FLOOD INSURANCE STUDY

CLACKAMAS COUNTY, OREGON

AND INCORPORATED AREAS

Volume 1 of 3

Community Name	Community Number
BARLOW, CITY OF	410013
CANBY, CITY OF	410014
DAMASCUS, CITY OF	410006
*ESTACADA, CITY OF	410016
GLADSTONE, CITY OF	410017
HAPPY VALLEY, CITY OF	410026
*JOHNSON CITY, CITY OF	410267
LAKE OSWEGO, CITY OF	410018
MILWAUKIE, CITY OF	410019
*MOLALLA, CITY OF	410020
OREGON CITY, CITY OF	410021
RIVERGROVE, CITY OF	410022
SANDY, CITY OF	410023
WEST LINN, CITY OF	410024
WILSONVILLE, CITY OF	410025
CLACKAMAS COUNTY (UNINCORPORATED AREAS)	415588

*No Special Flood Hazard Areas Identified

REVISED: JANUARY 18, 2019

Reprinted with corrections on December 6, 2019

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

41005CV001B

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Initial Countywide Effective Date: June 17, 2008
Revised Countywide Date: January 18, 2019

This FIS report was reissued on December 6, 2019 to make corrections; this version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

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FLOOD INSURANCE STUDY
CLACKAMAS COUNTY AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Clackamas County, including the Cities of Barlow, Canby, Damascus, Estacada, Gladstone, Happy Valley, Johnson City, Lake Oswego, Milwaukie, Molalla, Oregon City, Rivergrove, Sandy, West Linn, Wilsonville and the unincorporated areas of Clackamas County (referred to collectively herein as Clackamas County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44CFR, 60.3.

Please note that the Cities of Rivergrove, Tualatin, and Wilsonville are geographically located in Clackamas and Washington Counties, the City of Milwaukie is geographically located in Clackamas and Multnomah Counties, and the Cities of Lake Oswego and Portland are geographically located in Clackamas, Multnomah, and Washington Counties. The Cities of Lake Oswego, Milwaukie, Rivergrove and Wilsonville are included in their entirety in this FIS report. The Cities of Portland and Tualatin are published separately.

Please note that the Cities of Estacada, Johnson City, and Molalla have no Special Flood Hazard Areas (SFHA). This does not preclude future determinations of SFHAs that could be necessitated by changed conditions affecting the community (i.e., annexation of new lands) for the availability of new scientific or technical data about flood hazards.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the FEMA DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Pre-Countywide Analyses

The hydrologic and hydraulic analyses for the original FIS for the City of Barlow, City of Canby, the unincorporated areas of Clackamas County, City of Lake Oswego, City of Oregon City, City of Rivergrove, and the City of Wilsonville, were performed by James M. Montgomery, Consulting Engineers, Inc., for FEMA, under Contract Nos. H-4583 and H-4582. These studies were completed in December, 1979, January, 1983, November, 1984, March, 1984, June, 1978, November, 1984, and November, 1979, respectively. For the City of Milwaukie, analyses for the original FIS were performed by the United States Army Corps of Engineers (USACE) - Portland District, under contract No. IAA-H-16-75-P019. That study was completed in July, 1978. The USACE-Portland District also completed a channel improvement project in 1983 within the reach of the Tualatin River directly upstream of the City of Rivergrove. The hydrologic and hydraulic analyses for Seely Ditch were performed by Westech Engineering, Inc. These analyses were completed in May, 1985.

June 17, 2008
The Initial Countywide FIS Report

The hydrologic and hydraulic analyses for Tickle Creek were performed by Ogden Beeman & Associates, Inc., for FEMA, under Contract No. EMS-96-C0-0078-TA04. The Analyses were completed in September 1998.

Curran-McLead, Inc. submitted data to remove an area of shallow flooding and ponding in the City of Gladstone. A LOMR was issued on October 18, 1996.

The City of Portland submitted data to revise flood hazards on a portion of Johnson Creek in Clackamas County and the City of Milwaukie. A LOMR was issued on December 21, 2000.

Harper Houf Righellis, Inc. performed hydrologic and hydraulic analyses of Kellogg Creek to obtain a LOMR dated March 1, 2001.

Parsons, Brinkerhoff, Quade, and Douglas, Inc. performed hydrologic and hydraulic analyses of the Salmon River in Clackamas County to obtain a LOMR dated August 11, 2005.

The hydrologic and hydraulic analyses for Rock and Richardson Creeks were performed by Pacific Water Resources, Inc., for Clean Water Services (CWS) of Clackamas County, a participant in FEMA's Cooperating Technical Partners (CTP) Program. These studies were completed in June, 2005.

The hydrologic and hydraulic analyses for the Tualatin River Basin were also completed by Pacific Water Resources, Inc., under contract with CWS. This study was completed in December 2005.

This Physical Map Revision

The hydrologic and hydraulic analyses for Clear Creek, Cedar Creek, Henry Creek, Salmon River, Sandy River upstream of Alder Creek, Still Creek and Zigzag River were performed by Strategic Alliance for Risk Reduction (STARR), and DOGAMI for FEMA, under Contract No. EMS-2010-GR-0020. The work was completed in June 2013.

Base map information shown on the FIRM was derived from multiple sources in digital format provided by Clackamas County and the USGS produced at a scale of 1:24,000 from National Agricultural Imagery Program mosaic photography dated 2014 or later. The projection used in the preparation of this map is Universal Transverse Mercator (UTM) Zone 10, and the horizontal datum used is North American Datum 1983, GRS 1980 spheroid.

1.3 Coordination

An initial meeting is held with representatives from FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied or restudied. A final meeting is held with representatives from FEMA, the community, and the study contractor to review the results of the study.

Pre-Countywide Analyses

The initial and final meeting dates for previous FIS reports for Clackamas County and its communities are listed in the following table:

Table – 1 – CCO Meeting Dates for Pre-Countywide Study

Community	FIS Date	Initial Meeting	Final Meeting
Barlow, City of	*	June, 1977	May 28, 1980
Canby, City of	*	October 16, 1979	July 18, 1983
Clackamas County (Unincorporated Areas)	January 18, 2019	May 9, 1984	August 21, 1986 May 5, 2016
Oswego Lake, City of	*	May 10, 1984	August 20, 1986
Milwaukie, City of	*	March 5, 1975	May 17, 1979
Oregon, City of	*	June, 1977	October 11, 1978
Rivergrove, City of	*	June, 1977	August 21, 1986
Sandy, City of	January 18, 2019	July 13, 1999	May 5, 2016
West Linn, City of	*	October 9, 1974	March 5, 1975
Wilsonville, City of	*	June, 1977	January 29, 1981

*Data not available for this FIS

June 17, 2008
The Initial Countywide FIS Report

The results of the analyses performed for this countywide study were reviewed at the final CCO meeting held on January 18, 2007, and attended by representatives of Clackamas County and FEMA.

This Physical Map Revision

The results of this study were reviewed at the final meeting held on May 5, 2016, and attended by representatives of FEMA, Oregon Department of Geology and Mineral Industries, STARR II, and Clackamas County. All issues and/or concerns raised at the meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Clackamas County, Oregon, including the incorporated communities listed in Section 1.1.

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction through June, 2013.

Table 2 – Limits of Detailed Study

The following streams were studied by detailed methods in this FIS report:

Flooding Source	Limit of Study
Abernethy Creek	From its confluence with the Willamette River to approximately 920 feet upstream of the Redland Road Bridge
Clackamas River	From its confluence with the Willamette River to approximately 800 feet downstream of the River Mill powerhouse
Clear Creek	From its confluence with Sandy River to approximately 2160 feet upstream of Ashcroff Road Bridge
Cedar Creek	At confluence with Sandy River approximately 1.25 miles upstream of 422nd avenue
Dear Creek	From its confluence with Mt. Scott Creek to approximately 350 feet downstream of Interstate Highway 205
Eagle Creek	From its confluence with the Clackamas River to approximately 1,400 feet upstream of Eagle Creek County Road
Johnson Creek	From the Portland corporate limits to the Clackamas-Multnomah County line, 950 feet upstream of Southeast Luther Road
Kellogg Creek	From its confluence with the Willamette River to approximately 150 feet upstream of Southeast Marel Avenue
Milk Creek	From its confluence with the Molalla River to Beaver Creek Road, near Four Corners
Molalla River	From its confluence with the Willamette River to 150 feet upstream of the private road southwest of Dickey prairie

Table 2 – Limits of Detailed Study (continued)

Flooding Source	Limit of Study
Mt. Scott Creek	From its confluence with Kellogg Creek to approximately 550 feet upstream of Interstate Highway 205
Oswego Canal	From its divergence from the Tualatin River to its confluence with Lake Oswego
Phillips Creek	From its confluence with Mt. Scott Creek to approximately 600 feet downstream of Southeast 82nd Avenue
Pudding River	From its confluence with the Molalla River to U.S. Highway 99
Rock Creek	From its confluence with the Clackamas River upstream to Tillstrom Road
Rock Creek Hemrick Road Tributary	From its confluence with Rock Creek to the upstream face of Tillstrom Road
Rock Creek North Golf Course Tributary	From its confluence with Rock Creek to the upstream face of 162nd Avenue
Rock Creek South Golf Course Tributary	From its confluence with Rock Creek to the upstream face of 162nd Avenue
Rock Creek 172nd Avenue Tributary	From its confluence with Rock Creek to a point approximately 1.53 miles upstream of the confluence with Rock Creek
Rock Creek Highway 224 Tributary	From its confluence with Rock Creek to the upstream face of Goose Hollow Drive
Richardson Creek	From its confluence with the Clackamas River to a point approximately .4 mile upstream of Royer Road
Richardson Creek Royer Road Tributary	From its confluence with Richardson Creek upstream to Royer Road
Richardson Creek Anderson Road Tributary	From its confluence with Richardson Creek to upstream face if Sunnyside Road
Richardson Creek Keller Road Tributary	From it's confluence with Richarson Creek to upstream face of Keller Road

Table 2 – Limits of Detailed Study (continued)

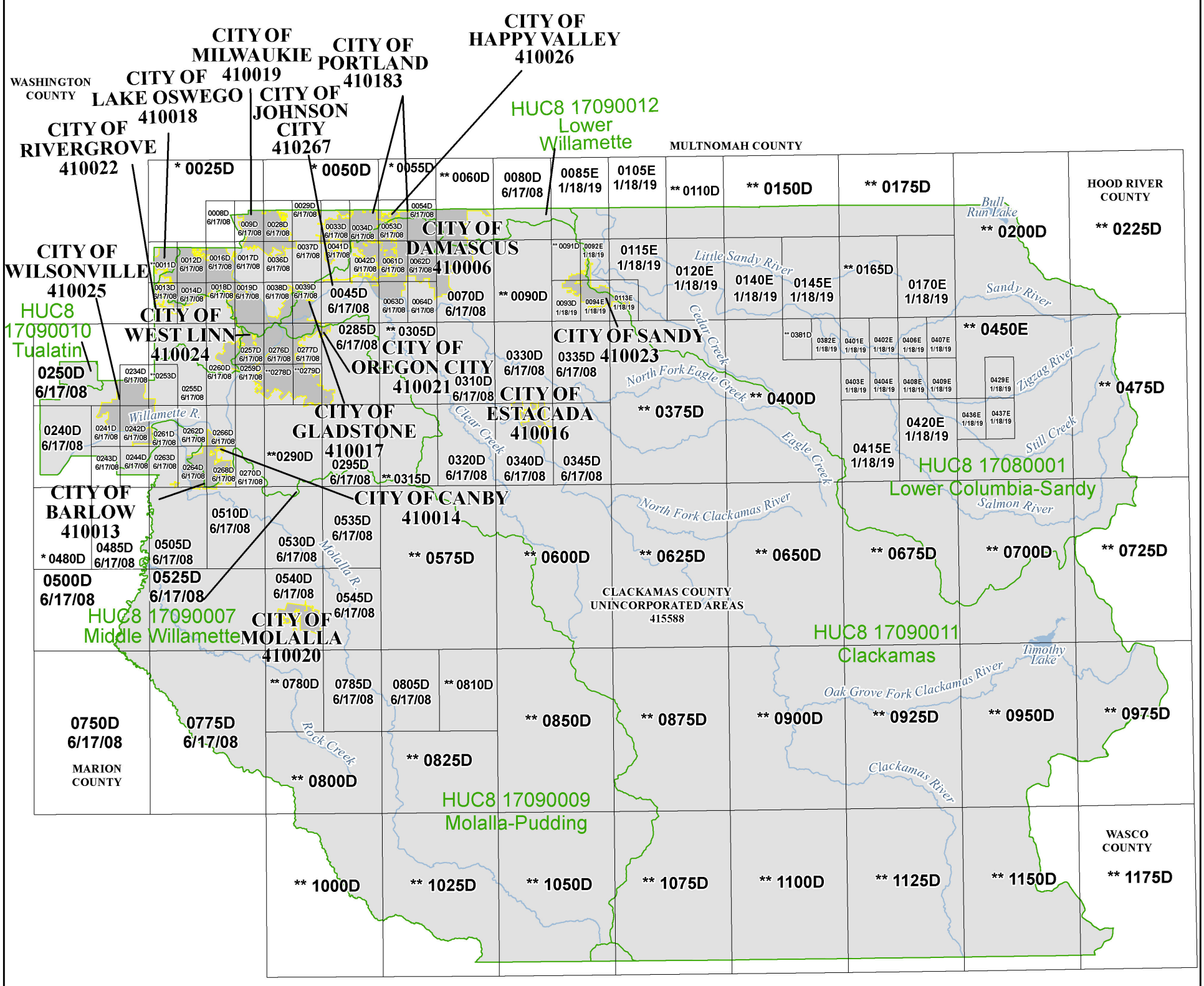
Flooding Source	Limit of Study
Salmon River	From its confluence with the Sandy River to approximately River Mile (R.M.) 0.9 upstream of Cheeney Creek
Sandy River	From 820 feet upstream of the Clackamas-Multnomah County line to approximately R.M. 21.2, east of Sandy
Sandy River	From approximately 150 feet upstream of R.M. 23 to approximately 1,000 feet upstream of Revenue Bridge
Sandy River	From approximately 150 feet downstream of R.M. 33 to approximately 2,000 feet southeast of the intersection of Lolo Pass and Muddy Fork Roads
Still Creek	From its confluence with the Zig Zag River to approximately 1,600 feet downstream of its confluence with Cool Creek
Tickle Creek	From approximately 1,500 feet downstream of Southeast 362nd street upstream to Langens and Road
Tualatin River	From its confluence with the Willamette River to approximately 850 feet downstream of R.M. 8, at the Clackamas-Washington County line
Willamette River	From the Portland corporate limits near Golf Junction to the Clackamas-Yamhill-Marion county line, 1,200 feet upstream of its confluence with Ryan Creek
Zig Zag River	From its confluence with the Sandy River to approximately 2,500 feet northeast of the Bruin Run campground

The limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

Each FIS report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood elevations (the 1-percent-annual-chance flood elevation is also referred to as the Base Flood Elevation (BFE); delineations of the 1-percent-annual-chance floodway. This information is presented on the FIRM and/or in many components of the FIS report, including Flood Profiles and Floodway Data tables.

Figure 1 presents important considerations for using the information contained in this FIS report and the FIRM and is provided in response to changes in format and content.

Figure 1: FIRM Panel Index



ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before JANUARY 18, 2019.

N

1 inch = 33,333 feet 1:400,000

0 9,500 19,000 38,000 57,000 76,000 Feet

Map Projection:
Universal Transverse Mercator Zone 10 North;
North American Datum 1983

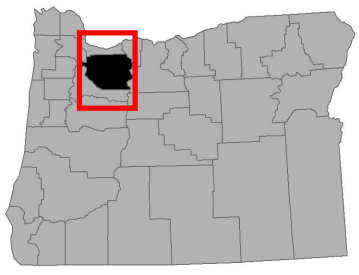
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

* PANEL NOT PRINTED - AREA OUTSIDE COUNTY BOUNDARY
** PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

CLACKAMAS COUNTY, OREGON and Incorporated Areas

PANELS PRINTED:

0008, 0009, 0012, 0013, 0014, 0016, 0017, 0018, 0019, 0028, 0029, 0033, 0034, 0036, 0037, 0038, 0039, 0041, 0042, 0045, 0053, 0054, 0061, 0062, 0063, 0064, 0070, 0080, 0085, 0092, 0093, 0094, 0105, 0113, 0115, 0120, 0140, 0145, 0170, 0234, 0240, 0241, 0242, 0243, 0244, 0250, 0255, 0257, 0259, 0260, 0261, 0262, 0263, 0264, 0266, 0268, 0270, 0276, 0277, 0285, 0295, 0310, 0320, 0330, 0335, 0340, 0345, 0382, 0401, 0402, 0403, 0404, 0406, 0407, 0408, 0409, 0415, 0420, 0429, 0436, 0437, 0485, 0500, 0505, 0510, 0525, 0530, 0535, 0540, 0545, 0750, 0775, 0785, 0805

FEMA

MAP NUMBER
41005CIND0B
MAP REVISED
JANUARY 18, 2019

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 9 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 10. The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Figure 2: FIRM Notes to Users (continued)

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 3 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by Flood County GIS Department at a scale of 1:5,000. The following panels used base map information provided by the U.S. Geological Survey at a scale of 1:12,000: 125, 130, and 140. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Clackamas County, Oregon, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 9 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Clackamas County.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Figure 3: Map Legend for FIRM (continued)

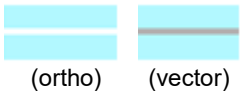
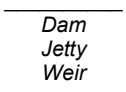
	Regulatory Floodway determined in Zone AE.
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood. See Notes to Users for important information.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.
	Unshaded Zone X: Areas of minimal flood hazard.
FLOOD HAZARD AND OTHER BOUNDARY LINES	
	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
	Channel, Culvert, Aqueduct, or Storm Sewer
	Dam, Jetty, Weir

Figure 3: Map Legend for FIRM (continued)

	Levee, Dike, or Floodwall
Bridge	Bridge
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA): *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.* ***See Notes to Users for important information.***	
CBRS AREA 09/30/2009	Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.
OTHERWISE PROTECTED AREA 09/30/2009	Otherwise Protected Area
REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth

Figure 3: Map Legend for FIRM (continued)

ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway
	State Highway
	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
 *RAILROAD*	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}$E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

Table 3 is a list of the locations where FIRMs for Clackamas County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 3 – Community Map Repositories

Community	Address	City	State	Zip Code
City of Barlow	City Hall 106 North Main Street	Barlow	OR	97013
City of Canby	City Hall 182 North Holly Street	Canby	OR	97013
Clackamas County (Unincorporated Areas)	Clackamas County Public Services 2051 Kaen Road	Oregon City	OR	97045
City of Damascus	City Hall 19920 Southeast Highway 212	Damascus	OR	97089
City of Gladstone	City Hall 525 Portland Avenue	Gladstone	OR	97027
City Happy Valley	City Hall 12915 Southeast King Road	Happy Valley	OR	97086
City Lake Oswego	City Hall 380 A Avenue	Lake Oswego	OR	97034
City of Milwaukie	City Hall- Public Works 6101 Southeast Johnson Creek Boulevard	Milwaukie	OR	97206
City of Oregon City	City Hall 320 Warner Milne Road	Oregon City	OR	97045
City of Rivergrove	City Hall 5311 Childs Road	Lake Oswego	OR	97055
City of Sandy	City of Sandy City Hall 39250 Pioneer Boulevard	Sandy	OR	97055
City of West Linn	City Hall 22500 Salamo Road	West Linn	OR	97068
City of Wilsonville	City Hall 29799 Southwest Town Center Loop E	Wilsonville	OR	97070

2.2 Community Description

Clackamas County is located in northwestern Oregon and is bordered to the west by Washington, Yamhill, and Marion Counties; to the east by Hood River and Wasco Counties; to the north by Multnomah County; and to the south by Marion County.

The county is in the northeastern portion of the Willamette valley. The eastern third of the county is part of Mt. Hood National Forest, extending from the foothills to the crest of the Cascade Range. The Willamette River lies immediately to the west of the county along most of its western boundary, and runs through the northwestern section of the county.

