENT**

Table of Contents

RISK ASSESSMENT REQUIREMENTS1

TABLE OF CONTENTS2

HAZARD SUB-SECTIONS.....3

PIERCE COUNTY EARTHQUAKE HAZARD SUB-SECTIONS4.1

PIERCE COUNTY FLOOD HAZARD SUB-SECTION.....S4.2

PIERCE COUNTY VOLCANIC HAZARD SUB-SECTIONS4.3

PIERCE COUNTY SEVERE STORMS HAZARD SUB-SECTIONS4.4

PIERCE COUNTY LANDSLIDE HAZARD SUB-SECTION.....S4.5

PIERCE COUNTY TSUNAMI HAZARD SUB-SECTION.....S4.6

PIERCE COUNTY WUI FIRE HAZARD SUB-SECTION.....S4.7

Hazard Sub-Sections

The Risk Assessment portrays the risks and vulnerabilities, and is divided by natural hazard type. In order of decreasing vulnerability to Pierce County, the Pierce County Plan addresses the following hazards: earthquake hazard (Sub-Section 4.1), flood hazard (Sub-Section 4.2), volcanic hazard (Sub-Section 4.3), severe storms hazard (Sub-Section 4.4), landslide hazard (Sub-Section 4.5), tsunami hazard (Sub-Section 4.6), and wildland/urban interface(WUI) fire Hazard (Sub-Section 4.7). Each hazard is defined through an identification description, a profile, and a vulnerability description. Using this analysis, the Plan then describes Pierce County's vulnerability to each hazard. The specific vulnerabilities of each of the County's critical facilities are discussed in the Critical Facility Section (Section 6).

The following tables and charts summarize the risk assessment processes:

- **Table 4-1 Pierce County Hazard Matrix**
- **Table 4-2 Pierce County Hazard Identification and Risk Assessment**
- **Chart 4-1 Pierce County Hazard Ratings**
- **Table 4-3 Pierce County Disaster Assistance Summary**