The Willamette Valley was one of the earliest settled areas in the Pacific Northwest. It was frequently visited by fur trappers in the l820s and l830s, and large-scale emigration over the Oregon Trail began in 1843.

Clackamas County was created by the provisional Government Legislative Committee on July 3, 1843, 16 years before Oregon obtained statehood. The county was named for the resident Clackamas Indians. The county boundaries encompass 1,890 square miles, including Oregon City, the county seat.

Most of Clackamas County is within a 1-hour drive of the City of Portland, making it a prime development area. The population of the county has increased rapidly since World War II. In 2000 the population was. 338,391. In 2010 the county population increased to 375,922.

Elevations within the county range from sea level at Milwaukie to 11,235 feet at the peak of Mt. Hood at the eastern county boundary. The average temperature is 65 degrees Fahrenheit (°F) in July and 43°F in January. Annual precipitation ranges from 32 inches to 100 inches.

Main transportation arteries serving Clackamas County include Interstate Highways 5 and 205, U.S. Highway 26, and State Highway 99E.

Abernethy Creek flows for approximately 16 miles through the hills east and north of Oregon City, joining the Willamette River from the east. The total drainage area of Abernethy Creek is 30 square miles.

The Clackamas River flows northwesterly for approximately 70 miles from its headwaters in the Cascade Range, then westerly for 10 miles to its confluence with the Willamette River. The total drainage area of the Clackamas River is 937 square miles.

The Clackamas River experiences a significant overflow during flood events near River Mile (R.M.) 7.6. The overflow follows a 1.2-mile-long natural channel that returns to the Clackamas River at R.M. 5.6.

Clear Creek flows southwesterly from its headwaters in the northeastern corner of the county to its confluence with the Sandy River, north of Zigzag. The total drainage area of Clear Creek is 9.3 square miles.

Deer Creek flows northwesterly to its confluence with Mt. Scott Creek, south of Harmony. The total drainage area of Deer Creek is 1.5 square miles.

Eagle Creek flows northwesterly to its confluence with the Clackamas River near Bonnie Lure. The total drainage area of Eagle Creek is 83.0 square miles.

Henry Creek flows westerly to its confluence with the Zigzag River, near Rhododendron. The total drainage area of Henry Creek is 3.6 square miles.

Johnson Creek flows southwesterly. It has a total drainage area of 54 square miles at its confluence with the Willamette River.

Kellogg Creek flows northwesterly for approximately 4.5 miles from its headwaters to its confluence with the Willamette River. The total drainage area of Kellogg Creek is 16.6 square miles.

Milk Creek flows westerly for 28 miles from its headwaters in the foothills of the Cascade Range to its confluence with the Molalla River. The total drainage area of Milk Creek is 108.0 square miles.

The Molalla River flows northerly for 50 miles from its headwaters near the southern county boundary to its confluence with the Willamette River. The total drainage area of the Molalla River is 878.0 square miles.

Mt. Scott Creek flows westerly from its headwaters to its mouth at Kellogg Creek. The total drainage area of Mt. Scott Creek is 10.2 square miles.

Oswego Canal connects Oswego Lake to the Tualatin River at R.M. 6.7. The canal flows northerly toward the lake for approximately 1.6 miles near the City of Lake Oswego.

Phillips Creek flows 1.5 miles southerly from its headwaters near Harmony Point to its confluence with Mt. Scott Creek, south of Harmony. The total drainage area of Phillips Creek is 2.4 square miles.

The Pudding River is a tributary of the Molalla River, flows northerly, and has a total drainage area of 530.0 square miles.

Rock Creek drains a watershed with a total area of close to 10 square miles and is the lowest contributing sub-basin to the Clackamas River.

Richardson Creek enters the Clackamas River approximately 2 miles upstream of the Rock Creek confluence. Its watershed is less than half the size of the Rock Creek Watershed with a drainage area of little more than 3 square miles. The Salmon River flows southwesterly from its headwaters near Mt. Hood, then northerly to its confluence with the Sandy River near Brightwood. The total drainage area of the Salmon River is 114.4 square miles. The Salmon River East Metsger Island Split is a 0.4-mile-long overflow channel of the Salmon River that breaks away from the main channelnear R.M. 4.8 and rejoins it near R.M. 4.2.

Still Creek flows northwesterly from its headwaters near Government Camp to its confluence with the Zigzag River near Rhododendron. The total drainage area of Still Creek is 23.0 square miles.

The Tualatin River is one of the larger tributaries of the Willamette River. Its basin is bounded by the Coast Range on the west, the Tualatin Mountains on the north and east, and several short mountain ranges on the south. The river flows easterly for more than 75 miles from its headwaters at the eastern edge of the Coast Range to its mouth at the Willamette River, near the City of West Linn. The total drainage area of the Tualatin River is 711 square miles.

The Willamette River, one of the principal rivers in Oregon, drains approximately 11,200 square miles of northwestern Oregon. Originating upstream of the City of Eugene at the confluence of its Middle and Coast Forks, the river flows 187 miles before entering the Columbia River downstream of Portland. Both the Clackamas and Molalla Rivers are tributaries of the Willamette River and are significantly affected by backwater from floods on that river.

The Zigzag River flows southwesterly from its headwaters near Mt. Hood, then northwesterly to its confluence with the Sandy River, near Zigzag. The total drainage area of the Zigzag River is 60 square miles.

The City of Barlow, a residential community on the western edge of Clackamas County, is approximately 18 miles south of Portland. The City of Canby lies approximately 1 mile to the northeast. Barlow is surrounded by unincorporated areas of Clackamas County. The total land area contained within the city limits is 35.39 acres or 0.06 square miles. According to U.S. Census Bureau figures, the population decreased from 140 in 2000 to 135 in 2010.

The topography of the Barlow area is generally level. Any grade in the area is very slight. Soil of the area is well-drained, sandy alluvium on valley terraces. Natural vegetation is coniferous Douglas fir and deciduous willows and alder.

The City of Canby is located in western Clackamas County, approximately 17 miles south of Portland. The City of Canby is completely surrounded by unincorporated Clackamas County. The total land area contained within the corporate limits is approximately 3.77 square miles. According to U.S. Census figures, the population of Canby increased from 12, 790 in 2000 to 15,829 in 2010.

The Willamette River flows along a portion of the northern boundary of Canby. Approximately 9,300 square miles of its drainage area is located upstream from Canby.

The Molalla River flows northerly and forms the western boundary of Canby.

Approximately 71% of the city has been developed. Within the floodplain, there is very little agricultural or urban development; however, the areas are zoned primarily for industrial use. Less than 1% of the total city housing lies within the floodplain.

The topography of the Canby area is generally very level. Any grade is very slight. The soil is a well-drained, sandy alluvium on valley terraces. Natural vegetation is coniferous Douglas fir and deciduous willows and alder.

The City of Damascus is located east of Happy Valley and Interstate 205 and west of Boring; its northern boundary is the Multnomah County line. According to Oregon Geographic Names, Damascus can date its existence as a community back to 1867, when a post office by that name was established. The original heart of the

community is along Oregon Highway 212, which as of 2004 serves as part of the city's southern boundary.

It is part of the North Clackamas School District and the Gresham-Barlow School District.

A 2000 decision by Metro to expand Portland's urban growth boundary into the area prompted some citizens of the community to submit Measure 3-138, a measure on the ballot for the 2004 general election. The initiative's passage resulted in the incorporation of the former unincorporated communities of Damascus and Carver into the City of Damascus, a step which prevents nearby cities from annexing the community. In a special election on September 21, 2005, a city charter was approved by 88 percent of voters.

The City of Gladstone, a rapidly growing suburb of the Portland, Oregon, metropolitan area, is located at the confluence of the Willamette and Clackamas Rivers. The community's commercial development is primarily a strip along Highway 99E, which extends north and south through the city and was for many years the main access to Willamette Valley. Now, the city is bypassed by HighwayI-205. Nearly all of the residential development extends eastward from Highway 99E. West of the highway, low-lying river frontage is used for agricultural and recreational purposes.

Gladstone's population has grown dramatically in recent years. According to the 2010 U.S. Census the population was 11, 497.

The climate consists of warm, dry summers and mild, wet winters. Temperatures are usually moderate, ranging from an average monthly minimum in January of 33°F to an average monthly maximum in July of 82°F. The average annual precipitation is 45.3 inches, with 86 percent of precipitation occurring form October to May.

The Willamette and Clackamas Rivers form Gladstone's corporate boundaries on the west and south. Willamette River, a tributary to the Columbia River, drains 11,200 square miles and has its origin at the confluence of its Middle and Coast Forks near Eugene, Oregon. Clackamas River, a tributary to Willamette River, drains 937 square miles and originates high in the Cascade Mountains.

Gladstone's 100-year floodplain is relatively undeveloped, except for a few residences and farms in the reach of Clackamas River upstream of Highway I-205. A 500-year flood would inundate a much larger area, including many residences on the east side of Highway 99E and a mobile home complex, apartments, a golf course and various businesses on the west side of the highway.

The City of Happy Valley is a city in Clackamas County, just east of Damascus. It has a total area of 2.7 square miles. The population was 13,903 at the 2010 Census. Happy Valley is part of the North Clackamas School District. Happy Valley was originally called Christilla Valley, named after its first residents, Christian and Matilda Deardorff. The city was officially incorporated in 1965. It remained a small community until the late 1990s, when urbanization of the surrounding area became inevitable. Happy Valley became one of the fastest-growing cities in Oregon.

The City has a mayor, along with four other city council members. There is also a planning commission, as well as a Park Advisory/Urban Forestry Commission and Citizen Traffic and Public Safety Committee.

Mount Scott, and extinct volcano that is part of the Boring Lava Field, is the highest point in Happy Valley, at 1,050 feet.

The City of Lake Oswego is located in the northwestern corner of Clackamas County, Oregon. It shares its northern boundary with of the City of Portland. There are 15.6 square miles (10,000 acres) within Lake Oswego's urban growth boundary. As of the 2010 census, the city had a total population of 36,619.

The Willamette River forms the eastern boundary of the City of Lake Oswego. Approximately 11,105 square miles of its drainage area are upstream of the City of Lake Oswego.

The Tualatin River flows easterly along the southern corporate limits of the city to its mouth at the Willamette River southeast of Lake Oswego. Approximately 690 square miles of its drainage area are upstream of the City of Lake Oswego. Oswego Lake is impounded by Oswego Dam, which is operated by the Lake Oswego Corporation for recreation and hydropower. Oswego Lake, which covers 0.7 square mile, divides the community into northern and southern sections. Blue Heron Bay, Lakewood Bay, and West Bay are extensions of the Lake. Oswego Creek drains the lake from Oswego Dam to the Willamette River. Oswego Canal flows northerly for approximately 1.6 miles and connects Oswego Lake to the Tualatin River at River Mile (R.M.) 6.7.

The comprehensive plan for the city is based on the urban growth boundary, which includes areas outside the corporate limits that are to be annexed in the future. As of 1987, a total of 15.6 square miles (10,000 acres) of land are located within the city's urban growth boundary. Sixty-five percent of this area has been developed. The area within the Willamette River flood plain is zoned for heavy industry, with 87.9 percent of that land actually developed for heavy industrial use. Development in the Tualatin River flood plain is completely residential.

The Tualatin Valley is generally flat or gently sloping. Soils in the area have poor drainage characteristics. Trees, grass and shrubs are the dominant vegetation.

The City of Milwaukie is located in the northwest corner of Clackamas County, along the Clackamas and Multnomah County line. It is situated immediately southeast of Portland, on the east bank of the Willamette River. Milwaukie's 2010 population was 20,291, down from the 2000 population of 20,490.

The Willamette River flows north along the western corporate limits. Upstream of Milwaukie, it drains approximately 11,130 square miles of central Oregon.

Johnson Creek drains a highly urbanized area northeast of Milwaukie. It has a total drainage area of 54 square miles, of which 45 square miles contribute directly to Johnson Creek runoff. The remaining 9 square miles drain into a depression upstream of the study area.

Kellogg Creek flows northwesterly along Milwaukie's southern corporate limits and has a drainage area of 16.6 square miles.

Commercial and industrial areas are primarily located in the southern and western portions of Milwaukie, while residential development is spread throughout the community. Milwaukie's central business district is located along Southeast McLoughlin Boulevard, near the Willamette River. Development within the flood plains include industrial sites along Johnson Creek and scattered business and residential structures along Willamette River and Johnson and Kellogg Creeks. Residential development has also occurred in a flood-prone depression near Southeast 46th Avenue and Southeast King Road.

The City of Oregon City is situated in the upper northwest corner of Clackamas County. The City of Gladstone is directly north of Oregon City on the opposite side of the Clackamas River, and West Linn is directly northwest of Oregon City on the opposite side of the Willamette River.

Oregon City is located on the southeast periphery of the Portland, Oregon, metropolitan urban area. The total land area contained within the corporate limits is 8.4 square miles. According to U.S. Census figures, the population increased from 8,000 in 1960 to 14,100 in 1977, to 31,859 in 2010.

The Willamette River flows northerly through Oregon City and forms its western corporate limits. Approximately 10,100 square miles of its drainage area are upstream of Oregon City.

The Clackamas River flows westerly and forms part of the northern corporate limits of Oregon City.

Abernethy Creek, also a tributary of the Willamette River, flows westerly through Oregon City. It extends approximately 16 miles and has a total drainage area of 30 square miles.

Approximately 70% of the city has been developed. Within the floodplains studied, development is mainly commercial as well as light and heavy industry. Less than 1% of the total city housing lies within the floodplain.

Oregon City is located along a gorge of the Willamette River. Development began adjacent to the river and progressed up and away from the river. The topography has formed a lower commercial-industrial area, an intermediate area with mixed commercial-residential development and an upper area that is predominantly residential.

Other than the rocky broken ground in the southeast portion of the city, the soil is typically silt loam or clay loam which naturally supports deciduous trees and shrubs, with a mix of coniferous trees.

The City of Rivergrove is a southern suburb of Portland, in the northwestern corner of Clackamas County. The total land area contained within the corporate limits is 0.18 square mile. According to the U.S. Census Bureau figures, the population decreased from 324 in 2000 to 289 in 2010. Development within the Tualatin River basin is mainly residential. 55% of the housing in the city lies within the floodplain.

Located in the Tualatin Valley, the topography of Rivergrove is relatively flat and gently sloping. Soils in the area have poor drainage characteristics. Trees, grass, and shrubs are the predominant vegetation.

The City of Sandy is located in the Willamette Valley. The Willamette Valley was one of the earliest settled areas in the Pacific Northwest. It was frequently visited by fur trappers in the 1820's and 1830s, and large-scale emigration over the Oregon Trail began in 1843. Sandy's first post office was established in 1873 and the village became an incorporated City in 1913.

As of 2010, the City of Sandy had a population of 9, 570, and is located on the Mt. Hood Highway (U.S. Highway 26), midway between Portland and Mt. Hood.

Residents of the City enjoy a mild climate, clean air, good water, beautiful scenic views in a country setting, and all the advantages of small-town living while being only 45 minutes from the urban amenities of downtown Portland.

Though the City of Sandy's heritage was logging and saw milling, today's economic activity ranges from light industrial manufacturing to service businesses. Many Sandy residents commute to jobs in nearby Portland. Agricultural crops in the surrounding area are primarily nursery stock and a variety of berries.

U.S. Highway 26 remains a major thoroughfare for travelers and for commerce. Agriculture is central to the area's economic stability, and industrial activity is increasing.

The City of West Linn, a rapidly growing suburb of Portland, is located at the confluence of the Willamette and Tualatin Rivers. The city stretches for 6 miles along the west bank of the Willamette River in an area characterized by rolling hills and random development. Several concentrations of residential development occur throughout the area. Commercial development is centered near the Oregon City-West Linn Bridge, and an industrial district fronts on Willamette River upstream of the bridge. Major industries located at one time there included a paper mill and a hydroelectric plant adjacent to Willamette Falls. At Willamette Falls, a navigational lock enables river traffic to bypass the 45-foot falls. Highway transportation is provided by State Highway 43 and I-205.

Settlement of the West Linn area, once known as Robins Nest, began in 1840. In 1850, the legislature named the area Linn City. In 1923, the area was incorporated under the name West Linn.

The population of West Linn grew dramatically in the mid-1900s and continues to do so today. According to census of 2010, there were 25,109 inhabitants.

The City of Wilsonville is situated in the northwestern corner of Clackamas County and the southeastern corner of Washington County, in northwestern Oregon. Oregon City is approximately 9 miles northeast of Wilsonville, and the City of Canby lies approximately 5 miles southeast. Wilsonville is bordered by unincorporated areas of Clackamas County on all sides except the north where it borders unincorporated Washington County. The total land area contained within the corporate limits is 5.92 square miles. The population of Wilsonville increased from 1,009, when it was incorporated in 1969, to 2,040 in 1977. According to U.S. Census Bureau figures, Wilsonville had a 2000 population of 13,991, and grew to 19,509 at the 2010 census.

Seely Ditch, which flows southerly, is a minor tributary of the Willamette River. It extends approximately 5.2 miles from its origin to Willamette River. The total drainage area of Seely Ditch is 8.2 square miles.

Boeckman Creek, also a tributary of the Willamette River, flows southerly through Wilsonville. It extends approximately 4.2 miles and has a total drainage area of approximately 2.0 square miles.

Corral Creek, also a tributary flowing southeasterly to the Willamette River, is 6.8 miles long and has a total drainage area of 10.9 square miles.

Approximately 19 percent of the city has been developed. Within, the flood plains studied, development is residential, commercial, and light industrial.

The terrain in the Wilsonville area is generally flat, with slopes of less than 3 percent. There are some areas of low, gently rolling hills. Soil consists of a large deposit of lacustrine gravel (bouldry pebble and cobble gravel in silt and coarse sand) for approximately 1 mile north of Willamette River. A young alluvium (sand and clay) has been deposited over Willamette silt (unconsolidated sediments, silt, and fine sand) along stream banks and floodplain areas. A wide variety of trees is common in the area. This includes ash, cottonwood, maple, willow, dogwood, oak, Douglas fir, hemlock, cedar, sycamore, and poplar. A variety of grasses and smaller plants forms the understory. Undergrowth, bushes, and trees are especially dense along the Willamette River, Boeckman Creek, and Seeley Ditch.

2.3 Principal Flood Problems

Historically, flooding within Clackamas County normally occurs from October through April. Cyclonic winter storms from the Pacific Ocean sometimes produce intense rainfall on drainage basins of the Pacific Northwest. When these storm fronts move in a downstream direction, greater discharges are produced. If this condition is accompanied by rapid snowmelt and frozen ground in the upper watersheds, large floods can result.

Floods in the study area are normally widespread rather than limited to a few streams. Because of longer travel times between the upstream headwaters and the study area, crests on larger rivers occur several days later than those on some of the smaller tributaries. For example, the Willamette River remains above the bankfull stage for approximately 10 days following a major flood, whereas most tributaries recede to within their banks in 4 or 5 days. The Tualatin River is an exception because there is considerable ponding in the middle and lower reaches.

The February, 1996 flood on the Tualatin River produced the highest flows ever recorded, with an estimated 84-year return period and an annual probability of recurrence of 1.2%. However, for almost all of the smaller urbanized Tualatin River tributaries that were studied, the November 1996 flood is thought to be the largest flood ever observed with an estimated 25-year return period and an annual probability of recurrence of 4%. Other major floods have occurred on the Tua1atin River. Prior to the floods of 1996, a flood occurred on January 18, 1974, and had peak discharge of 21,400 cfs. On December 23, 1933, a flood occurred that had a recorded flow of 23,300 cfs at the West Linn gage and 6,000 cfs at the Oswego Canal gage.

A number of major floods have occurred on the Willamette River. The largest recent flood occurred as the result of a December 1964 storm that dropped 6 to 10 inches of rainfall over the watershed and caused the freezing level to rise to the 10,000-foot elevation. A peak discharge of 403,000 cubic feet per second (cfs) for this flood was observed on December 24, 1964, at the Wil1amette Locks Upper Gage in Oregon City. This discharge exceeded the projected 100-year (1-percent-annual-chance) floodflow of 341,000 cfs. The flood of December 1861 is believed to be the greatest historical flood, with a peak discharge at the same gaging station estimated at 590,000 cfs.

The second largest historical flood, in 1890, had an estimated discharge of 510,000 cfs. Both floods exceeded the 500-year (0.2-percent-annual-chance) floodflow of 469,000 cfs. The January 9, 1923, peak discharge of 357,000 cfs and the January 3, 1943, peak discharge of 324,000 cfs are the fourth and fifth largest recorded floods, for the Wi11amette River at the Wi11amette Locks Upper Gage.

Major floods have also occurred on the Mo1a11a River. The largest recorded flood at the gage near Canby occurred on December 22, 1964, and had a peak discharge of 43,600 cfs. Other major floods on the Molal1a River occurred in January 1972 and January 1974, and had peak discharges of 36,200 cfs and 31,200 cfs, respectively. The estimated 1-percent-annual-chance flood discharge for the Mo1a1la River at the gaging station near Canby is 41,200 cfs.

The largest recorded flood on the Clackamas River at the gage near the City of Clackamas occurred on December 22, 1964, and had a peak discharge of 120,000 cfs. The estimated 1-percent-annual-chance flood discharge at this point is 110,000 cfs.

Industrial, commercial, and residential developments in the flood plains of the streams studied are found only near the incorporated communities in the northwestern corner of the county. Elsewhere, the flood plains are generally devoted to agricultural use.

City of Barlow

Major floods have occurred on the Pudding River. The largest recorded flood at the gaging station at Aurora occurred on December 23, 1964, with a peak discharge of 26,200 cfs. This discharge is less than the estimated 1%-annual-chance flow of 30,100 cfs. Other major floods on Pudding River occurred in December, 1937 and February, 1949, with peak discharges of 25,400 cfs and 22,200 cfs, respectively.

City of Canby

The major developed area of the City of Canby lies almost entirely above the historic high-water levels of Willamette and Molalla Rivers. The flood damages that have occurred within the city have been limited to agricultural lands in the Willamette and Molalla River flood plains. High channel velocities on Molalla River have caused erosion and, in some cases, channel migration.

City of Gladstone

Floods in Gladstone are caused by bank overflow from both the Willamette and Clackamas Rivers and to a lesser extent, by ponding resulting from local storm runoff. The annual flood season extends from October through April, the period of the greatest storm activity. Major riverine floods usually result from intense rainfall augmented by snowmelt.

Many large floods have occurred on the Willamette and Clackamas Rivers in the past. Severe floods of approximately 100-year frequency occurred on both streams in December 1964; however, Gladstone experienced only moderate damages, mainly because the areas susceptible to flooding were generally known and development was avoided. The regulated peak flow of the Willamette River during that flood was 435, 00 cfs, while Clackamas River peaked at 120,000 cfs. Floods on Clackamas River and Willamette River usually occur together, although Clackamas River crests 1 to 2 days prior to Willamette River.

City of Lake Oswego

Flooding on Oswego Canal is a result of overflow from the Tualatin River.The flood of February 1996 caused extensive property damage within the City of Lake Oswego, particularly areas affected by unusually high flooding from the Willamette and Tualatin Rivers. Flooding along the rivers was understandable, but many people were surprised at the extensive flooding of areas along the Oswego Canal and the shore of Oswego Lake (including portions of downtown Lake Oswego along McVey and State Streets) when a significant volume of floodwater spilled from the Tualatin River over the canal headgate and through the Tualatin River Overflow to Rivergrove, flooding the Oswego Canal and overwhelming the capacity of the Oswego Lake Dam. The resulting lake level was almost 4 feet higher than normal high water.

City of Milwaukie

The largest flood this century on Willamette River occurred in December 1964. The peak discharge in the vicinity of Milwaukie was 440,000 cubic feet per second (cfs), with an estimated recurrence interval of 120 years. Business and residential areas along Willamette River, as well as the city's sewage treatment plants, were inundated. Willamette River backwater extended approximately 1 mile up both Johnson and Kellogg Creeks, flooding industrial and residential areas along those streams. Figure 2 shows flooding in December 1964. Other large floods on Willamette River occurred in January 1923 (421,000 cfs) and January 1943 (367,000 cfs).

Flood discharges above 2,000 cfs have been recorded four times on Johnson Creek since the USGS established a stream gage at Sycamore, approximately 9 miles upstream of Milwaukie, in 1940. The largest discharge, 2,620 cfs, occurred in December 1964. That flood had an estimated recurrence interval of only 15 years. Additional discharges greater than 2,000 cfs were 2,220 cfs in January 1969, 2,180 cfs in November 1960, and 2,110 cfs in February 1949. Those floods caused minor damages in Milwaukie. Several bridges present severe restrictions to flow, which result in localized increases in flood heights.

The largest discharge on Kellogg Creek also occurred in December 1964. There are no stream gages on Kellogg Creek, but it was estimated that the December 1964 flood had a discharge of 1,570 cfs and a recurrence interval of 25 years. That flood caused little damage along Kellogg Creek, outside of the area affected by the

Willamette River backwater. There are no constrictions on Kellogg Creek that aggravate flooding problems in Milwaukie.

Flooding from Mount Scott Creek, a tributary to Kellogg Creek, has occurred near the intersection of Rusk and Lake Roads. There are no recorded discharges on Mount Scott Creek, but it was estimated that the peak discharge in December 1964 was 1,160 cfs. There was minor residential flooding along Mount Scott Creek during that flood.

Local ponding has occurred in the depression near Southeast 46th Avenue and Southeast King Road, but it has been limited to the flooding of streets and has not involved any structures. Runoff from approximately 450 acres is trapped in the depression.

Major floods have occurred on the Clackamas River. The largest recorded flood at the gage near Oregon City occurred on December 22, 1964, with a peak discharge of 120,000 cfs. Other major floods on the Clackamas River occurred in March 1931, January 1923, and November 1960, with peak discharges of 82,000 cfs, 80,000 cfs and 73,000 cfs, respectively. The estimated 1%-annual-chance discharge for the Clackamas River at the gaging station near Oregon City s is 110,000 cfs.

Oregon City has sustained damage from flooding of the Willamette and Clackamas Rivers. The 1861 Willamette River flood inundated the main streets of Oregon City with 4 feet of water. Although the 1890 Willamette River flood had a smaller discharge than the 1861 flood, water from the later flood rose to a level 2.1 feet above the earlier flood, due to the presence of buildings along the river which reduced the channel capacity in Oregon City. The December 1964 flood also caused extensive damage in Oregon City. Waterfront industry and shopping areas along the Willamette and Clackamas Rivers received significant damage from this flood.

Major floods have occurred on the Tualatin River. The largest recent flood occurred on February 10, 2006, with a peak discharge of 26,400 cfs. The estimated 1-%-annual-chance flow at the West Linn gage on the Tualatin River is 23,455 cfs.

Since 1979 when the original approximate study of Tickle Creek in the City of Sandy was performed, the City has annexed new areas along the creek. Development is progressing at a rapid pace as evidenced by newly constructed roads and new subdivisions.

One unnamed tributary along Tickle Creek, an urban creek, is confined to culverts of irregular sizes in many places. The unnamed tributary causes flooding problems of approximately 6 inches in places where it daylights, but the water does not presently threaten any living spaces and is primarily nuisance flooding of some streets. City planners are concerned about the flows and flooding increasing due to the increasing development and larger areas of impermeable ground.

The largest flood of historical record on Willamette River occurred in December, 1861, with an estimated flow of 590,000 cfs at West Linn. Many large floods have occurred since then. The next 5 largest floods, in order of descending magnitude, occurred in February 1890, December 1964, January 1923, January 1943, and December 1955. The Willamette River flood of December 1964, had it not been regulated by upstream storage projects, would have been approximately equal to the 1861 flood. The December 1964 flood reached approximately a 1-%-annual-chance magnitude and had a peak flow at West Linn of 403,000 cfs. A corresponding crest

elevation of 70.1 feet MSL, 1947 adjustment, was recorded at the Willamette Falls upper gage. The December 1964 flood caused considerable damage to the study area. The paper mill on Moores Island and those low-lying residences were especially hard hit.

Floods have been observed on Seely Ditch, and Boeckman and Corral Creeks; however, there are no gaging stations on these streams, and as a result, no records of major floods are available.

Flooding in the Lower Columbia-Sandy Watershed in Clackamas County occurs along the banks of Sandy River and its tributaries, including Salmon and Zigzag Rivers, and Clear, Cedar, Henry, and Still Creeks. Flooding typically occurs from October through April, exacerbated by intense rainfall from winter storms.

The Sandy River is Clackamas County's main source of riverine flooding, and there have been at least four floods since 1861 that have been estimated to have exceeded the 1% annual chance flood. The Sandy River is a dynamic channel that drains the western flank of Mount Hood, and storm events combined with snowmelt from its upper reaches can cause extensive flooding and channel migration.

Flooding in the upper Sandy River area is due to channel aggradation and movement, debris in the waterways, heavy rainfall, and snowmelt. Dynamic and augmented streams in developed areas can cause major property and environmental damage.

Cedar Creek floods during the winter months due to increased rainfall, upstream snowmelt, and riverine debris interacting with flood control structures.

The main areas of flooding in the Zigzag River area are those where development has caused the river to be constrained, thus creating a conflict between developed areas and peak flow. These streams flood frequently.

Flooding in the Salmon River area is largely due to riverine structures, particularly bridges, restricting the river flows and rendering existing peak flow data inaccurate.

The main areas of flooding in the Zigzag River area are those where development has caused the river to be constrained, thus creating a conflict between developed areas and peak flow. These streams flood frequently.

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2.4 Flood Protection Measures

Levees exist in the study areas that provide the county with some degree of protection against flooding. However, it has been ascertained that some of these levees may not protect the community from rare events such as the 1-percent-annual-chance flood. The criteria used to evaluate protection against the 1-percent-annual-chance flood are 1) adequate design, including freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect

against the 1-pecent-annual-chance flood are not considered in the hydraulic analysis of the 1-percent-annual-chance floodplain.

Other levees may exist within Clackamas County. Levees not identified in this section are not known to have the necessary features to provide protection from a flood with a 1-percent chance of annual occurrence.

Willamette River flood stages have been reduced significantly by 14 storage projects operated by the USACE. These projects have been placed in operation since 1942 and provide a total flood-storage capacity of 1.7 million acre-feet. Three more reservoirs are authorized and are in preliminary planning stages as of 2005.

The Tualatin River basin has one multipurpose storage project available for flood control. Henry Hagg Lake Project, constructed by the U.S. Bureau of Reclamation, began operation during the 1974—75 flood seasons. It provides 30,000 acre-feet of flood storage, starting in November of each year. The flood-storage capacity is reduced as the winter flood season terminates, and the reservoir is filled each spring in anticipation of the summer irrigation demand. The effect of the Henry Hagg Lake Project on flood storage has been considered in the calculation of water-surface profiles for the segment of the Tualatin River near the City of Lake Oswego. Located approximately 50 miles upstream, this storage facility is distant enough that the effect it would have on the 1- and 0.2-percent-annual-chance floods is negligible. The U.S. Bureau of Reclamation has completed a draft feasibility study of two alternative storage projects on the Tualatin River near the Town of Gaston that could provide additional flood storage in the Tualatin River basin. Those projects, however, are still in the planning stages and are not reflected in this study.

There are no flood control structures on Johnson, Kellogg, or Mount Scott Creeks. In an effort to reduce flood losses, The City of Milwaukie has established a flood hazard zoning ordinance that requires planning commission approval for building permits within the 1%-annual-chance flood plain. When reviewing a building permit application, the planning commission considers such factors as the danger to life and property due to increased flood heights or velocities caused by encroachments, the ability of water supply and sanitation systems to prevent unsanitary conditions, and the availability of alternative locations not subject to flooding.

Regulatory measures have been adopted by the City of Oregon City to guide new development in the floodplain consistent with the hazards involved (Reference 11). Finished floors must be at least 2 feet higher than the 1%-annual-chance flood, and development within the floodway which would hinder flow is not permitted.

Regulatory measures have been adopted by the City of Rivergrove to guide new development in the floodplain consistent with the hazards involved. New residential development must be adequately protected from flooding, and development within the floodway that would hinder flow is not permitted.

In West Linn, Levees provide flood protection for industrial waste lagoons on the left bank, upstream of Willamette Falls. Those levees, although constructed above 500-year flood levels, are not recognized by the National Flood Insurance Program consequently are not reflected on the Flood Insurance Rate Map. West Linn has also adopted land use regulatory measures to guide new development in the floodplain consistent with the hazard involved. Current ordnances require that building foundations be at least 1 foot higher than the 1%-annual-chance flood.

Regulatory measures have been adopted by the City of Wilsonville to prevent construction within 5 feet of the 1%-annual-chance flood elevation on the Willamette River in Wilsonville.

River stage forecasting for Clackamas County is the responsibility of the Portland River Forecast Center, National Weather Service. Forecasts and flood warnings prepared by the center are disseminated through Clackamas County Emergency Services, radio, television, and other news media. Forecasts are prepared for the USGS gages on the Clackamas River near Clackamas and on the Tualatin River at West Linn. Forecasts are also prepared for the USACE gages above and below Willamette Falls on the Willamette River.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance (100-year) flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the

community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

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The flood peak discharges used for mapping the flooding along the main stem of the Tualatin River including the Tualatin River Overflow to Rivergrove and the Oswego Canal were based on a flood frequency analysis of historic gaged annual peak flows after accounting for the effect of the upstream regulation at Hagg Lake. Flow losses observed at the Tualatin River Overflow to Rivergrove and the Oswego Canal were considered at downstream locations along the Tualatin River. A stream gage on Oswego Canal has been maintained by USGS since 1928 to measure outflow from the Tualatin River. The flood peak discharges for mapping the flooding along the tributary waterways of the Tualatin River were based on HEC-HMS hydrologic modeling of these watersheds. The Tualatin River basin study included a new analysis of lake levels, inflow, and outflow for Lake Owego.

Peak discharge-frequency relationships for Abernethy, Deer, Kellogg, Mt. Scott, and Phillips Creeks were developed by a regional hydrologic analysis using previously computed discharge-frequency information and statistical analyses of recorded runoff data for other nearby streams. Because there are no long-term gaging stations on these streams, the hydrologic analysis could not be based on the statistical approach that was used for streams with gage data. The regional analysis was performed using discharge-frequency curves developed by the USACE. The curves were adjusted slightly on the basis of the discharge-frequency curves for Johnson Creek, at the Sycamore gaging station. As a result, new flood elevations were determined. These elevations are reported in Table 4, "Summary of Stillwater Elevations.

Table 4 - Summary of Stillwater Elevations for the Initial Countywide Study

	Elevation (feet NAVD 88)			
Flooding Source	10%-Annual Chance	2%-Annual Chance	1%-Annual Chance	0.2%-Annual Chance
Oswego Lake	102.5	104.4	106.9	109.8

Clackamas River discharge-frequency data (Reference 14) were based on records from the USGS gaging station at R.M. 4.9. Those records have been continuous since October 1962, the date of installation. Another gage, at Estacada (at R.M. 23.1), has had a continuous record since 1908. Flood data before 1962 were extrapolated by correlation with the Estacada gage.

Discharge-frequency data for the following streams were developed using methodology
developed by USGS (Reference 9)., Eagle Creek, Milk Creek, and Sandy River. The 10-, 50-, and 1-percent-annual-chance flood discharge frequencies were obtained using this methodology, whereas the .2%-annual-chance flood discharge frequencies were determined by extrapolating the lower recurrence interval data on a log-probability plot.

The peak discharges for floods on the Molalla and Willamette Rivers and Johnson Creek were determined by statistical analysis of river-gage records, using the standard log Pearson. Type III method as outlined by the U.S. Water Resources Council.

Molalla River discharge-frequency data were based on records from the USGS gaging
stations at Goods Bridge, near Canby (No. 14200000), and above Pine Creek near Wilhoit (No. 14198500) (Reference 16). The records for these two gages are continuous from the times that records were first kept, October 1929 and October 1936, respectively. The Goods Bridge gage, was discontinued in May 1979. The Pine Creek gage is still in operation.

Peak discharges for the Willamette River were based on stage-frequency curves for gages at Willamette Falls Locks and Wilsonville, (References 17 and 18, respectively). The flows were derived by correlation of stream flow records (Reference 19) and the discharge frequency curve (Reference 20) for the gage upstream of the study area at the City of Salem, Oregon.

Willamette River stages were first recorded in 1879, at the Portland Morrison Bridge, by the U.S. Weather Bureau (Reference 21). The gages at Willamette Falls Locks and Salem have also had long periods of record, dating back to 1915 and 1909, respectively. The gage at Wilsonville was established in 1948. Willamette Falls Locks gage is operated by the USACE, and the other gages are operated by the USGS.

The discharge-frequency data for Tickle Creek were developed using a set of USGS regional regression equations that relate basin characteristics to streamflow characteristics for western Oregon. Using the size of the drainage area and the regression equations, the discharges at two locations in the study reach were determined for the various flood events.

The June 2005 hydrologic study of Rock and Richardson Creek, which was performed by Pacific Water Resources, Inc. (PWR), was developed using USGS regional regression equations. The 10-, 2-, and 1-percent-annual-chance flood discharge frequencies were obtained using the USGS developed equation. PWR extended the equation to estimate values for the 0.2-percent chance flow.

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 5. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Several sections of the Sandy River in Clackamas County rely on effective hydrologic analysis from the previous Flood Insurance Study. For these sections, discharge-frequency data was developed using methodology developed by USGS (USGS 1979). The 10-, 50-, and 1-percent-annual-chance flood discharge frequencies were obtained using this methodology, whereas the .2%-annual-chance flood discharge frequencies were determined by extrapolating the lower recurrence interval data on a log-probability plot.

This Physical Map Revision

Discharges for Cedar Creek, Clear Creek, Henry Creek, Salmon River, portions of the Sandy River, Still Creek, and Zigzag River were based on discharge drainage area relationships developed from eight USGS gages within the Sandy River Watershed: USGS gage 14131400 Zigzag River near Rhododendron Oregon (USGS, 2011c), USGS gage 14135000 Salmon River at Welches Oregon (USGS, 2011d), USGS gage 14135500 Salmon River at Boulder Creek near Brightwood Oregon (USGS, 2011e), USGS gage 14137000 Sandy River upstream of Marmot Dam (USGS, 2011f), USGS gage 14140000 Bull Run River near Bull Run, Oregon (USGS, 2011g), USGS gage 14141500 Little Sandy River near Bull Run, Oregon (USGS, 2011h), USGS gage 14142500 Sandy River below Bull Run River (USGS, 2011i), and USGS gage 14142800 Beaver Creek at Troutdale Oregon (USGS, 2011j).

Assessment of the data clearly demonstrated that the majority of annual peak floods occur in the winter season.

The gage data was analyzed by Bulletin 17B (WRC, 1981) methodology and the log-Pearson Type III distribution, using the USGS PeakFQ computer program (Flynn, et al, 2006). The Sandy River gage (14137000), discharges below 5,000 cubic feet per second (cfs) were considered to be outliers, based on information provided in the USGS regional regression equation report for Oregon (Cooper, 2005). Additionally, the State of Oregon has a specific mean square error value of 0.112 which was used in the PeakFQ program (Flynn, et al, 2006).

For streams which had a USGS gage, the final discharge was a combination of the gage discharge weighted with the regression discharge. The regression discharges were obtained from the USGS regression report (Cooper, 2005). To determine discharges for segments which are outside the tolerance range of 50-150% of the drainage area at the gage, a discharge–drainage area curve was developed for each flood event based on the stream gage regional regression equations weighted discharge values.

Salmon River had two separate gages with similar drainage areas, and slightly different periods of record. To determine the discharges for the Salmon River, the two weighted discharges were weighted with each other to produce a single discharge- drainage area relationship to be used for the Salmon River. This relationship was applied to the Salmon River only.

Peak discharge-drainage area relationships for the streams studied by detailed methods in Clackamas County are shown in Table 5**,** "Summary of Discharges."