Table 4-1 Pierce County Hazard Matrix

HAZARD	DECLARATION #—DATE/PLACE		PROBABILITY/RECURRENCE	MAPS AND FIGURES
HAZARD RATING				
<u>EARTHQUAKE</u> Medium Risk (36)	N/A--7/22/2001 Nisqually Delta N/A--6/10/2001 Satsop DR-1361-WA--2/2001 Nisqually N/A--7/2/1999 Satsop N/A--4/29/1965 Maury Island, South Puget Sound N/A--4/13/1949 South Puget Sound N/A--2/14/1946 Maury Island		Magnitude 4.3 Magnitude 5.0—Intraplate Earthquake Magnitude 6.8—Intraplate Earthquake Magnitude 5.8—Intraplate Earthquake Magnitude 6.5—Intraplate Earthquake Magnitude 7.0—Intraplate Earthquake Magnitude 6.3 MG20/20--100 years or less occurrence Best Available Science--About every 32 years for intraplate earthquakes	Earthquakes Types (p. 4.1-3) Major Faults (p. 4.1-4) County Seismic Areas (p. 4.1-5) Major Earthquakes (p. 4.1-6)
<u>FLOOD</u> Medium Risk (28) Since 1978 3 Repetitive Loss Areas have produced 83 Claims totaling Nearly \$1.78 Millions Dollars.	DR-1499-WA--10/2003 DR-1159-WA--12/96-2/1997 DR-1100-WA--1-2/1996 DR-1079-WA--11-12/1995 DR-896-WA--12/1990 DR-883-WA--11/1990 DR-852-WA--1/1990	DR-784-WA--11/1986 DR-545-WA--12/1977 DR-492-WA--12/1975 DR-328-WA--2/1972 DR-185-WA--12/1964 DR-137-WA--10/1962	MG20/20--25 years or less occurrence Best Available Science--The frequency of the repetitive loss claims indicates there is approximately a 33 percent chance of flooding occurring each year.	County Watersheds (p. 4.2-4) County Flood Areas (p. 4.2-6) County Repetitive Loss Areas (p. 4.2-8) Clear Creek Watershed (p. 4.2-10) Clear Creek Flood Of Record (p. 4.2-11)
<u>VOLCANIC</u> Low Risk (24)	DR-623-WA--5/1980		MG20/20--Unknown but rare occurrence Best Available Science--Case 1 Lahars 500 yr-1000yr and Case 2 Lahars 100yr-500yr	Volcanic Hazards (p. 4.3-2) County Volcanic Areas (p. 4.3-5)
<u>SEVERE STORMS</u> Low Risk (18)	DR-1159-WA--12/96-2/1997 DR-1152-WA--11/19/1996	DR-981-WA--1/1993 DR-137-WA--10/1962	MG20/20--100 years or less occurrence	County Windstorm-South Wind Event (p. 4.4-4) County Windstorm-East Wind Event (p. 4.4-5)
<u>LANDSLIDE</u> Low Risk (15)	DR-1159-WA--12/96-2/1997 DR-852-WA--1/1990 DR-545-WA--12/1977		MG20/20--Unknown but anticipate an occurrence	County Landslide/Soil Erosion Areas (p. 4.4-4) County Slope Stability Areas (p. 4.4-5)
<u>TSUNAMI</u> Low Risk (10)	N/A--1894 Puyallup River Delta (did not induce tsunami) N/A--1943 Puyallup River Delta N/A--1949 Tacoma Narrows		MG20/20--Unknown but anticipate an occurrence	Earthquake Sources of Tsunamis (p. 4.4-5) Landslide Sources of Tsunamis (p. 4.4-7) Historic Delta Failures (p. 4.4-8) Shaded Relief of Puyallup Delta (p. 4.4-11) Evidence of Past Delta Failures (p. 4.4-12) WA State Tsunami Vulnerability (p. 4.4-15) Puyallup Delta Seismic Activity (p. 4.4-17) Puyallup River Delta (p. 4.4-20) Nisqually River Delta (p. 4.4-22) Nisqually River Delta Shaded Relief (p. 4.4-23)
<u>WUI FIRE</u> Low Risk (5)	None at Time Plan Published.		MG20/20--Unknown but anticipate an occurrence	WA State Fire Hazard (p. 4.7-3) County Forest Canopy (p. 4.7-4) WA State Fire Occurrences (p. 4.7-6)

Table 4-2 Pierce County Identification and Risk Assessment

Hazard	Impacted Area	Health & Safety	Property Damage	Environmental Damage	Economic Damage	Probability of Occurrence	Risk Score
Earthquake	4	2	2	1	3	3	36=M
Flood	2	1	1	1	2	4	28=M
Volcanic	2	3	3	2	3	2	24=L
Severe Storms	2	1	1	1	1	3	18=L
Landslide	1	1	1	1	1	3	15=L
Tsunami	1	1	1	1	1	2	10=L
WUI Fire	1	1	1	1	1	1	5=L
Date of Assessment 3/1/2003						Total Risk Score	132

Impact Area

- 0 No developed area impacted
- 1 Less than 25% of developed areas impacted
- 2 Less than 50% of developed area impacted
- 3 Less than 75% of developed area impacted
- 4 Over 75% of developed area impacted

Economic Damage

- 0 No economic impact
- 1 Low direct and/or low indirect costs
- 2 High direct & low indirect costs
- 2 Low direct & high indirect costs
- 3 High direct & high indirect costs

Health & Safety

- 0 No Health and Safety impact
- 1 Few injuries/illnesses
- 2 Few fatalities but many injuries/illnesses
- 3 Numerous fatalities

Property Damage

- 3 Many properties destroyed and damaged
- 2 Few damaged - many destroyed
- 2 Few destroyed - many damaged
- 1 Few properties destroyed - few properties damaged
- 0 No property damage