Table 5 - Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Abernethy Creek					
At mouth	30.0	2,460	3,930	4,560	6,600
Cedar Creek					
At confluence with Sandy River	14.54	1,678	2, 360	2, 608	3, 230
Clackamas River					
At mouth	937.0	65,000	95,000	110,000	145,000
Upstream of confluence with Eagle Creek	683.0	46,900	68,900	78,700	102,800
Clear Creek					
At mouth	9.3	1,140	1,572	1,705	2,022
Deer Creek					
At mouth	1.5	130	220	285	405
Eagle Creek					
At mouth	83.0	6,800	10,000	11,500	15,100
Johnson Creek					
At mouth	54.0	1,900	2,600	2,900	3,390
At the upstream study limits	49.0	1,870	2,590	2,770	3,080
Kellogg Creek					
At mouth	16.6	1,290	1,780	1,990	2,500
Upstream of confluence with Mt. Scott Creek	2.8	[1]	[1]	555	[1]

[1] Data not available

[2] Data not computed

Table 5 - Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Milk Creek					
At mouth	108.0	8,100	12,100	14,000	18,900
Upstream of confluence with Cedar Creek	67.7	6,200	9,200	10,600	14,100
Molalla River					
At mouth	878.0	47,000	63,500	73,000	97,000
At confluence with Pudding River	346.0	25,000	36,000	41,200	54,500
Upstream of confluence with Milk Creek	215.0	20,100	29,000	33,000	43,000
Mt. Scott Creek					
At mouth	10.2	940	1,300	1,440	1,750
Oswego Canal					
At Bryant Road	[1]	250	2,700	5,700	12,500
At divergence from Tualatin River	[1]	250	1,600	2,800	6,200
Phillips Creek					
At mouth	2.4	210	270	310	370
Pudding River					
At mouth	530.0	[2]	[2]	32,000	[2]

[1] Data not available

[2] Data not computed

Table 5 - Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Richardson Creek					
Upstream of Confluence with Clackamas River	4.2	466	618	677	761
Downstream of Confluence with Richardson Creek Anderson Road Tributary	3.5	393	522	571	641
Downstream of Confluence with Richardson Creek Royer Road Tributary	2.3	259	346	376	423
Richardson Creek Royer Road Tributary					
Upstream of Confluence with Richardson Creek	0.8	95	128	138	155
Richardson Creek Anderson Road Tributary					
Upstream of Confluence with Richardson Creek	0.7	87	118	127	143
Richardson Creek Keller Road Tributary					
Upstream of Confluence with Richardson Creek	0.4	45	61	65	73
Rock Creek					
Upstream of Confluence with Clackamas River	10.3	1,071	1,408	1,155	1,747
Downstream of Confluence with Rock Creek 172nd Avenue Tributary	8.5	902	1,188	1,310	1,472

[1] Data not available

[2] Data not computed

Table 5- Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Rock Creek (continued)					
Downstream of Confluence with Rock Creek South Golf Course Tributary	7.4	787	1,038	1,143	1,284
Downstream of Confluence with Rock North Golf Course Tributary	6.2	669	883	971	1,091
Downstream of Confluence with Rock Creek Hemrick Road Tributary	5.4	586	775	850	955
At Private Road	2.4	271	361	393	442
Rock Creek Hemrick Road Tributary					
Upstream of Confluence with Rock Creek	2.1	240	320	348	391
Rock Creek North Golf Course Tributary					
Upstream of Confluence with Rock Creek	0.5	58	79	85	95
Rock Creek South Golf Course Tributary					
Upstream of Confluence with Rock Creek	0.4	54	73	78	88
Rock Creek 172nd Avenue Tributary					
Upstream of Confluence with Rock Creek	0.6	80	108	116	130
Rock Creek Highway 224 Tributary					
Upstream of Confluence with Rock Creek	0.8	101	136	147	165

[1] Data not available

[2] Data not computed

Table 5 - Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Salmon River					
At mouth	115	9,070	13,800	15,818	21,133
Upstream of Confluence with Cheeney Creek	88	6,903	10,504	12,039	16,085
Sandy River					
Upstream of confluence with Alder Creek	249.9	25,940	39,538	46,090	63,291
Upstream of confluence with Clear Creek	41.1	4,407	6,357	7,182	9,353
Seely Ditch					
At confluence with Willamette River	8.2	493	706	777	950
At Wilsonville Road	[1]	398	516	581	730
Still Creek					
At mouth	22.8	2,527	3,603	4,030	5,134
Tickle Creek					
At downstream study limit (Approximately 2,600 feet downstream of Northeast 362nd Street)	3.9	368	549	633	807
Upstream of confluence with Unnamed (Highway 211)	1.7	176	263	303	388

[1] Data not available

[2] Data not computed

Table 5 - Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Tualatin River					
At month	706.0	15,750	24,200	27,900	36,000
Downstream of overflow through Rivergrove	698	16,000	28,800	30,700	42,200
Downstream of confluence with Nyberg Slough	698.0	16,000	26,900	33,600	48,500
Tualatin River overflow to Rivergrove	[1]	[1]	1,100	2,900	6,300
Willamette River					
At Milwaukie	11,130	251, 000	329,000	375,000	495,000
At Willamette Locks Upper Gage	10,100	219, 000	295, 000	341,000	469,000
At Fish Eddy	9,300	209, 200	284,200	328,000	457,000
At downstream of Wilsonville corporate limits	8,400	178,000	250,000	287,000	420,000
Zigzag River					
At mouth	60.0	7,800	11,500	13,100	17,400
Upstream of confluence with Still Creek	30.0	4,300	6,300	9,800	10,400

[1] Data not available

[2] Data not computed

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data Table in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

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The hydraulic analyses for Johnson Creek and portions of Clackamas River, Kellogg Creek, and Willamette River were obtained from USACE-Portland District.

Water-surface elevations (WSELs) of the selected recurrence intervals along the streams studied by detailed methods of the original studies were computed using the USACE HEC-2 step-backwater computer program. Cross sections were obtained photogrammetrically from aerial photographs at a photographic scale of approximately 10,200.

WSELs of Oswego Canal, Rock Creek and its tributaries, Richardson Creek and its tributaries, Tickle Creek, the Tualatin River, and Tualatin River Overflow to Rivergrove, were determined with the use of the USACE HEC-RAS program. Cross sections were field surveyed and supplemented with topographic maps in the overbank areas. The below-water sections were obtained by hydrographic survey. Bridge dimensions and elevations were obtained from design drawings and field measurements.

Cross section data for the Pudding River were obtained from the USACE.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM.

Manning's "n" roughness values used in the hydraulic computations were generally chosen by engineering judgment and based on field observations of the streams and flood plain areas and comparisons with previous studies. In the case of the Clackamas, Molalla, and Willamette Rivers, roughness values were calibrated using stage-discharge information at gaging stations. For other streams that crossed gaging locations, the hydraulic analyses were compared to available stage-discharge information, but no calibrations of roughness values were warranted.

Roughness values used for the main channel of Rock Creek and its tributaries range from 0.02 to 0.09 and were estimated to be 0.06 for Richardson Creek and its tributaries. Overbank roughness values range from 0.02 to 0.20 for Rock Creek and its tributaries and from 0.04 to 0.10 for Richardson Creek and its tributaries.

Roughness values were estimated at 0.1 in the channel and 0.6 to 0.1 in the overbank areas for the Tualatin River study (including Oswego Canal and Tualatin River Overflow to Rivergrove). Roughness values for the Willamette River were verified by comparing computed profiles with high-water marks from known discharges for the December 1964 flood. Channel roughness values for the Molalla River were verified using high-water marks at Goods Bridge. Clackamas River roughness values were verified using the rating curve for the gage at Estacada.

The Willamette River backwater model from Fish Eddy to R.M. 41.4 was first adjusted by modeling the 1964 flood and matching the elevations obtained at R.M.s 34.4, 38.5, and 41.4 to the high-water marks at these three locations. Because the elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods are known from the gage records at the Wilsonville gage (R.M. 38.5), successive starting WSELs were approximated at Fish Eddy to obtain the known elevations at the gage for each of the flood frequencies.

Starting WSELs for Abernethy Creek, Eagle Creek, Milk Creek, Molalla River, Phillips Creek, Salmon River, and Sandy River were based on slope-area calculations. Starting WSELs for the Clackamas River, Johnson Creek and Kellogg Creek were based on confluence elevations with Willamette River. Starting WSELs for Deer Creek were based on elevations at the confluence with Mt. Scott Creek. Starting WSELs for Mt. Scott Creek were based on elevations at the confluence with Kellogg Creek. Starting WSELs for the Pudding River were based on elevations at the confluences with the Molalla and Willamette Rivers. The starting WSELs for the Salmon River East Metsger Island Split were obtained from Salmon River profile elevations at the entrance of the overflow channel.

Starting WSELs for Oswego Canal, the Tualatin River, and Tualatin River Overflow to Rivergrove were based on Normal Depth calculations.

The starting WSELs for Rock Creek and Richardson Creek were determined by normal depth analysis. Starting WSELs for their tributaries were calculated by HEC-RAS considering backwater from the main stem.

Near Cross Section A on Milk Creek, the 1-percent-annual-chance flood overtops Canby Mulino Road, resulting in shallow flooding in the northern overbank of the river, extending westerly across the Southern Pacific Railroad tracks.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail. The exception to this is a structure found on a private road along Rock Creek. This multiple-culvert structure was found to have a broken pipe joint on one culvert, a collapsed bank blocking a second pipe, and a third unobstructed pipe. This culvert system was modeled with obstructions in-place.

This Physical Map Revision

Water surface elevations of the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance floods Cedar Creek and Sandy River in Clackamas County, Oregon were estimated using of the USACE HEC-RAS 4.1.0 computer program (HEC, 2010). Cross sectional geometries for the detailed analysis of these streams were comprised of field run survey data and a digital terrain model (DTM) generated from Light Detection and Ranging (LiDAR) data collected by the Oregon Department of Geology & Mineral Industries (DOGAMI) in 2011 (DOGAMI 2011). Surveyed channel sections were transferred upstream and downstream to LiDAR generated cross sections and were blended with the LiDAR data to create a consistent channel profile. Floodway encroachment stations were established, first using Method 4. The Method 4 encroachment stations were imported and the Method 1 encroachment analysis was then executed to create the final floodway.

Clear Creek, Salmon River, Still Creek, and Zigzag River water surface profiles were computed using the HEC-RAS step-backwater program (HEC, 2010). Channel cross section and hydraulic structure survey data were obtained from field surveys performed by STARR between June and September 2012. The channel survey data were combined with overbank LiDAR topography data (DOGAMI 2011)

Roughness coefficients are provided in Table. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Manning's Roughness were determined based on surface conditions in the channel and on the overbanks based on site visit, aerial photography and photographs. Manning's roughness used in the modeling is summarized in Table 6.

Table –6 Roughness Coefficients Manning's "n" Values

Stream	Channel "n"	Overbank "n"
Cedar Creek	0.045 – 0.050	0.035 – 0.120
Clear Creek	0.050 – 0.060	0.120
Salmon River	0.050 – 0.060	0.050 – 0.100
Sandy River	0.040 – 0.120	0.050 – 0.120
Still Creek	0.045 – 0.055	0.080 – 0.120
Zigzag River	0.050 – 0.065	0.070 – 0.100
Cedar Creek	0.045 – 0.050	0.035 – 0.120
Clear Creek	0.050 – 0.060	0.120
Salmon River	0.050 – 0.060	0.050 – 0.100
Sandy River	0.040 – 0.120	0.050 – 0.120

The profile baselines depicted on the FIRM represent the hydraulic modeling baselines that match the flood profiles on this FIS report. As a result of improved topographic data, the profile baseline, in some cases, may deviate significantly from the channel centerline or appear outside the Special Flood Hazard Area.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was NGVD. With the finalization of North American Vertical Datum (NAVD), many FIS reports and FIRMs are being prepared using NAVD as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD. Structure and ground elevations in the community must, therefore, be referenced to NAVD. It is important to note that adjacent communities may be referenced to NGVD. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities. Some of the data used in this study were taken from the prior effective FIS reports and adjusted to NAVD. The average conversion factor that was used to convert the data in this FIS report to NAVD was calculated using the National Geodetic Survey's (NGS) VERTCON online utility.

For additional information regarding conversion between NGVD and NAVD, visit the NGS website at www.ngs.noaa.gov.

Table 7 – Vertical Datum Conversions

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Cherryville	NE	45.375	-122.125	3.461
Estacada	NE	45.375	-122.250	3.490
High Rock	NE	45.250	-121.875	3.624
Rhododendron	NE	45.375	-121.875	3.556
Wildcat Mountain	NE	45.375	-122.000	3.473
Three Lynx	NE	45.250	-122.000	3.727

Average Conversion from NGVD29 to NAVD88 = 3.555 (FEET)

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance (100-year) flood elevations and delineations of the 1- and 0.2-percent-annual-chance (500-year) floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data Table, and Summary of Stillwater Elevations Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community.

For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scale of 1:4,800, with a contour interval of 5 feet.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards Zones A, AE, AH, AO, and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies

The floodways presented in this FIS report and on the FIRM were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections (Table 8). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY[2]	WITH FLOODWAY[2]	INCREASE
						FEET (NAVD)		
ABERNETHY CREEK								
A	200	50	345	13.2	48.3	18.1	18.1	0.0
B	255	21	317	14.4	48.3	25.2	25.3	0.1
C	890	21	287	15.9	48.3	28.0	28.4	0.4
D	965	47	733	6.2	48.3	33.4	33.4	0.0
E	1,055	137	1,390	3.3	48.3	33.9	33.9	0.0
F	1,235	72	1,144	4.0	48.3	33.9	34.5	0.6
G	1,355	109	1,298	3.5	48.3	34.0	34.6	0.6
H	1,505	64	979	4.7	48.3	34.0	34.6	0.6
I	1,985	67	864	5.3	48.3	34.2	34.7	0.5
J	2,585	69	994	4.6	48.3	34.9	35.5	0.6
K	3,085	62	967	4.7	48.3	35.3	35.9	0.6
L	3,785	46	737	6.2	48.3	35.7	36.3	0.6
M	4,975	148	1,151	4.0	48.3	36.8	37.4	0.6
N	5,995	102	1,004	4.5	48.3	37.5	38.1	0.6
O	6,095	100	918	5.0	48.3	37.8	38.6	0.8
P	6,275	175	1,246	3.7	48.3	38.1	38.8	0.7
Q	8,015	441	2,609	1.7	48.3	38.9	39.6	0.7
R	9,375	316	1,664	2.4	48.3	39.2	39.9	0.7
S	11,215	48	553	7.2	48.3	40.6	41.2	0.6
T	11,695	128	1,039	3.8	48.3	43.7	44.4	0.7
U	12,165	84	714	5.6	48.3	44.0	44.7	0.7
V	12,595	78	906	4.4	48.3	45.4	46.0	0.6
W	12,785	68	866	4.6	48.3	45.7	46.3	0.6

[1] Stream distance in feet above confluence with Willamette River

[2] Water surface elevations computed without consideration of backwater effects from Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

ABERNETHY CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,369	71	246	10.6	391.3	391.3	391.3	0.0
B	2,317	66	241	10.8	441.8	441.8	441.8	0.0
C	4,588	64	295	8.8	555.2	555.2	555.3	0.1
D	4,686	74	431	6.1	558.3	558.3	558.4	0.1
E	5,827	70	246	10.6	587.1	587.1	587.1	0.0
F	6,063	57	229	11.4	596.5	596.5	596.5	0.0
G	7,200	64	237	11.0	621.4	621.4	621.4	0.0
H	8,298	74	313	8.3	645.8	645.8	645.9	0.1
I	8,566	145	589	4.4	649.4	649.4	649.5	0.1
J	9,579	102	393	6.6	659.2	659.2	659.7	0.5
K	10,904	106	318	8.2	672.5	672.5	672.8	0.3
L	11,905	79	353	7.4	683.3	683.3	684.3	1.0
M	12,224	80	400	6.5	687.1	687.1	687.9	0.8
N	14,069	63	276	9.5	708.1	708.1	708.7	0.6
O	14,387	81	353	7.4	712.4	712.4	712.7	0.3
P	15,461	111	354	7.4	729.7	729.7	730.1	0.4
Q	15,956	82	459	5.7	740.3	740.3	741.2	0.9
R	16,424	87	268	9.7	747.0	747.0	747.0	0.0
S	17,292	48	217	12.0	765.9	765.9	766.0	0.1
T	18,127	49	232	11.2	783.2	783.2	783.5	0.3
U	19,258	52	223	11.7	811.5	811.5	811.5	0.0
V	20,204	86	267	9.8	834.0	834.0	834.1	0.1

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CEDAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
CLACKAMAS RIVER								
A	1,320	530	16,747	6.6	47.8	44.5[2]	44.7[2]	0.2
B	2,534	470	12,161	9.1	47.8	44.7[2]	44.8[2]	0.1
C	3,590	541	12,753	8.6	47.8	44.9[2]	45.6[2]	0.7
D	4,171	380	9,137	12.1	47.8	44.9[2]	45.6[2]	0.7
E	5,170	530	11,102	9.9	47.7	46.6[2]	46.6[2]	0.0
F	6,280	370	8,030	13.7	47.7	47.0[2]	47.5[2]	0.5
G	6,550	380	7,987	13.8	47.7	47.5[2]	48.0[2]	0.5
H	7,290	360	6,891	16.0	49.9	49.9	50.2	0.3
I	7,760	475	11,825	9.3	55.6	55.6	55.6	0.0
J	8,030	420	13,492	8.2	58.1	58.1	58.3	0.2
K	9,080	950	24,885	4.4	59.3	59.3	59.6	0.3
L	10,240	810	14,963	7.4	59.5	59.5	59.7	0.2
M	11,140	650	13,279	8.3	59.9	59.9	60.3	0.4
N	12,090	620	11,468	9.6	60.1	60.1	60.9	0.8
O	12,990	820	13,395	8.2	61.5	61.5	62.1	0.6
P	13,940	635	11,652	9.4	63.1	63.1	63.1	0.0
Q	14,940	680	11,564	9.5	63.8	63.8	64.2	0.4
R	15,945	734	12,668	8.7	64.3	64.3	65.2	0.9
S	16,845	480	10,297	10.7	64.8	64.8	65.8	1.0
T	18,005	478	11,882	9.3	66.4	66.4	67.4	1.0
U	19,045	665	12,976	8.5	67.5	67.5	68.4	0.9
V	20,070	757	15,258	7.2	69.9	69.9	70.8	0.9
W	20,930	779	15,092	7.3	70.6	70.6	71.5	0.9
X	21,930	755	13,997	7.9	71.7	71.7	72.6	0.9
Y	23,010	719	14,058	7.8	73.9	73.9	74.9	1.0
Z	24,045	566	11,446	9.6	75.2	75.2	76.2	1.0

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations computed without consideration of backwater effects from Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

CLACKAMAS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
CLACKAMAS RIVER								
AA	25,095	608	10,271	10.7	77.2	77.2	77.9	0.7
AB	25,975	656	10,712	10.3	79.4	79.4	80.0	0.6
AC	27,015	819	12,481	8.8	81.1	81.1	82.1	1.0
AD	28,030	930	16,988	6.5	82.9	82.9	83.9	1.0
AE	29,660	1,210	17,420	6.3	84.3	84.3	85.3	1.0
AF	30,710	1,064	14,288	7.7	85.3[2]	85.3	86.3	1.0
AG	32,830	1,874	22,084	5.0	88.6[2]	88.6	89.6	1.0
AH	37,820	1,862	2,014	5.5	99.8[2]	92.1	92.9	0.8
AI	38,650	888	7,799	14.1	100.7[2]	92.6	93.2	0.6
AJ	40,110	553	9,207	11.9	102.9	101.0	101.0	0.0
AK	41,080	535	9,430	1l.7	104.0	102.8	103.2	0.4
AL	41,970	400	8,881	12.4	105.4	104.6	105.1	0.5
AM	42,820	330	10,359	10.6	108.2	107.6	108.1	0.5
AN	43,475	322	9,402	10.6	108.8	108.3	108.6	0.3
AO	44,215	318	7,713	12.9	109.0	108.6	109.0	0.4
AP	45,095	1,113	19,690	5.1	111.4	111.4	112.1	0.7
AQ	45,775	1,187	16,087	6.2	111.5	111.5	112.1	0.6
AR	46,480	1,280	17,377	5.7	112.6	112.6	113.5	0.9
AS	48,480	914	14,700	6.8	115.9	115.9	116.5	0.6
AT	49,850	692	8,877	1l.2	117.2	117.2	117.6	0.4
AU	50,050	573	8,600	11.6	117.7	117.7	118.1	0.4
AV	51,470	516	6,598	15.1	120.8	120.8	121.6	0.8
AW	52,895	1,260	15,157	6.6	127.1	127.1	127.9	0.8
AX	53,575	890	12,177	8.2	127.9	127.9	128.8	0.9
AY	55,735	816	10,723	9.3	130.6	130.6	131.4	0.8
AZ	57,305	503	7,081	14.1	131.9	131.9	132.9	1.0

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations based on consideration of levee

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

CLACKAMAS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
CLACKAMAS RIVER								
BA	58,130	538	8,367	11.9	136.7	136.7	137.3	0.6
BB	58,580	541	10,114	9.9	138.9	138.9	139.9	1.0
BC	59,160	683	10,273	9.7	139.0	139.0	139.9	0.9
BD	60,560	1,469	16,450	6.1	143.5	143.5	144.3	0.8
BE	62,200	1,431	14,922	6.7	146.0	146.0	147.0	1.0
BF	63,800	2,096	18,506	5.4	147.8	147.8	148.8	1.0
BG	65,700	1,061	7,475	12.0	149.5	149.5	149.9	0.4
BH	66,350	560	8,444	10.6	154.2	154.2	154.6	0.4
BI	68,350	620	7,721	11.6	158.6	158.6	159.3	0.7
BJ	69,925	403	5,548	16.1	162.6	162.6	163.5	0.9
BK	70,660	323	5,856	15.3	169.9	169.9	169.9	0.0
BL	73,110	833	11,463	7.8	175.9	175.9	176.4	0.5
BM	76,010	2,767	18,541	4.8	180.6[2]	180.5	181.4	0.9
BN	78,050	2,070	17,233	5.2	185.4[2]	183.1	183.6	0.5
BO	78,890	2,385	18,157	4.9	186.8[2]	184.2	184.8	0.6
BP	80,730	1,921	11,220	8.0	190.0[2]	187.6	188.0	0.4
BQ	82,250	1,643	16,165	5.5	194.0[2]	193.1	194.1	1.0
BR	83,220	1,668	15,092	5.9	195.5[2]	195.1	196.1	1.0
BS	84,270	949	8,766	10.2	196.4[2]	196.2	197.0	0.8
BT	86,000	917	12,184	7.3	201.4	201.4	202.4	1.0
BU	87,630	1,058	10,138	8.8	204.0	204.0	205.0	1.0
BV	88,910	1,082	9,665	9.3	207.8	207.8	208.6	0.8
BW	89,675	1,011	7,229	10.9	212.0	212.0	212.1	0.1
BX	90,395	1,083	15,160	5.2	216.8	216.8	217.6	0.8
BY	91,225	1,150	14,726	5.3	218.0	218.0	218.7	0.7
BZ	92,205	1,366	12,370	6.4	218.5	218.5	219.5	1.0

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations based on consideration of levee

Table 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

CLACKAMAS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
CLACKAMAS RIVER								
CA	93,715	1,227	10,985	7.2	222.5	222.5	222.7	0.2
CB	95,025	427	4,624	17.0	227.6	227.6	227.6	0.0
CC	96,355	1,150	13,263	5.9	236.8	236.8	237.1	0.3
CD	98,425	509	6,363	12.4	239.9	239.9	240.9	1.0
CE	101,285	600	7,220	10.9	250.3	250.3	250.9	0.6
CF	104,095	400	6,651	11.8	257.3	257.3	257.9	0.6
CG	105,545	500	7,577	10.4	260.5	260.5	261.5	1.0
CH	107,395	1,137	8,943	8.8	265.9	265.9	266.9	1.0
CI	108,595	579	6,389	12.3	268.9	268.9	269.7	0.8
CJ	109,475	803	9,631	8.2	273.0	273.0	273.3	0.3
CK	110,175	749	5,099	15.4	273.5	273.5	273.5	0.0
CL	111,095	1,136	9,255	8.5	280.0	280.0	280.2	0.2
CM	111,665	638	6,124	12.9	281.2	281.2	281.2	0.0
CN	112,445	698	7,598	10.4	284.7	284.7	285.3	0.6
CO	113,175	353	5,762	13.7	285.8	285.8	286.5	0.7
CP	114,125	215	3,845	20.5	287.1	287.1	287.5	0.4
CQ	115,095	695	9,735	8.1	295.1	295.1	295.4	0.3
CR	116,075	729	5,273	14.9	295.5	295.5	295.9	0.4
CS	117,295	259	4,189	18.8	302.0	302.0	302.6	0.6
CT	118,855	402	4,889	16.1	313.2	313.2	313.2	0.0
CU	119,695	278	6,338	12.4	319.3	319.3	319.6	0.3
CV	121,615	329	5,913	13.3	322.8	322.8	323.4	0.6

[1] Stream distance in feet above confluence with Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

CLACKAMAS RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	70	41	210	9.9	1,453.9	1,449.8	1,450.3	0.5
B	714	41	214	9.7	1,464.1	1,464.1	1,464.6	0.5
C	1,268	39	235	8.9	1,474.8	1,474.8	1,475.3	0.5
D	1,433	41	298	7.0	1,477.5	1,477.5	1,478.0	0.5
E	1,576	28	185	11.3	1,478.9	1,478.9	1,479.6	0.7
F	2,000	52	264	7.9	1,488.2	1,488.2	1,488.5	0.3
G	2,665	64	314	6.6	1,496.6	1,496.6	1,496.8	0.2
H	3,196	51	223	9.3	1,504.1	1,504.1	1,504.4	0.3
I	3,897	36	220	9.5	1,521.8	1,521.8	1,521.9	0.1
J	4,528	47	225	9.3	1,531.8	1,531.8	1,532.6	0.8
K	5,345	50	235	8.9	1,548.3	1,548.3	1,549.0	0.7
L	6,017	35	183	11.4	1,564.3	1,564.3	1,564.4	0.1
M	6,698	44	196	10.6	1,582.5	1,582.5	1,582.5	0.0
N	7,242	30	180	11.6	1,596.9	1,596.9	1,597.6	0.7
O	7,780	32	159	10.7	1,613.1	1,613.1	1,613.5	0.4
P	8,336	36	168	10.1	1,627.3	1,627.3	1,627.6	0.3
Q	8,453	63	292	5.8	1,631.7	1,631.7	1,631.7	0.0
R	8,547	50	255	6.7	1,632.3	1,632.3	1,632.4	0.1
S	9,130	53	219	7.8	1,640.2	1,640.2	1,640.3	0.1
T	9,647	38	210	8.1	1,645.4	1,645.4	1,645.8	0.4
U	10,028	48	243	7.0	1,648.9	1,648.9	1,649.6	0.7

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLEAR CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
V	10,117	43	271	6.3	1,650.1	1,650.1	1,650.7	0.6
W	10,189	96	444	3.8	1,651.0	1,651.0	1,651.4	0.4
X	10,692	39	219	7.8	1,655.9	1,655.9	1,656.7	0.8
Y	11,242	39	199	8.6	1,661.7	1,661.7	1,662.4	0.7
Z	11,628	43	192	8.9	1,668.3	1,668.3	1,668.5	0.2
AA	11,762	49	291	5.9	1,671.5	1,671.5	1,671.9	0.4
AB	11,881	31	175	9.7	1,671.9	1,671.9	1,672.4	0.5
AC	12,305	69	220	7.7	1,680.0	1,680.0	1,680.0	0.0
AD	12,814	73	222	7.7	1,688.4	1,688.4	1,689.4	1.0
AE	13,417	56	226	7.6	1,705.7	1,705.7	1,706.6	0.9
AF	13,988	38	175	9.8	1,717.8	1,717.8	1,718.4	0.6
AG	14,057	39	297	5.7	1,722.4	1,722.4	1,722.4	0.0
AH	14,089	63	400	4.3	1,722.7	1,722.7	1,722.7	0.0
AI	14,920	65	215	7.9	1,746.5	1,746.5	1,747.5	1.0
AJ	15,564	21	137	12.5	1,762.9	1,762.9	1,763.7	0.8
AK	16,263	23	127	13.4	1,790.7	1,790.7	1,790.8	0.1

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLEAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
DEER CREEK								
A	845	40	130	2.2	96.0	95.3[2]	96.3[2]	1.0
B	1,205	34	168	1.7	96.7	96.7[2]	97.1[2]	0.4
C	1,460	31	137	1.5	97.0	96.7[2]	97.2[2]	0.5
D	1,607	72	185	1.1	97.5	97.5[2]	97.9[2]	0.4
E	1,837	66	263	0.8	97.5	97.5	97.9	0.4
F	1,938	55	182	1.1	97.8	97.8	98.6	0.8
G	2,188	15	69	2.9	97.8	97.8	98.6	0.8
H	2,988	29	81	2.5	100.3	100.3	100.9	0.6

[1] Stream distance in feet above confluence with Mt. Scott Creek

[2] Water-surface elevations computed without consideration of backwater effects from Mt. Scott Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

DEER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
EAGLE CREEK								
A	2,225	387	1,350	8.5	210.4	209.9[2]	210.5[2]	0.6
B	2,825	187	1,172	9.8	215.5	215.5	215.5	0.0
C	3,195	135	1,168	9.8	219.7	219.7	219.7	0.0
D	3,895	161	1,166	9.9	222.9	222.9	223.9	1.0
E	4,870	449	2,974	3.9	228.6	228.6	229	0.4
F	5,695	191	914	12.6	233.4	233.4	234.4	1.0
G	6,045	256	1,634	7.0	237.3	237.3	237.7	0.4
H	6,745	241	1,631	7.0	240.6	240.6	241.6	1.0
I	7,495	317	2,012	5.7	245.1	245.1	246	0.9
J	8,445	163	1,113	10.3	250.3	250.3	251.2	0.9
K	9,170	255	1,387	8.3	256.1	256.1	256.3	0.2
L	9,770	225	1,603	7.2	260.2	260.2	261.2	1.0
M	11,370	183	915	12.6	270.5	270.5	270.5	0.0
N	12,320	102	906	12.7	278.1	278.1	279.1	1.0
O	12,845	235	2,180	5.3	284.3	284.3	284.4	0.1
P	13,720	215	1,048	11.0	287.5	287.5	287.5	0.0
Q	14,720	295	1,807	6.4	294.9	294.9	295.8	0.9
R	15,420	202	2,135	5.4	300.7	300.7	300.7	0.0
S	16,030	131	1,032	11.1	301.6	301.6	302.2	0.6
T	16,660	107	1,153	10.0	306.5	306.5	306.8	0.3

[1] Stream distance in feet above confluence with Clackamas River

[2] Water-surface elevations computed without consideration of backwater effects from Clackamas River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

EAGLE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
JOHNSON CREEK								
A	554	31	735	3.9	35.8[2]	34.6	34.7	0.1
B	840	38	825	3.5	35.8[2]	34.6	34.8	0.2
C	2,344	82	964	3.0	35.8[2]	34.8	35.6	0.8
D	2,809	80	757	3.8	35.8[2]	34.9	35.6	0.7
E	3,200	80	617	4.5	35.8[2]	35.1	35.8	0.7
F	3,633	45	412	6.8	35.8[2]	35.6	36.4	0.8
G	3,828	79	481	5.8	36.1	36.1	36.8	0.7
H	4,483	56	416	6.7	38.8	38.8	39.4	0.6
I	4,842	62	391	7.1	39.5	39.5	40.3	0.8
J	5,085	48	288	9.7	40.3	40.3	40.9	0.6
K	5,945	67	348	8.0	45.7	45.7	45.9	0.2
L	16,796	55[3]	425	6.6	106.9	106.9	107.2	0.3
M	17,276	205	1,023	2.7	108.1	108.1	108.9	0.8
N	17,767	54	295	9.5	109.5	109.5	110.2	0.7
O	18,274	74	400	7.0	113.1	113.1	113.5	0.4
P	18,834	39	234	12.0	116.2	116.2	116.2	0.0
Q	19,298	75	459	6.1	119.3	119.3	120.3	1.0
R	19,869	48	404	8.6	123.4	123.4	124.0	0.6
S	20,511	122	422	6.6	128.7	128.7	128.8	0.1
T	20,697	50	868	3.2	136.1	136.1	137.0	0.9
U	21,622	102	645	4.3	136.6	136.6	137.4	0.8
V	22,699	264	557	5.0	142.9	142.9	143.5	0.6
W	22,938	111	354	7.8	147.4	147.4	147.4	0.0
X	23,399	57	519	5.3	151.3	151.3	151.8	0.5
Y	24,008	74	268	10.3	152.4	152.4	152.6	0.2
Z	24,360	125	383	7.2	155.4	155.4	155.9	0.5

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations computed without consideration of backwater effects from Willamette River

[3] Floodway located entirely outside county limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

JOHNSON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
JOHNSON CREEK								
AA	24,851	122	424	6.5	159.0	159.0	159.9	0.9
AB	25,308	70	318	8.7	162.7	162.7	163.1	0.4
AC	25,487	93	637	4.9	164.8	164.8	165.7	0.9
AD	25,764	101	330	8.4	166.2	166.2	166.4	0.2
AE	26,374	68	392	7.1	170.9	170.9	171.5	0.6
AF	26,935	51	281	9.9	173.7	173.7	173.8	0.1
AG	27,414	54	256	10.8	176.5	176.5	176.6	0.1
AH	28,567	40	220	13.5	187.1	187.1	187.1	0.0
AI	109,032	200[2]	451	2.2	446.0	446.0	447.0	1.0
AJ	109,138	258[2]	1,669	0.6	450.4	450.4	451.2	0.8
AK	117,274	29/14[3]	90	6.4	497.8	497.8	498.4	0.6

[1] Stream distance in feet above confluence with Willamette River

[2] Floodway lacated entirely outside county limits

[3] Width/width within corporate limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

JOHNSON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
KELLOGG CREEK								
A	370	25	381	5.2	36.3	35.3[2]	36.3[2]	1.0
B	1,795	130	2,904	0.7	36.3	35.8[2]	36.7[2]	0.9
C	2,530	130	2,509	0.8	36.1	35.8[2]	36.7[2]	0.9
D	3,915	140	1,878	1.1	36.1	35.8[2]	36.7[2]	0.9
E	4,971	156	1,547	1.3	36.1	35.9[2]	36.9[2]	1.0
F	5,636	98	557	3.6	36.1	35.9[2]	36.9[2]	1.0
G	6,194	80	296	6.7	37.3	37.3	37.7	0.4
H	6,882	77	293	6.8	41.3	41.3	41.3	0.0
I	7,762	70	321	6.2	44.9	44.9	45.1	0.2
J	8,682	62	298	6.7	48.6	48.6	48.8	0.2
K	9,402	41	331	6.0	54.2	54.2	54.2	0.0
L	9,997	60	325	5.5	55.3	55.3	55.4	0.1
M	10,632	59	336	5.3	56.4	56.4	56.7	0.3
N	10,822	60	322	5.6	56.8	56.8	57.0	0.2
O	11,082	40	296	1.3	57.2	57.2	57.9	0.7
P	12,500	30	119	4.6	63.7	63.7	64.5	0.8
Q	12,687	42	184	3.0	64.5	64.5	65.4	0.9
R	13,125	16	62	9.0	67.5	67.5	67.7	0.2
S	13,399	35	167	3.3	69.1	69.1	69.9	0.8
T	13,622	35	159	3.0	69.5	69.5	70.3	0.8
U	13,769	20	90	5.4	70.6	70.6	71.6	1.0
V	14,605	53	276	1.8	75.3	75.3	76.3	1.0
W	14,738	70	726	0.7	87.5	87.5	88.0	0.5
X	17,100	46	108	3.3	94.7	94.7	95.3	0.6
Y	17,201	110	290	1.2	96.2	96.2	96.2	0.0
Z	17,844	121	186	1.9	97.0	97.0	97.1	0.1

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations computed without consideration of backwater effects from Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

KELLOGG CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
KELLOGG CREEK								
AA	18,184	13	39	9.2	100.4	100.4	100.4	0.0
AB	18,740	37	86	4.2	104.4	104.4	104.8	0.4
AC	18,888	40	131	2.7	105.2	105.2	105.8	0.6
AD	19,380	55	199	1.8	106.9	106.9	106.9	0.0
AE	19,516	58	125	1.8	107.0	107.0	107.0	0.0
AF	19,711	97	424	0.5	107.0	107.0	107.1	0.1
AG	21,054	13	57	4.0	109.0	109.0	109.8	0.8
AH	21,492	223	557	0.4	109.3	109.3	110.1	0.8
AI	22,569	289	670	0.3	109.5	109.5	110.2	0.7
AJ	23,407	39	168	0.8	112.3	112.3	112.5	0.2

[1] Stream distance in feet above confluence with Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

KELLOGG CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
MILK CREEK								
A	4,275	737	3,003	4.7	155.1	155.1	155.1	0.0
B	5,405	642	4,658	3.0	157.3	157.3	157.9	0.6
C	6,060	970	4,648	3.0	158.0	158.0	158.7	0.7
D	6,170	1,050	5,713	2.5	158.1	158.1	159.0	0.9
E	8,065	750	2,759	5.1	160.1	160.1	160.7	0.6
F	8,395	715	3,734	3.7	162.9	162.9	163.2	0.3
G	10,475	548	4,353	3.2	164.7	164.7	165.4	0.7
H	10,990	224	2,277	6.1	165.2	165.2	165.8	0.6
I	12,970	227	1,722	8.1	170.0	170.0	170.9	0.9
J	14,870	336	2,178	6.4	177.2	177.2	178.1	0.9
K	16,780	144	1,854	7.5	182.4	182.4	183.2	0.8
L	17,980	156	2,076	6.7	185.0	185.0	186.0	1.0
M	20,350	486	3,397	4.1	189.2	189.2	190.1	0.9
N	21,300	516	3,386	4.1	190.5	190.5	191.3	0.8
O	24,475	329	1,937	7.2	196.1	196.1	196.8	0.7
P	28,585	220	2,343	6.0	205.5	205.5	206.1	0.6
Q	30,825	496	5,613	2.5	207.7	207.7	208.5	0.8
R	32,105	565	5,378	2.6	208.3	208.3	209.1	0.8
S	32,615	503	3,855	3.6	209.3	209.3	209.3	0.0
T	34,275	388	3,185	3.7	210.6	210.6	211.0	0.4
U	38,045	584	5,595	2.5	212.8	212.8	213.5	0.7
V	39,565	438	4,645	2.5	213.4	213.4	214.1	0.7
W	40,265	495	5,306	2.1	214.2	214.2	215.0	0.8
X	42,120	639	4,540	2.5	215.5	215.5	216.1	0.6
Y	43,385	250	1,560	7.3	216.5	216.5	217.2	0.7
Z	44,195	730	3,795	3.0	220.3	220.3	221.1	0.8

[1] Stream distance in feet above confluence with Molalla River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

MILK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
MILK CREEK								
AA	44,835	782	4,717	2.4	222.6	222.6	223.1	0.5
AB	47,445	627	2,391	4.8	225.9	225.9	226.6	0.7
AC	49,355	117	1,369	8.3	232.1	232.1	233.1	1.0
AD	51,055	143	1,367	8.3	237.8	237.8	238.5	0.7
AE	51,685	231	2,064	5.5	245.4	245.4	245.4	0.0
AF	52,345	338	3,399	3.4	246.5	246.5	246.6	0.1
AG	53,455	625	3,537	3.2	247.3	247.3	247.3	0.0
AH	55,685	261	1,295	8.8	249.0	249.0	250.0	1.0
AI	56,985	440	2,865	4.0	253.5	253.5	254.0	0.5
AJ	57,145	490	2,785	4.1	254.3	254.3	254.4	0.1
AK	59,095	850	3,998	2.7	256.3	256.3	256.8	0.5
AL	59,335	792	3,163	3.4	256.5	256.5	257.1	0.6
AM	61,805	379	1,275	8.3	262.8	262.8	262.8	0.0
AN	63,085	424	2,502	4.2	268.2	268.2	268.8	0.6
AO	63,720	289	1,725	6.1	269.6	269.6	270.3	0.7
AP	65,510	550	1,656	6.4	275.6	275.6	276.2	0.6
AQ	65,845	500	2,509	4.2	277.6	277.6	278.3	0.7
AR	67,225	580	3,374	3.1	281.4	281.4	281.6	0.2
AS	67,955	132	1,100	9.6	281.9	281.9	282.2	0.3
AT	70,255	400	1,848	5.7	291.6	291.6	292.5	0.9
AU	71,695	109	942	11. 2	298.7	298.7	299.0	0.3
AV	73,455	791	3,491	3.0	306.9	306.9	307.2	0.3
AW	75,165	308	2,135	5.0	310.8	310.8	310.8	0.0
AX	77,065	273	1,796	5.9	317.1	317.1	318.0	0.9