Environmental Damage

- 3 Resources destroyed beyond recovery
- 2 Resources damaged with long term recovery feasible
- 1 Resources damaged with short term recovery practical
- 0 Little or no environmental damage

Probability of Occurrence

- 1 Unknown but rare occurrence
- 2 Unknown but anticipate an occurrence
- 3 100 years or less occurrence
- 4 25 years or less occurrence
- 5 Once a year or more occurrence

Chart 4-1 Pierce County Hazard Ratings

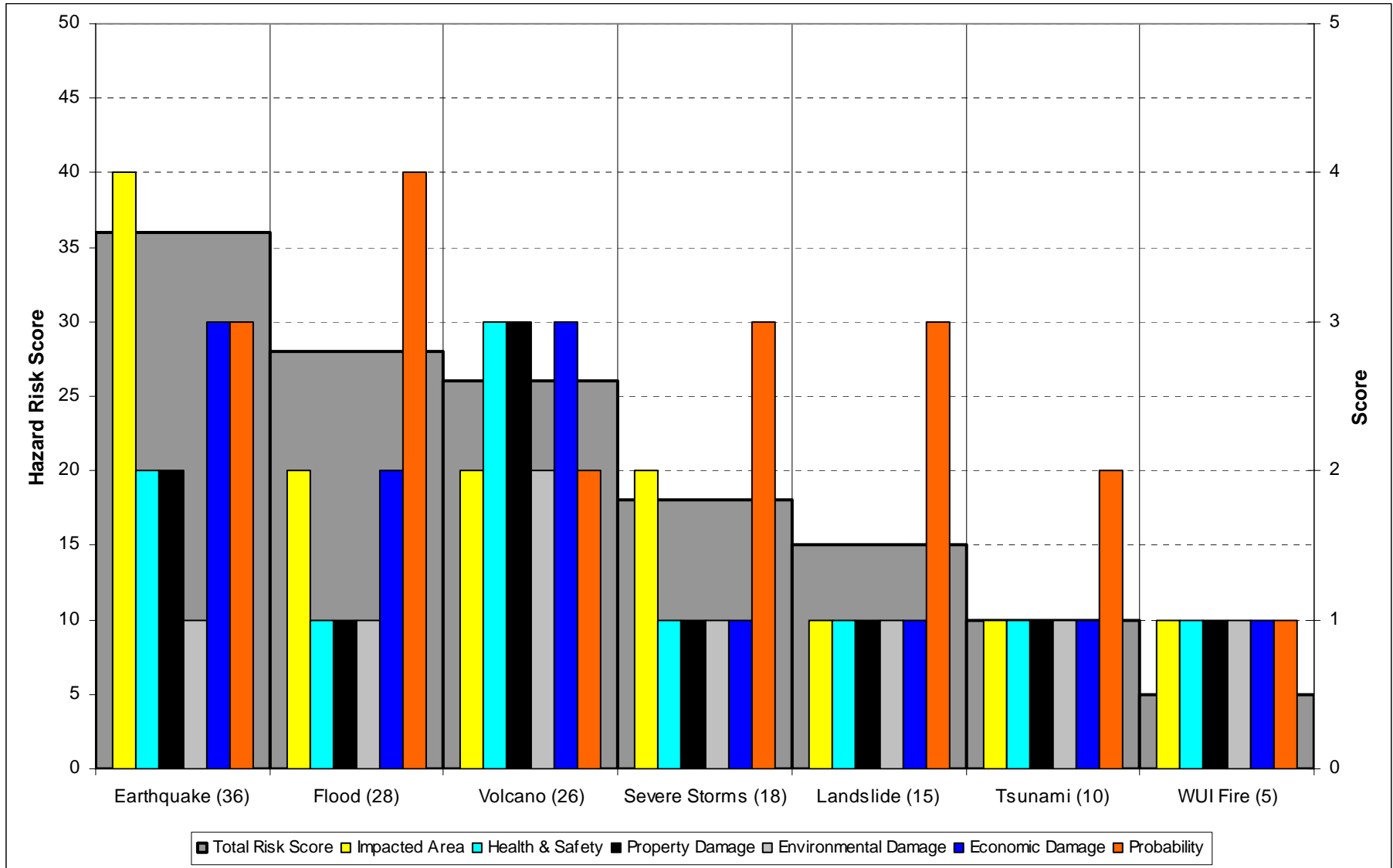


Table 4-3 Pierce County Disaster Assistance Summary

DISASTER NUMBER	IHP* PROGRAM		PA* PROGRAM	HMGP* PROGRAM	SBA* PROGRAM
YEAR EVENT	IFG/ONA* AWARDS TOTAL \$	DH/HA* AWARDS TOTAL \$	PROJECTS TOTAL \$	PROJECTS TOTAL \$	TOTAL LOANS--\$ HOME LOANS--\$ BUSINESS LOANS--\$
DR-852-WA January 1990 Flood	TBD	TBD	72 DSR \$934,049	N/A	TBD
DR-883-WA November 1990 Winter Storms & Flooding	TBD	TBD	33 DSR \$1,403,390	N/A	TBD
DR-981-WA January 1993 Inaugural Day Windstorm	N/A	N/A	33 DSR \$2,055,811	5 PR \$372,361	TBD
DR-1079-WA Nov.-Dec.1995 Winter Storms and Flooding	4 Awards \$16,515	8 Awards \$17,340	3 DSR \$52,662	1 PR \$750,000	5 Loans--\$47,200
					HL--3--\$22,300 BL--2--\$24,900
DR-1100-WA February 1996 Winters Storms and Flooding	305 Awards \$1,112,639	892 Awards \$2,325,889	90 DSR \$7,194,590	1 PR \$2,035,032	284 Loans--\$9,257,300
					HL--235--\$7,656,300 BL--49--\$1,601,000