[1] Stream distance in feet above confluence with Molalla River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

MILK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET (NAVD))	WITH FLOODWAY (FEET (NAVD))	INCREASE
MOLALLA RIVER								
A	4,180	3,215	32,501	2.2	91.1	81.2[2]	82.1[2]	0.9
B	6,760	2,300	19,881	3.7	91.1	82.8[2]	83.8[2]	1.0
C	8,400	1,480	11,012	3.9	91.1	84.8[2]	85.8[2]	1.0
D	9,520	1,447	6,935	6.2	91.1	85.4[2]	86.4[2]	1.0
E	11,380	1,263	6,311	6.8	91.2	91.2	91.2	0.0
F	13,580	1,300	12,974	3.3	95.4	95.4	96.1	0.7
G	14,120	1,345	14,061	3.0	97.7	97.7	98.5	0.8
H	16,320	1,520	16,396	2.6	98.9	98.9	99.9	1.0
I	18,180	838	8,226	5.2	100.0	100.0	101.0	1.0
J	19,790	570	5,660	7.6	102.0	102.0	102.9	0.9
K	21,670	1,530	7,832	5.5	106.8	106.8	107.3	0.5
L	24,530	1,470	13,811	3.1	109.7	109.7	110.6	0.9
M	26,310	1,075	7,610	5.6	111.3	111.3	112.0	0.7
N	28,210	2,345	11,888	3.6	115.8	115.8	116.8	1.0
O	30,110	1,520	10,159	4.2	120.2	120.2	121.2	1.0
P	31,470	825	6,139	6.7	122.3	122.3	122.9	0.6
Q	34,240	1,800	12,595	3.3	129.2	129.2	129.2	0.0
R	35,420	2,480	17,606	2.3	129.7	129.7	129.9	0.2
S	37,700	2,448	14,420	2.9	130.7	130.7	131.2	0.5
T	39,660	2,250	10,128	4.1	135.3	135.3	136.3	1.0
U	42,300	1,670	8,404	3.9	143.4	143.4	143.7	0.3
V	44,540	830	6,243	5.3	148.8	148.8	149.6	0.8
W	46,540	590	4,924	6.7	154.3	154.3	155.1	0.8
X	48,620	455	3,480	9.5	161.5	161.5	162.3	0.8
Y	49,980	400	3,762	8.8	167.8	167.8	168.8	1.0
Z	51,300	480	4,856	6.8	173.2	173.2	174.1	0.9

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations computed without consideration of backwater effects from Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

MOLALLA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
MOLALLA RIVER								
AA	51,830	413	5,590	5.9	177.4	177.4	177.9	0.5
AB	53,830	435	5,182	6.4	180.1	180.1	180.9	0.8
AC	55,750	420	2,763	11.9	184.3	184.3	184.8	0.5
AD	57,950	546	5,400	6.1	194.2	194.2	194.9	0.7
AE	59,150	210	2,630	12.5	197.1	197.1	198.1	1.0
AF	61,510	460	5,267	6.3	205.4	205.4	206.1	0.7
AG	62,210	430	4,223	7.8	206.6	206.6	207.4	0.8
AH	64,010	519	5,137	6.4	210.9	210.9	211.8	0.9
AI	65,935	714	7,843	4.2	213.5	213.5	214.4	0.9
AJ	68,015	468	2,602	12.7	221.9	221.9	221.9	0.0
AK	70,155	665	5,339	6.2	232.1	232.1	232.8	0.7
AL	73,155	477	3,765	8.8	239.7	239.7	240.3	0.6
AM	74,055	572	5,230	6.3	243.3	243.3	243.6	0.3
AN	76,405	781	4,305	7.7	249.7	249.7	250.2	0.5
AO	79,255	182	2,529	13.0	266.5	266.5	267.5	1.0
AP	80,605	1,840	18,603	1.8	271.4	271.4	271.9	0.5
AQ	81,605	1,908	13,299	2.5	271.6	271.6	272.1	0.5
AR	82,980	1,655	5,087	6.5	273.5	273.5	274.3	0.8
AS	84,780	1640	8,579	3.8	281.1	281.1	282.0	0.9
AT	87,130	1355	5,369	6.1	287.3	287.3	287.8	0.5
AU	88,155	956	7,644	4.3	290.8	290.8	291.4	0.6
AV	90,355	1008	5,913	5.6	298.6	298.6	299.6	1.0
AW	91,655	579	5,311	6.2	303.6	303.6	304.5	0.9
AX	93,355	537	5,041	6.5	307.9	307.9	308.8	0.9
AY	94,675	554	6,065	5.4	310.7	310.7	311.6	0.9
AZ	95,750	796	3,932	8.4	313.0	313.0	313.9	0.9

[1] Stream distance in feet above confluence with Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

MOLALLA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
MOLALLA RIVER								
BA	97,875	810	4,518	7.3	324.8	324.8	325.8	1.0
BB	98,850	528	6,309	5.2	330.2	330.2	330.9	0.7
BC	99,850	583	5,662	5.8	331.5	331.5	332.2	0.7
BD	100,830	850	5,077	6.5	335.9	335.9	336.6	0.7
BE	101,890	885	4,351	7.6	341.9	341.9	342.1	0.2
BF	103,640	524	4,189	7.9	350.5	350.5	351.3	0.8
BG	105,090	418	3,846	8.6	357.2	357.2	357.8	0.6
BH	106,690	520	2,688	12.3	366.0	366.0	366.0	0.0
BI	108,365	829	6,072	5.4	376.8	376.8	377.6	0.8
BJ	108,790	836	6,830	4.8	381.3	381.3	382.2	0.9
BK	110,340	370[2]	3,799	8.7	384.5	384.5	385.5	1.0
BL	111,465	1,472	4,785	6.9	389.7	389.7	390.5	0.8
BM	112,540	1,120	5,832	5.7	396.2	396.2	396.8	0.6
BN	114,415	1,127	7,495	4.4	403.9	403.9	404.6	0.7
BO	116,215	908	5,171	6.4	412.1	412.1	412.6	0.5
BP	117,915	933	11,408	2.9	422.9	422.9	423.9	1.0
BQ	119,365	290	2,338	14.1	426.4	426.4	426.8	0.4

[1] Stream distance in feet above confluence with Willamette River

[2] Values calculated from original model prior redelineation

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

MOLALLA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
MT. SCOTT CREEK								
A	660	27	136	10.6	57.7	57.7	58.1	0.4
B	1,970	43	222	5.4	62.9	62.9	63.8	0.9
C	3,800	117	450	3.2	69.9	69.9	70.6	0.7
D	5,983	79	496	2.6	77.3	77.3	78.2	0.9
E	7,983	113	367	3.6	81.1	81.1	81.9	0.8
F	10,853	423	685	1.9	89.9	89.9	90.3	0.4
G	12,899	12	78	4.8	97.0	97.0	97.3	0.3
H	14,500	18	85	5.7	103.6	103.6	104.1	0.5
I	15,020	34	122	3.9	106.4	106.4	106.5	0.1
J	16,120	21	64	7.5	111.1	111.1	111.8	0.7
K	16,730	37	207	2.3	123.7	123.7	123.7	0.0
L	17,150	30	59	8.1	143.5	143.5	143.5	0.0

[1] Stream distance in feet above confluence with Kellog Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

MT. SCOTT CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
OSWEGO CANAL								
A	697	125	901	6.3	106.3	106.3	106.3	0.0
B	731	126	934	6.1	106.6	106.6	106.6	0.0
C	1365	74	591	10.2	108.2	108.2	108.2	0.0
D	1540	75	653	9.4	109.1	109.1	109.2	0.1
E	2073	67	697	9.0	110.9	110.9	110.9	0.0
F	2280	64	695	9.1	111.3	111.3	111.3	0.0
G	2820	95	1007	7.3	112.3	112.3	112.9	0.6
H	3180	88	975	7.2	112.9	112.9	113.4	0.5
I	3498	90	1037	6.6	113.3	113.3	113.8	0.5
J	3977	156	824	8.6	115.5	115.5	115.9	0.4
K	4020	155	1354	6.6	116.6	116.6	116.7	0.1
L	4391	92	916	7.8	116.8	116.8	116.9	0.1
M	4562	97	1042	6.7	117.4	117.4	117.6	0.2
N	4912	105	1116	6.1	118.5	118.5	118.8	0.3
O	5443	238	2047	3.2	119.4	119.4	120.0	0.6
P	5707	347	2696	2.7	119.5	119.5	120.4	0.9
Q	5950	373	2796	2.0	119.7	119.7	120.5	0.8
R	6482	391	2557	2.7	120.1	120.1	120.9	0.8
S	7207	84	897	3.2	121.0	121.0	121.8	0.8
T	7465	84	900	3.2	121.6	121.6	122.6	1.0
U	7747	80	995	2.8	121.8	121.8	122.8	1.0
V	8533	56	839	3.5	122.5	122.5	123.3	0.8

[1] Stream distance in feet above Lake Oswego

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
PHILLIPS CREEK								
A	140	17	42	7.4	92.8	92.8	92.8	0.0
B	440	84	69	4.5	96.4	96.4	96.4	0.0
C	670	14	50	6.2	96.7	96.7	97.7	1.0
D	820	16	56	5.5	99.6	99.6	100.5	0.9
E	1,440	33	46	6.8	113.3	113.3	113.3	0.0
F	2,130	13	34	9.2	132.7	132.7	132.7	0.0
G	2,590	14	22	8.9	142.7	142.7	142.7	0.0
H	2,745	28	39	7.5	146.9	146.9	146.9	0.0
I	3,255	19	60	5.2	153.2	153.2	153.2	0.0
J	3,555	47	86	2.5	154.2	154.2	154.2	0.0
K	4,125	32	63	3.8	156.8	156.8	156.8	0.0
L	4,410	29	80	3.9	157.8	157.8	157.8	0.0
M	5,100	39	59	5.3	161.7	161.7	161.7	0.0
N	5,850	38	86	3.6	168.0	168.0	168.0	0.0
O	6,460	23	40	5.9	171.6	171.6	171.6	0.0
P	6,560	11	50	6.2	173.2	173.2	173.2	0.0

[1] Stream distance in feet above confluence with Mt. Scott Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
PUDDING RIVER								
A	15,840	1,182	7,657	4.2	96.9	89.7[3]	90.5[3]	0.8
B	25,340	2,163/2,060[2]	10,346	3.1	98.6	96.6[3]	97.6[3]	1.0
C	40,120	598/220[2]	6,645	4.5	102.2	102.2	103.1	0.9
D	42,760	438/190[2]	6,530	4.6	104.7	104.7	105.7	1.0

[1] Stream distance in feet above confluence with Molalla River

[2] Width/width within study area

[3] Water-surface elevations computed without consideration of backwater effects from Molalla River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

PUDDING RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD)			
Richardson Creek								
A	407	83	422	1.6	116.0	106.5[2]	107.3[2]	0.8
B	857	70	337	2.0	116.0	106.9[2]	107.7[2]	0.8
C	1,839	103	137	5.0	116.8	116.8	116.8	0.0
D	2,217	13	130	5.2	130.2	130.2	130.0	0.0
E	2,636	18	64	10.6	139.3	139.3	140.3	1.0
F	3,383	27	116	5.9	159.5	159.5	160.5	1.0
G	4,233	29	67	8.6	199.4	199.4	199.3	0.0
H	4,972	32	89	6.4	220.9	220.9	221.9	1.0
I	5,747	20	61	9.4	243.6	243.6	243.6	0.0
J	6,669	20	86	6.7	266.7	266.7	267.2	0.5
K	7,318	22	61	9.4	290.5	290.5	290.6	0.1
L	7,960	18	62	6.1	309.0	309.0	309.4	0.4
M	8,675	18	43	8.8	331.8	331.8	331.8	0.0
N	8,992	31	61	6.2	353.4	353.4	353.7	0.3
O	9,657	18	57	6.6	369.7	369.7	369.6	0.0
p	10,356	17	47	7.9	392.2	392.2	392.5	0.3
Q	11,099	12	20	7.3	424.5	424.5	424.5	0.0
R	11,254	20	122	1.2	434.2	434.2	434.3	0.1
S	11,802	12	20	7.3	453.1	453.1	453.2	0.1
T	12,352	16	27	5.5	474.9	474.9	475.3	0.4
U	12,876	8	14	7.0	492.5	492.5	492.6	0.1
V	12,931	8	13	7.4	494.7	494.7	494.7	0.0
W	13,301	14	22	4.5	506.7	506.7	507.0	0.3
X	14,022	20	20	4.9	527.9	527.9	528.0	0.1
Y	14,339	11	19	5.1	537.9	537.9	538.3	0.4
Z	15,110	11	15	6.4	565.2	565.2	565.2	0.0

[1] Stream distance in feet above confluence with Clackamas River

[2] Water-surface elevation computed without consideration of backwater effects from Clackamas River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

RICHARDSON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
Richardson Creek								
AA	15,188	10	30	3.4	568.1	568.1	569.1	1.0
AB	15,511	13	75	1.3	589.9	589.9	590.8	0.9

[1] Stream distance in feet above confluence with Clackamas River

[2] Water-surface elevation computed without consideration of backwater effects from Clackamas River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

RICHARDSON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
Richardson Creek - Anderson Road Tributary								
A	673	15	39	3.2	328.3	328.3	328.6	0.3
B	956	9	16	7.8	345.8	345.8	345.7	0.0
C	1,426	9	16	7.7	360.0	360.0	359.9	0.0
D	2,138	23	28	4.5	387.6	387.6	387.8	0.2
E	2,732	14	13	5.4	414.0	414.0	413.9	0.0
F	3,004	11	12	5.8	451.6	451.6	451.6	0.0
G	3,324	9	11	5.9	502.2	502.2	502.3	0.1
H	3,798	14	25	2.7	509.5	509.5	509.7	0.2
I	3,913	6	20	3.3	511.3	511.3	511.8	0.5
J	4,315	15	60	1.5	516.8	516.8	517.0	0.2
K	4,649	12	30	2.3	516.8	516.8	517.6	0.8
L	4,851	9	32	2.1	520.4	520.4	520.7	0.3
M	5,276	9	11	6.3	524.1	524.1	524.1	0.0
N	5,694	15	24	2.8	531.5	531.5	531.6	0.1
O	5,742	15	55	1.2	533.3	533.3	534.2	0.9

[1] Stream distance in feet above confluence with Richardson Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

RICHARDSON CREEK - ANDERSON ROAD TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
Richardson Creek - Keller Road Tributary								
A	380	6	9	7.2	211.7	211.7	211.7	0.0
B	743	6	23	2.8	275.3	275.3	275.5	0.2
C	1,000	28	15	4.2	294.8	294.8	294.8	0.0
D	1,773	18	16	4.0	330.1	330.1	330.2	0.1
E	2,523	13	11	2.8	367.3	367.3	367.5	0.2
F	2,712	12	7	4.4	374.2	374.2	374.2	0.0
G	2,839	7	18	1.7	377.5	377.5	378.2	0.7

[1] Stream distance in feet above confluence with Richardson Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

RICHARDSON CREEK - KELLER ROAD TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD)			
Richardson Creek - Royer Road Tributary								
A	730	12	20	6.9	419.6	419.6	419.8	0.2
B	1,529	10	23	6.0	447.8	447.8	448.1	0.3

[1] Stream distance in feet above confluence with Richardson Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

RICHARDSON CREEK - ROYER ROAD TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
Rock Creek								
A	351	47	212	7.3	94.0	84.0[2]	84.2	0.2
B	833	44	195	8.0	94.0	91.1[2]	91.3	0.2
C	1,606	31	168	7.8	103.0	103.0	103.6	0.6
D	1,906	29	154	8.5	108.4	108.4	108.9	0.5
E	2,138	27	185	7.1	111.4	111.4	112.3	0.9
F	2,201	25	167	7.8	112.2	112.2	113.1	0.9
G	2,975	30	167	7.9	123.0	123.0	123.4	0.4
H	3,594	18	105	12.5	134.9	134.9	134.8	0.0
I	4,091	37	270	4.9	141.9	141.9	142.9	1.0
J	4,957	34	123	10.7	152.1	152.1	152.4	0.3
K	5,479	3	215	6.1	160.9	160.9	161.6	0.7
L	6,548	22	107	12.3	200.7	200.7	201.1	0.4
M	7,560	36	189	6.9	219.8	219.8	220.6	0.8
N	7,925	35	161	8.2	225.4	225.4	225.9	0.5
O	8,495	35	162	7.1	235.9	235.9	236.8	0.9
p	9,346	40	162	7.1	248.1	248.1	249.0	0.9
Q	9,995	34	146	7.8	258.2	258.2	259.1	0.9
R	10,369	26	139	8.3	264.7	264.7	265.2	0.5
S	10,559	54	258	4.4	268.8	268.8	269.1	0.3
T	10,837	40	250	4.6	273.9	273.9	274.5	0.6
U	11,116	33	181	6.3	275.9	275.9	276.5	0.6
V	11,792	37	168	6.8	283.5	283.5	284.2	0.7
W	12,302	41	195	5.9	289.3	289.3	289.8	0.5
X	12,654	36	182	6.3	291.9	291.9	292.8	0.9
Y	12,882	46	240	4.0	295.6	295.6	295.6	0.0
Z	13,075	32	171	5.7	297.2	297.2	297.2	0.0

[1] Stream distance in feet above confluence with Clackamas River

[2] Water-surface elevation computed without consideration of backwater effects from Clackamas River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
Rock Creek								
AA	13,562	32	143	6.8	300.9	300.9	301.4	0.5
AB	13,976	28	142	6.0	304.9	304.9	305.8	0.9
AC	14,210	27	119	7.1	307.0	307.0	307.3	0.3
AD	14,581	19	160	5.3	309.7	309.7	310.1	0.4
AE	14,742	19	155	5.5	310.2	310.2	311.0	0.8
AF	15,092	48	312	2.7	311.3	311.3	312.0	0.7
AG	15,571	54	286	3.0	312.0	312.0	313.0	1.0
AH	16,083	54	216	3.9	313.1	313.1	313.8	0.7
AI	16,137	42	202	4.2	313.5	313.5	314.2	0.7
AJ	16,571	42	250	3.4	314.4	314.4	315.2	0.8
AK	17,039	17	81	4.8	315.2	315.2	316.1	0.9
AL	17,829	19	90	4.4	320.7	320.7	321.3	0.6
AM	18,486	20	77	5.1	325.2	325.2	326.1	0.9
AN	18,942	24	76	5.2	331.6	331.6	331.8	0.2
AO	19,035	23	105	3.7	335.0	335.0	335.1	0.1
AP	19,294	26	70	5.6	337.4	337.4	337.6	0.2
AQ	19,441	27	80	4.9	340.8	340.8	340.9	0.1
AR	19,922	19	87	4.5	349.0	349.0	349.5	0.5
AS	20,035	20	71	5.5	349.4	349.4	350.1	0.7
AT	20,411	20	104	3.8	357.8	357.8	358.6	0.8
AU	20,535	19	81	4.9	358.4	358.4	359.1	0.7
AV	20,733	16	86	4.6	361.0	361.0	361.9	0.9
AW	21,072	20	87	4.5	364.6	364.6	365.1	0.5
AX	21,643	29	116	3.4	369.3	369.3	369.8	0.5
AY	22,146	29	82	4.8	374.1	374.1	374.4	0.3
AZ	22,225	35	194	2.0	377.1	377.1	378.1	1.0

[1] Stream distance in feet above confluence with Clackamas River

[2] Water-surface elevation computed without consideration of backwater effects from Clackamas River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
Rock Creek								
BA	22,778	26	121	3.3	379.5	379.5	379.9	0.4
BB	23,024	17	99	4.0	382.3	382.3	382.7	0.4
BC	23,421	48	237	1.3	385.9	385.9	386.3	0.4
BD	23,837	15	38	7.9	386.6	386.6	386.7	0.1
BE	24,264	25	101	3.0	392.8	392.8	393.2	0.4
BF	24,837	27	73	4.2	397.8	397.8	398.0	0.2
BG	25,179	45	109	2.8	402.1	402.1	402.1	0.0
BH	25,937	45	94	3.2	407.5	407.5	408.3	0.8
BI	26,646	21	90	3.4	415.2	415.2	415.7	0.5
BJ	26,718	29	227	1.3	418.6	418.6	419.6	1.0
BK	26,954	34	145	2.1	418.8	418.8	419.8	1.0
BL	27,465	14	35	8.6	428.7	428.7	428.7	0.0
BM	27,941	12	58	5.3	442.7	442.7	442.9	0.2
BN	28,174	29	66	5.7	447.6	447.6	448.2	0.6
BO	28,311	22	79	3.8	453.2	453.2	453.9	0.7

[1] Stream distance in feet above confluence with Clackamas River

[2] Water-surface elevation computed without consideration of backwater effects from Clackamas River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
Rock Creek - Hemrick Road Tributary								
A	90	17	116	3.0	314.6	314.6	315.4	0.8
B	607	24	106	3.3	315.4	315.4	316.3	0.9
C	686	47	203	1.7	318.0	318.0	318.9	0.9
D	896	23	141	2.5	318.2	318.2	319.1	0.9
E	1,079	38	145	2.4	319.5	319.5	320.4	0.9
F	1,676	25	64	5.4	322.0	322.0	322.3	0.3
G	1,914	32	103	3.4	323.6	323.6	324.3	0.7
H	2,292	12	67	5.6	331.3	331.3	331.7	0.4
I	2,534	61	214	1.6	331.7	331.7	332.6	0.9
J	2,799	34	90	3.2	331.7	331.7	332.7	1.0
K	3,515	57	165	1.7	333.4	333.4	333.9	0.5
L	4,029	40	46	6.1	335.4	335.4	335.4	0.0
M	4,480	12	59	2.2	343.2	343.2	344.0	0.8
N	4,829	21	78	1.7	343.8	343.8	344.6	0.8
O	5,136	13	19	6.9	346.8	346.8	346.9	0.1
P	5,295	13	69	1.9	352.1	352.1	352.5	0.4
Q	5,897	19	41	3.2	354.1	354.1	355.0	0.9
R	6,414	14	51	2.6	358.3	358.3	358.7	0.4
S	6,654	24	54	2.4	359.4	359.4	360.1	0.7
T	7,019	14	26	5.0	365.0	365.0	364.8	0.0
U	7,126	150	534	0.3	374.8	374.8	374.8	0.0
V	7,409	61	201	0.7	374.8	374.8	374.8	0.0
W	8,059	22	23	5.8	376.8	376.8	376.8	0.0
X	8,279	9	40	3.3	381.8	381.8	382.6	0.8
Y	8,810	19	40	3.3	388.4	388.4	389.4	1.0
Z	9,080	4	49	2.7	407.1	407.1	407.4	0.3

[1] Stream distance in feet above confluence with Rock Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK - HEMRICK ROAD TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD)			
Rock Creek - Highway 224 Tributary								
A	274	4	14	10.4	105.7	105.7	105.9	0.2
B	916	7	31	4.7	139.2	139.2	140.2	1.0
C	1,310	6	22	6.8	151.6	151.6	152.5	0.9
D	1,647	5	16	10.2	166.9	166.9	166.9	0.0
E	1,801	18	167	0.9	180.0	180.0	180.0	0.0
F	2,443	8	18	8.3	185.8	185.8	185.8	0.0
G	3,295	17	55	2.7	198.6	198.6	198.7	0.1
H	3,488	34	214	0.7	213.3	213.3	213.8	0.5

[1] Stream distance in feet above confluence with Rock Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK - HIGHWAY 224 TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD)			
Rock Creek - North Golf Course Tributary								
A	148	9	13	6.8	304.3	304.3	304.4	0.1
B	504	55	147	0.6	326.5	326.5	326.5	0.0
C	636	13	14	6.0	327.7	327.7	327.7	0.0
D	821	108	556	0.2	339.3	339.3	339.6	0.3
E	1,055	98	389	0.2	343.4	343.4	343.6	0.2
F	1,185	50	173	0.5	343.4	343.4	343.6	0.2
G	1,563	92	539	0.2	354.8	354.8	354.9	0.1
H	1,810	74	314	0.3	354.8	354.8	354.9	0.1
I	1,908	120	589	0.1	360.9	360.9	360.8	0.0
J	2,536	30	107	0.8	370.5	370.5	371.0	0.5
K	2,865	13	81	1.0	381.4	381.4	381.7	0.3

[1] Stream distance in feet above confluence with Rock Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK - NORTH GOLF COURSE TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD)			
Rock Creek - South Golf Course Tributary								
A	232	9	7	5.2	298.3	298.3	298.4	0.1
B	547	20	9	3.9	325.6	325.6	325.9	0.3
C	677	20	16	2.3	334.1	334.1	334.3	0.2
D	883	51	242	0.3	352.9	352.9	352.9	0.0
E	1,082	10	6	4.6	347.5	347.5	347.5	0.0
F	1,425	10	6	4.6	357.7	357.7	358.1	0.4
G	1,800	10	6	4.6	371.6	371.6	372.1	0.5
H	2,169	30	117	0.7	383.1	383.1	383.9	0.8

[1] Stream distance in feet above confluence with Rock Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK - SOUTH GOLF COURSE TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD)			
Rock Creek - 172nd Avenue Tributary								
A	520	11	17	6.9	241.3	241.3	241.3	0.0
B	1,023	18	22	5.3	265.0	265.0	265.1	0.1
C	1,474	11	19	6.2	282.2	282.2	282.3	0.1
D	2,084	13	19	6.1	306.8	306.8	306.9	0.1
E	2,183	50	272	0.4	324.2	324.2	324.3	0.1
F	2,487	15	49	2.4	324.3	324.3	324.3	0.0
G	2,685	13	27	4.4	327.8	327.8	328.5	0.7

[1] Stream distance in feet above confluence with Rock Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK - 172ND AVENUE TRIBUTARY

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	275	139	1,282	12.3	1,025.5	1,023.3	1,023.8	0.5
B	2,165	133	1,677	9.4	1,047.8	1,047.8	1,047.8	0.0
C	2,772	146	1,404	11.3	1,050.5	1,050.5	1,050.7	0.2
D	3,131	146	1,319	12.0	1,053.2	1,053.2	1,053.4	0.2
E	3,624	143	1,636	9.7	1,060.2	1,060.2	1,060.2	0.0
F	3,872	169	1,816	8.7	1,061.6	1,061.6	1,061.6	0.0
G	4,727	178	1,550	10.2	1,064.7	1,064.7	1,065.1	0.4
H	5,136	175	1,526	9.6	1,067.5	1,067.5	1,067.5	0.0
I	6,087	146	1,389	10.5	1,072.8	1,072.8	1,073.4	0.6
J	7,103	138	1,282	11.4	1,080.8	1,080.8	1,081.2	0.4
K	8,045	174	1,628	9.0	1,088.6	1,088.6	1,089.2	0.6
L	10,229	81	1,131	12.9	1,106.3	1,106.3	1,106.5	0.2
M	10,422	148	1,950	7.5	1,108.7	1,108.7	1,109.2	0.5
N	11,209	124	1,071	13.7	1,113.8	1,113.8	1,114.3	0.5
O	12,307	122	1,419	10.3	1,123.6	1,123.6	1,124.6	1.0
P	13,413	85	952	15.4	1,131.2	1,131.2	1,132.2	1.0
Q	14,816	156	1,401	10.5	1,147.6	1,147.6	1,148.2	0.6
R	15,857	148	1,378	10.6	1,155.5	1,155.5	1,155.8	0.3
S	17,023	126	1,151	12.7	1,165.1	1,165.1	1,165.5	0.4
T	18,182	89	1,084	13.5	1,176.1	1,176.1	1,176.6	0.5
U	19,410	112	1,151	12.3	1,187.7	1,187.7	1,188.2	0.5

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SALMON RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
V	20,978	147	1,232	11.5	1,202.3	1,202.3	1,203.1	0.8
W	22,418	142	1,342	10.6	1,214.2	1,214.2	1,214.9	0.7
X	22,768	162	1,382	9.9	1,217.1	1,217.1	1,217.9	0.8
Y	23,322	145	1,141	12.0	1,222.2	1,222.2	1,222.3	0.1
Z	23,997	110	1,079	12.7	1,228.9	1,228.9	1,229.7	0.8
AA	24,477	100	1,025	13.3	1,234.0	1,234.0	1,234.4	0.4
AB	24,648	142	1,328	10.7	1,236.5	1,236.5	1,237.1	0.6
AC	25,962	121	1,223	11.6	1,247.9	1,247.9	1,248.7	0.8
AD	26,860	126	1,267	11.2	1,254.5	1,254.5	1,255.0	0.5
AE	27,909	134	1,305	10.9	1,262.5	1,262.5	1,262.7	0.2
AF	28,883	177	1,470	9.6	1,269.2	1,269.2	1,269.5	0.3
AG	30,279	316	1,914	7.2	1,280.8	1,280.8	1,281.8	1.0
AH	31,471	421	2,059	6.7	1,289.5	1,289.5	1,290.1	0.6
AI	32,562	192	1,363	11.3	1,297.9	1,297.9	1,298.5	0.6
AJ	32,613	195	1,646	9.2	1,299.8	1,299.8	1,300.4	0.6
AK	32,804	246	1,674	8.2	1,300.4	1,300.4	1,301.3	0.9
AL	33,539	265	1,487	9.3	1,307.4	1,307.4	1,307.7	0.3
AM	34,163	224	1,315	10.5	1,312.4	1,312.4	1,313.4	1.0
AN	34,812	128	1,100	12.5	1,320.0	1,320.0	1,320.5	0.5
AO	35,658	148	1,157	11.9	1,329.4	1,329.4	1,330.0	0.6
AP	36,365	81	1,066	12.9	1,338.0	1,338.0	1,338.5	0.5

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SALMON RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AQ	36,605	91	1,090	12.7	1,339.6	1,339.6	1,340.6	1.0
AR	36,893	85	1,001	13.8	1,342.1	1,342.1	1,343.1	1.0
AS	37,069	100	1,187	11.6	1,345.1	1,345.1	1,345.7	0.6
AT	37,311	83	814	11.8	1,347.2	1,347.2	1,347.5	0.3
AU	37,456	78	737	13.0	1,347.8	1,347.8	1,348.7	0.9
AV	37,933	83	650	12.3	1,353.4	1,353.4	1,354.3	0.9
AW	38,645	92	656	12.2	1,363.7	1,363.7	1,364.2	0.5
AX	38,891	128	848	14.4	1,369.1	1,369.1	1,369.2	0.1
AY	39,263	147	986	12.3	1,375.4	1,375.4	1,376.3	0.9
AZ	40,215	124	978	12.4	1,389.9	1,389.9	1,390.3	0.4
BA	41,312	104	916	13.3	1,403.0	1,403.0	1,403.2	0.2
BB	42,144	95	869	14.0	1,413.2	1,413.2	1,413.5	0.3

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SALMON RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	190	93	229	10.4	1,348.3	1,348.3	1,348.4	0.1
B	794	56	96	9.2	1,359.4	1,359.4	1,360.2	0.8
C	1,148	57	105	12.7	1,363.8	1,363.8	1,364.1	0.3

[1]Stream Distance in Feet Above Confluence With Salmon River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SALMON RIVER - EAST ISLAND SPLIT

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	278	75	403	0.7	1,217.3	1,217.3	1,218.3	1.0
B	880	33	456	2.2	1,217.4	1,217.4	1,218.3	1.0
C	1,578	39	331	5.2	1,221.3	1,221.3	1,221.4	0.1
D	2,594	19	720	4.7	1,229.5	1,229.5	1,230.1	0.6

[1]Stream Distance in Feet Above Confluence With Salmon River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SALMON RIVER - EAST METSGER ISLAND SPLIT

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
A	820	321	3,833	17.7	321	196.5	196.5	196.5	0.0
B	1,470	358	5,687	11.9	358	204.2	205.2	205.2	1.0
C	2,310	342	5,335	12.7	342	210.0	210.3	210.3	0.3
D	3,020	310	4,501	15.1	310	213.9	214.5	214.5	0.6
E	3,760	264	4,154	16.3	264	219.5	220.5	220.5	1.0
F	4,410	232	4,553	14.9	232	223.5	224.4	224.4	0.9
G	5,720	275	5,954	11.4	275	229.5	230.2	230.2	0.7
H	6,460	262	4,649	14.6	262	231.5	232.0	232.0	0.5
I	7,390	274	6,095	11.1	274	239.3	240.3	240.3	1.0
J	8,000	243	3,738	18.2	243	240.0	240.0	240.0	0.0
K	9,060	309	6,119	11.1	309	251.5	251.7	251.7	0.2
L	10,460	391	3,884	12.7	391	257.5	258.4	258.4	0.9
M	10,760	350	3,848	12.8	350	261.0	261.0	261.0	0.0
N	11,490	229	2,876	17.2	229	264.2	264.2	264.2	0.0
O	11,960	298	4,348	11.4	298	270.9	270.9	270.9	0.0
P	12,470	293	4,242	11.6	293	272.5	273.3	273.3	0.8
Q	12,780	349	4,676	10.6	349	274.6	275.2	275.2	0.6
R	13,940	383	4,230	11.7	383	280.1	280.6	280.6	0.5
S	14,610	373	3,995	12.4	291.6	285.9	285.9	285.9	0.0
T	15,740	439	4,513	10.9	439	297.0	297.1	297.1	0.1
U	16,370	392	6,689	7.4	392	303.2	304.0	304.0	0.8

[1]Stream Distance in Feet Above Multnomah-Clackamas County Boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SANDY RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
V	17,550	286	3,439	14.4	286	312.4	312.4	312.4	0.0
W	18,270	375	5,926	8.3	375	319.8	319.8	320.0	0.2
X	18,630	406	5,578	8.9	320.9	320.4	320.4	320.6	0.2
Y	19,100	318	3,348	14.7	241	321.5	321.5	321.8	0.3
Z	19,740	329	3,736	13.2	276.8	326.2	326.2	326.6	0.4
AA	20,300	222	2,636	18.7	222	329.0	329.0	329.0	0.0
AB	20,690	273	3,697	13.4	273	334.2	334.2	334.6	0.4
AC	21,010	297	3,680	13.4	297	336.8	336.8	336.8	0.0
AD	22,370	223	3,158	15.6	223	343.7	343.7	344.4	0.7
AE	23,030	310	5,147	9.6	310	349.9	349.9	350.4	0.5
AF	33,360	256	3,778	12.4	256	424.7	424.7	424.9	0.2
AG	34,140	257	3,862	12.2	257	428.9	428.9	429.4	0.5
AH	35,050	394	5,096	9.2	394	434.0	434.0	434.4	0.4
AI	35,780	225	2,879	16.3	225	436.5	436.5	437.5	1.0
AJ	37,040	210	3,640	12.9	210	446.7	446.7	447.0	0.3
AK	38,000	188	4,060	11.6	188	462.8	462.8	463.3	0.5
AL	38,440	202	5,292	8.9	202	467.2	467.2	468.0	0.8
AM	39,020	316	5,313	8.8	316	468.3	468.3	469.2	0.9
AN	86,000	289	3,801	13.3	233	821.6	821.6	821.7	0.1
AO	88,237	244	2,992	16.9	201	837.5	837.5	837.5	0.0
AP	88,946	173	4,728	10.7	151	854.3	854.3	854.4	0.1

[1]Stream Distance in Feet Above Multnomah-Clackamas County Boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SANDY RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AQ	90,086	223	2,788	16.5	856.2	856.2	856.7	0.5
AR	91,153	206	2,685	17.2	867.3	867.3	867.6	0.3
AS	92,098	424	3,367	13.7	876.2	876.2	876.2	0.0
AT	93,002	769	5,788	8.0	886.1	886.1	886.2	0.1
AU	94,116	545	3,833	12.0	895.3	895.3	895.7	0.4
AV	95,153	650	4,255	10.8	904.2	904.2	904.4	0.2
AW	96,319	590	4,320	10.7	913.8	913.8	914.2	0.4
AX	97,195	969	6,179	7.5	920.5	920.5	920.6	0.1
AY	98,205	613	4,510	10.2	929.2	929.2	929.4	0.2
AZ	98,961	472	4,079	11.3	935.6	935.6	935.9	0.3
BA	100,174	463	4,118	11.2	942.8	942.8	943.7	0.9
BB	101,284	600	4,405	10.5	952.5	952.5	952.7	0.2
BC	102,348	400	3,938	11.7	961.3	961.3	962.0	0.7
BD	103,172	444	4,149	11.1	966.9	966.9	967.5	0.6
BE	105,211	139	2,439	18.9	985.1	985.1	985.9	0.8
BF	106,401	494	4,652	9.9	995.0	995.0	995.0	0.0
BG	107,322	605	3,883	11.9	999.7	999.7	999.7	0.0
BH	108,420	369	3,383	13.6	1,011.5	1,011.5	1,011.6	0.1
BI	109,390	350	4,020	11.5	1,021.0	1,021.0	1,021.2	0.2
BJ	112,150	501	3,699	6.1	1,043.2	1,043.2	1,043.3	0.1
BK	113,681	587	2,677	8.4	1,056.0	1,056.0	1,056.0	0.0

[1]Stream Distance in Feet Above Multnomah-Clackamas County Boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SANDY RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BL	115,743	283	2,086	12.8	1,079.1	1,079.1	1,079.5	0.4
BM	115,874	352	4,532	5.0	1,085.7	1,085.7	1,086.5	0.8
BN	116,798	168	1,529	14.7	1,088.8	1,088.8	1,089.0	0.2
BO	117,716	217	1,817	12.3	1,100.0	1,100.0	1,100.0	0.0
BP	118,656	203	1,895	11.8	1,110.7	1,110.7	1,111.3	0.6
BQ	120,646	341	2,200	10.2	1,135.1	1,135.1	1,135.8	0.7
BR	121,593	264	1,947	11.5	1,145.1	1,145.1	1,145.3	0.2
BS	122,783	277	2,026	11.1	1,158.8	1,158.8	1,158.8	0.0
BT	123,787	503	2,205	10.2	1,170.8	1,170.8	1,170.8	0.0
BU	124,818	770	3,721	6.0	1,183.3	1,183.3	1,183.7	0.4
BV	126,926	190	1,699	13.2	1,209.5	1,209.5	1,210.2	0.7
BW	127,831	217	2,003	11.2	1,220.8	1,220.8	1,221.1	0.3
BX	128,866	336	2,127	10.5	1,230.4	1,230.4	1,230.6	0.2
BY	129,929	543	2,312	9.7	1,244.2	1,244.2	1,244.9	0.7
BZ	130,887	302	2,228	10.1	1,257.0	1,257.0	1,257.3	0.3
CA	132,230	668	2,833	7.9	1,272.9	1,272.9	1,273.0	0.1
CB	133,244	310	1,949	11.5	1,285.8	1,285.8	1,285.9	0.1
CC	134,151	278	2,186	10.3	1,297.4	1,297.4	1,297.7	0.3
CD	135,238	146	1,464	15.3	1,314.6	1,314.6	1,315.3	0.7
CE	137,095	174	1,788	12.5	1,341.7	1,341.7	1,341.8	0.1
CF	138,314	184	1,578	14.2	1,355.1	1,355.1	1,355.5	0.4