DR-1159-WA Dec. 1996- Feb. 97 Winter Storms and Flooding	107 Awards \$291,083	310 Awards \$530,000	21 DSR \$3,671,728	3 PR \$2,944,335	89 Loans--\$1,428,300
					HL--58--\$688,800 BL--31--\$739,500
DR-1361-WA February 2001 Nisqually Earthquake	670 Awards \$869,284	5820 Awards \$10,810,619	24 PW \$654,571.34	3 PL \$155,000	1172 Loans--\$12,461,400
					HL--1059--\$10,311,600 BL--113--\$2,149,800
DR-1499-WA October 2003 Flooding	5 Awards \$3,189	37 Awards \$74,742	TBD	TBD	TBD
TOTALS	1091 Awards \$2,292,710	7067 Awards \$13,758,590	276 DSR/PW \$15,966,801.34	13 PR \$6,101,729	1550 Loans--\$23,194,200
					HL--1355--\$18,679,00 BL--195--\$4,515,200

*TBD=To Be Determined. N/A= Not Applicable.

*IHP=Individual and Households Program. Due to DMA2KIFG (Individual and Family Grants Program) replaced by ONA (Other Needs Assistance) and DH (Disaster Housing Program) replaced by HA (Housing Assistance Program), hence this affects total for all disasters starting with DR-1499-WA for Washington State.

*PA=Public Assistance Program. DSR=Damage Survey Reports. PW=Project Worksheets. For DR-1100-WA, 3 DSR totaling \$8,480,750.00 were not included, more information is being gathered on this.

*HMGP=Hazard Mitigation Grant Program. PR=Projects. PL=Plans. PC=The "Jurisdiction" of Pierce County, the jurisdiction had a total of 4 PR for totaling \$5,680,209.

*SBA=Small Business Administration. HL= Home Loans. BL= Business Loans.

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