[1]Stream Distance in Feet Above Multnomah-Clackamas County Boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SANDY RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CG	140,150	185	1,624	13.8	1,383.8	1,383.8	1,383.9	0.1
CH	140,729	174	1,314	8.5	1,392.2	1,392.2	1,392.6	0.4
CI	141,388	147	817	13.7	1,400.8	1,400.8	1,400.8	0.0
CJ	143,347	98	827	13.5	1,439.0	1,439.0	1,439.1	0.1
CK	144,199	100	1,026	10.9	1,455.9	1,455.9	1,456.0	0.1
CL	144,498	84	666	10.8	1,458.7	1,458.7	1,458.9	0.2
CM	144,809	154	905	7.9	1,462.7	1,462.7	1,462.7	0.0
CN	145,462	124	696	10.3	1,475.7	1,475.7	1,475.8	0.1
CO	146,295	128	765	9.4	1,491.7	1,491.7	1,491.9	0.2
CP	146,730	145	664	10.8	1,501.0	1,501.0	1,501.1	0.1
CQ	147,171	192	862	8.3	1,511.7	1,511.7	1,511.8	0.1
CR	148,411	229	675	10.6	1,532.9	1,532.9	1,532.9	0.0
CS	149,189	313	866	8.3	1,548.8	1,548.8	1,548.9	0.1
CT	149,781	158	757	9.5	1,559.9	1,559.9	1,560.0	0.1
CU	150,646	136	573	10.2	1,576.2	1,576.2	1,576.4	0.2
CV	151,163	91	427	13.6	1,586.9	1,586.9	1,586.9	0.0
CW	152,203	157	697	10.3	1,608.2	1,608.2	1,608.4	0.2
CX	152,992	129	776	9.3	1,622.0	1,622.0	1,622.2	0.2
CY	154,057	187	848	8.5	1,645.2	1,645.2	1,645.3	0.1
CZ	155,207	130	596	12.1	1,667.3	1,667.3	1,667.3	0.0
DA	157,077	232	919	7.8	1,710.4	1,710.4	1,710.5	0.1

[1]Stream Distance in Feet Above Multnomah-Clackamas County Boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SANDY RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DB	158,353	207	720	10.0	1,736.4	1,736.4	1,736.4	0.0
DC	159,435	153	776	9.3	1,761.6	1,761.6	1,762.0	0.4
DD	160,231	131	618	11.6	1,782.9	1,782.9	1,783.0	0.1
DE	161,182	93	535	13.4	1,809.3	1,809.3	1,809.4	0.1
DF	162,146	94	609	11.8	1,839.1	1,839.1	1,839.5	0.4
DG	163,331	124	709	10.1	1,872.8	1,872.8	1,873.0	0.2

[1]Stream Distance in Feet Above Multnomah-Clackamas County Boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SANDY RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	384	90	204	6.6	1,580.6	1,580.6	1,580.8	0.2
B	785	206	260	5.2	1,589.2	1,589.2	1,589.4	0.2

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SANDY RIVER SPLIT B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
SEELY DITCH								
A	80	21	77	10.1	94.4	68.4[2]	68.5[2]	0.1
B	160	28	79	9.9	94.4	72.0[2]	72.0[2]	0.0
C	428	32	132	5.9	94.4	77.1[2]	77.5[2]	0.4
D	688	26	112	6.9	94.4	79.8[2]	80.3[2]	0.5
E	886	26	78	10.0	94.4	84.1[2]	84.2[2]	0.1
F	1,158	25	103	7.6	94.4	90.6[2]	91.4[2]	0.8
G	1,286	29	101	7.7	94.4	92.9[2]	93.6[2]	0.7
H	1,407	31	84	9.3	97.6	97.6	97.6	0.0
I	1,511	22	74	10.4	102.5	102.5	103.1	0.6
J	1,727	23	76	10.3	112.4	112.4	112.6	0.2
K	1,879	21	73	10.6	118.8	118.8	118.9	0.1
L	1,989	18	70	11.2	124.9	124.9	125	0.1
M	2,154	25	100	7.8	129.6	129.6	130.3	0.7
N	2,289	49	300	2.6	135.5	135.5	135.7	0.2
O	2,597	47	234	3.3	135.7	135.7	135.8	0.1
P	3,265	43	207	3.8	138.2	138.2	138.2	0.0
Q	3,479	41	184	4.2	139.5	139.5	139.5	0.0
R	3,776	24	117	6.7	139.7	139.7	139.8	0.1
S	3,952	47	202	2.9	140.6	140.6	140.6	0.0
T	4,202	38	147	4.0	140.7	140.7	140.8	0.1
U	4,412	40	153	3.8	141.0	141.0	141	0.0
V	4,713	39	162	3.6	141.5	141.5	141.5	0.0
W	5,318	37	165	3.5	142.0	142.0	142	0.0
X	6,098	28	127	4.6	143.1	143.1	143.1	0.0

[1] Stream distance in feet above confluence with Willamette River

[2] Water surface elevations computed without consideration of backwater effects from Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

SEELY DITCH

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	135	56	315	12.8	1,574.4	1,572.6	1,572.8	0.2
B	721	53	328	12.3	1,587.1	1,587.1	1,587.3	0.2
C	851	58	311	13.0	1,590.6	1,590.6	1,590.6	0.0
D	918	46	367	11.0	1,592.9	1,592.9	1,592.9	0.0
E	1,479	49	378	10.7	1,604.6	1,604.6	1,605.2	0.6
F	2,179	43	441	9.4	1,622.9	1,622.9	1,622.9	0.0
G	2,767	51	322	12.6	1,636.4	1,636.4	1,637.2	0.8
H	3,699	71	400	10.1	1,659.8	1,659.8	1,659.9	0.1
I	4,648	144	412	9.8	1,685.5	1,685.5	1,685.5	0.0
J	5,486	66	384	10.5	1,705.9	1,705.9	1,706.1	0.2
K	6,343	63	506	8.0	1,722.1	1,722.1	1,722.5	0.4
L	6,886	59	566	7.1	1,726.3	1,726.3	1,727.1	0.8
M	7,013	54	356	11.3	1,726.8	1,726.8	1,727.6	0.8
N	7,049	76	1,166	5.3	1,730.2	1,730.2	1,730.3	0.1
O	7,246	105	1,509	2.7	1,731.0	1,731.0	1,731.0	0.0
P	7,838	80	639	6.3	1,731.5	1,731.5	1,731.8	0.3
Q	8,509	99	800	5.0	1,735.8	1,735.8	1,736.3	0.5
R	9,205	95	1,062	7.2	1,740.1	1,740.1	1,740.2	0.1
S	10,162	100	752	5.8	1,748.4	1,748.4	1,748.9	0.5
T	11,059	173	728	6.1	1,756.0	1,756.0	1,756.1	0.1
U	12,246	186	1,235	3.9	1,768.8	1,768.8	1,769.8	1.0

[1]Stream Distance in Feet Above Confluence With Zigzag River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: STILL CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
V	13,295	142	755	5.3	1,781.0	1,781.0	1,781.6	0.6
W	14,188	80	567	7.1	1,794.8	1,794.8	1,795.5	0.7
X	15,030	63	603	6.7	1,807.9	1,807.9	1,808.6	0.7
Y	15,446	54	585	8.1	1,814.8	1,814.8	1,815.5	0.7

[1]Stream Distance in Feet Above Confluence With Zigzag River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: STILL CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	24,093	23	75	8.5	697.5	697.5	698.0	0.5
B	24,958	52	104	6.1	715.4	715.4	715.5	0.1
C	25,463	24	67	9.5	731.9	731.9	732.0	0.1
D	26,588	27	76	8.3	750.1	750.1	750.1	0.0
E	27,708	23	68	9.3	772.8	772.8	773.1	0.3
F	28,163	24	73	8.7	782.9	782.9	783.1	0.2
G	29,163	34	221	2.9	802.8	802.8	802.8	0.0
H	30,063	50	236	4.0	811.7	811.7	812.6	0.9
I	30,503	32	72	8.8	819.1	819.1	819.1	0.0
J	30,628	115	369	2.8	823.2	823.2	823.9	0.7
K	30,953	80	196	5.3	823.1	823.1	824.1	1.0
L	32,598	32	82	7.7	858.7	858.7	859.0	0.3
M	33,108	33	81	7.8	867.9	867.9	868.0	0.1
N	33,952	30	72	8.8	889.8	889.8	889.0	0.0
O	35,093	29	43	7.0	913.7	913.7	913.7	0.0
P	35,533	31	44	6.8	925.8	925.8	925.8	0.0
Q	36,343	49	288	1.0	954.4	954.4	954.5	0.1
R	37,218	32	45	6.8	974.1	974.1	974.1	0.0
S	38,093	30	44	6.9	999.1	999.1	999.1	0.0

[1]Distances are measured in feet upstream from a point located 575 feet

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: TICKLE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
TUALATIN RIVER								
A	17	432	4,878	5.7	75.3	70.3[2]	70.3[2]	0.0
B	766	175	2,455	12.0	75.3	72.6[2]	72.6[2]	0.0
C	1,062	176	2,473	14.1	75.3	74.3[2]	74.5[2]	0.2
D	2,838	170	2,796	12.0	85.5	85.5	86.1	0.6
E	5,519	173	2,566	11.3	98.9	98.9	99.3	0.4
F	7,036	473	5,301	7.5	105.2	105.2	105.6	0.4
G	8,607	211	3,531	7.9	107.7	107.7	108.1	0.4
H	8,827	220	3,443	8.1	108.5	108.5	108.9	0.4
I	11,403	624	9,234	4.9	110.9	110.9	111.2	0.3
J	12,897	602	7,702	5.9	111.2	111.2	111.5	0.3
K	14,143	605	7,276	3.8	111.8	111.8	112.2	0.4
L	16,267	281	4,701	8.4	113.1	113.1	113.6	0.5
M	18,088	291	5,169	7.7	114.6	114.6	115.2	0.6
N	18,188	241	3,143	9.6	116.6	116.6	116.6	0.0
O	18,453	201	3,130	9.4	117.0	117.0	117.0	0.0
P	21,714	199	5,663	5.1	119.1	119.1	119.2	0.1
Q	22,002	233	5,523	5.1	119.2	119.2	119.3	0.1
R	22,260	265	5,966	4.8	119.6	119.6	119.7	0.1
S	22,928	254	5,614	5.1	119.8	119.8	119.9	0.1
T	25,332	226	5,671	5.1	120.8	120.8	120.9	0.1
U	27,404	267	4,785	6.6	121.7	121.7	121.8	0.1
V	28,016	265	6,471	4.3	122.5	122.5	122.6	0.1
W	28,211	283	6,547	4.4	122.6	122.6	122.7	0.1
X	29,049	303	6,142	4.9	122.8	122.8	122.9	0.1
Y	30,032	440	7,861	3.3	123.3	123.3	123.4	0.1
Z	31,357	605	9,279	3.2	123.5	123.5	123.7	0.2

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations computed without consideration of backwater effects from Willamette River

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
TUALATIN RIVER								
AA	34,487	232	5,117	5.5	124.4	124.4	124.5	0.1
AB	34,874	295	5,702	5.5	124.7	124.7	124.8	0.1
AC	35,845	410	6,834	5.5	125.0	125.0	125.1	0.1
AD	37,920	509	7,008	6.3	125.3	125.3	125.4	0.1
AE	38,516	446	6,462	6.4	125.5	125.5	125.5	0.0
AF	40,752	380	6,074	5.9	125.9	125.9	126.1	0.2

[1] Stream distance in feet above confluence with Willamette River

[2] Water-surface elevations computed without consideration of backwater effects from Willamette River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

TUALATIN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD)			
Tualatin River Overflow to Rivergrove								
A	678	475	1,942	1.7	121.2	121.2	122	0.8
B	931	511	3,360	0.9	121.4	121.4	122.3	0.9
C	1,157	284	1,781	1.7	122.2	122.2	123.1	0.9
D	1,741	428	3,064	1.0	123.2	123.2	124.0	0.8

[1] Feet above Oswego Canal

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

TUALATIN RIVER OVERFLOW TO RIVERGROVE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
WILLAMETTE RIVER								
A	91,661	964/460[2]	58,628	6.4	34.7	34.7	35.4	0.7
B	94,161	985/390[2]	63,554	5.9	35.3	35.3	36.0	0.7
C	96,691	815/220[2]	51,043	7.3	35.6	35.6	36.3	0.7
D	98,381	1,325/500[2]	85,767	4.4	36.3	36.3	37.0	0.7
E	100,861	1,519/1,020[2&3]	63,590	5.9	36.4	36.4	37.0	0.6
F	104,979	955	52,697	7.1	36.7	36.7	37.4	0.7
G	105,719	778	47,756	7.9	36.7	36.7	37.4	0.7
H	106,469	1,005	62,300	6.0	37.4	37.4	38.1	0.7
I	110,312	895	43,115	8.7	37.6	37.6	38.1	0.5
J	111,912	550	44,879	8.4	38.1	38.1	38.9	0.8
K	113,540	520	31,029	12.1	39.3	39.3	40.0	0.7
L	115,130	820	54,496	6.9	42.7	42.7	43.4	0.7
M	118,034	578	37,630	10.0	44.0	44.0	44.7	0.7
N	122,034	1,440	64,809	5.8	46.1	46.1	46.8	0.7
O	125,434	800	46,296	8.1	46.2	46.2	46.9	0.7
P	126,834	1,370	55,501	6.8	46.8	46.8	47.5	0.7
Q	129,034	1,230	52,785	7.1	47.2	47.2	47.9	0.7
R	131,034	1,335	48,241	7.8	47.7	47.7	48.4	0.7
S	143,020	888	42,725	8.0	74.5	74.5	74.7	0.2
T	145,970	1,040	47,541	7.2	74.9	74.9	75.1	0.2
U	149,170	1,050	51,473	6.6	75.2	75.2	75.3	0.1
V	165,070	665	31,973	10.3	84.3	84.3	85.3	1.0
W	168,300	1,450	66,319	4.9	86.4	86.4	87.3	0.9
X	170,950	1,057	47,397	6.9	86.6	86.6	87.5	0.9
Y	174,825	1,100	52,109	6.3	87.5	87.5	88.4	0.9
Z	176,685	705	37,988	8.6	87.5	87.5	88.4	0.9

[1] Stream distance in feet above mouth

[2] Width/width within study area

[3] Values calculated from original model prior redelineation

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

WILLAMETTE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						FEET (NAVD)		
WILLAMETTE RIVER								
AA	180,960	818	36,339	9.0	88.7	88.7	89.5	0.8
AB	184,535	760	33,080	9.9	89.8	89.8	90.6	0.8
AC	188,435	2,740[2]	35,841	8.0	91.7	91.7	92.5	0.8
AD	193,410	750	43,652	6.6	92.8	92.8	93.6	0.8
AE	200,200	747	42,342	6.8	93.6	93.6	94.3	0.7
AF	203,665	710	42,872	6.7	94.2	94.2	95.0	0.8
AG	205,610	731	38,605	7.4	94.5	94.5	95.3	0.8
AH	209,645	716	38,580	7.4	95.3	95.3	96.1	0.8
AI	213,795	690	42,290	6.7	96.1	96.1	97.0	0.9
AJ	217,760	680	41,838	6.9	96.6	96.6	97.5	0.9
AK	221,910	710	43,332	6.6	97.2	97.2	98.1	0.9
AL	223,590	730	43,718	6.6	97.4	97.4	98.3	0.9
AM	225,235	700	43,336	6.6	97.6	97.6	98.4	0.8
AN	227,010	709	43,605	6.6	97.8	97.8	98.6	0.8
AO	228,615	680	39,287	7.3	97.9	97.9	98.7	0.8

[1] Stream distance in feet above mouth.

[2] Width includes portion of Molalla River floodway

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

FLOODWAY DATA

WILLAMETTE RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	339	312	1,117	9.2	1,387.5	1,386.6	1,387.6	1.0
B	618	199	791	13.0	1,391.6	1,391.6	1,392.3	0.7
C	995	132	998	10.3	1,400.6	1,400.6	1,400.6	0.0
D	2,096	224	1,134	9.1	1,417.4	1,417.4	1,417.8	0.4
E	3,079	175	1,088	9.5	1,431.9	1,431.9	1,432.7	0.8
F	3,651	133	897	11.5	1,439.9	1,439.9	1,440.6	0.7
G	4,481	109	803	12.8	1,455.1	1,455.1	1,455.4	0.3
H	5,139	303	1,262	8.2	1,464.1	1,464.1	1,465.0	0.9
I	5,328	191	691	10.5	1,466.4	1,466.4	1,466.7	0.3
J	6,186	112	630	11.5	1,483.6	1,483.6	1,484.3	0.7
K	6,574	123	794	9.1	1,489.7	1,489.7	1,490.2	0.5
L	7,091	125	811	12.7	1,496.7	1,496.7	1,497.2	0.5
M	8,139	123	801	12.8	1,514.4	1,514.4	1,514.4	0.0
N	9,010	115	765	13.4	1,529.0	1,529.0	1,529.1	0.1
O	10,271	129	924	11.1	1,553.7	1,553.7	1,554.5	0.8
P	11,175	87	722	12.8	1,567.9	1,567.9	1,568.6	0.7
Q	11,432	76	870	10.6	1,574.4	1,574.4	1,574.5	0.1
R	11,625	64	427	12.4	1,576.1	1,576.1	1,576.7	0.6
S	11,850	62	480	11.1	1,581.6	1,581.6	1,581.6	0.0
T	12,605	69	480	11.1	1,600.9	1,600.9	1,600.9	0.0
U	13,342	70	504	10.5	1,617.4	1,617.4	1,618.1	0.7

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ZIGZAG RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
V	14,099	42	412	12.9	1,645.0	1,645.0	1,645.1	0.1
W	14,957	57	420	12.6	1,667.9	1,667.9	1,668.7	0.8
X	16,000	58	418	12.7	1,699.9	1,699.9	1,700.7	0.8
Y	17,121	78	477	11.1	1,728.9	1,728.9	1,729.5	0.6
Z	18,274	67	453	11.7	1,755.4	1,755.4	1,755.9	0.5
AA	19,359	79	501	10.6	1,783.0	1,783.0	1,783.4	0.4
AB	20,323	56	426	12.5	1,807.8	1,807.8	1,808.3	0.5
AC	21,392	65	411	12.9	1,838.1	1,838.1	1,838.4	0.3
AD	22,348	50	268	13.1	1,874.8	1,874.8	1,874.9	0.1
AE	23,196	46	313	11.2	1,898.6	1,898.6	1,899.2	0.6
AF	23,665	77	431	8.2	1,912.2	1,912.2	1,913.1	0.9
AG	23,811	65	402	8.7	1,918.5	1,918.5	1,918.5	0.0
AH	24,053	30	254	13.8	1,924.1	1,924.1	1,924.9	0.8
AI	24,555	44	320	11.0	1,937.9	1,937.9	1,938.2	0.3
AJ	25,728	68	312	11.3	1,972.9	1,972.9	1,973.2	0.3
AK	26,827	36	256	13.7	2,010.1	2,010.1	2,010.5	0.4
AL	27,646	41	272	12.9	2,036.4	2,036.4	2,036.9	0.5
AM	28,776	39	273	12.9	2,075.7	2,075.7	2,075.9	0.2
AN	29,801	40	257	13.7	2,108.6	2,108.6	2,108.6	0.0
AO	30,844	62	304	11.5	2,142.9	2,142.9	2,143.9	1.0
AP	32,012	50	268	13.1	2,191.6	2,191.6	2,192.0	0.4

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ZIGZAG RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AQ	32,349	45	346	10.2	2,207.6	2,207.6	2,207.6	0.0
AR	33,014	45	260	13.5	2,234.2	2,234.2	2,234.4	0.2
AS	34,050	46	278	12.6	2,275.5	2,275.5	2,275.9	0.4
AT	35,264	38	245	14.4	2,320.3	2,320.3	2,320.3	0.0
AU	36,144	60	329	10.7	2,348.2	2,348.2	2,348.9	0.7
AV	37,255	60	327	10.8	2,393.1	2,393.1	2,393.7	0.6
AW	38,517	35	251	14.0	2,456.2	2,456.2	2,456.3	0.1

[1]Stream Distance in Feet Above Confluence With Sandy River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ZIGZAG RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (Feet NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (Square Feet)	MEAN VELOCITY (Feet / Second)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	123	135	725	4.2	1,466.7	1,466.7	1,467.3	0.6
B	610	113	336	9.0	1,471.3	1,471.3	1,471.6	0.3
C	1,317	125	590	5.1	1,482.2	1,482.2	1,483.0	0.8
D	1,919	102	339	9.0	1,490.0	1,490.0	1,490.2	0.2

[1]Stream Distance in Feet Above Confluence With Zigzag River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ZIGZAG RIVER SIDE CHANNEL

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevation WSEL of the 1-percent-annual-chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

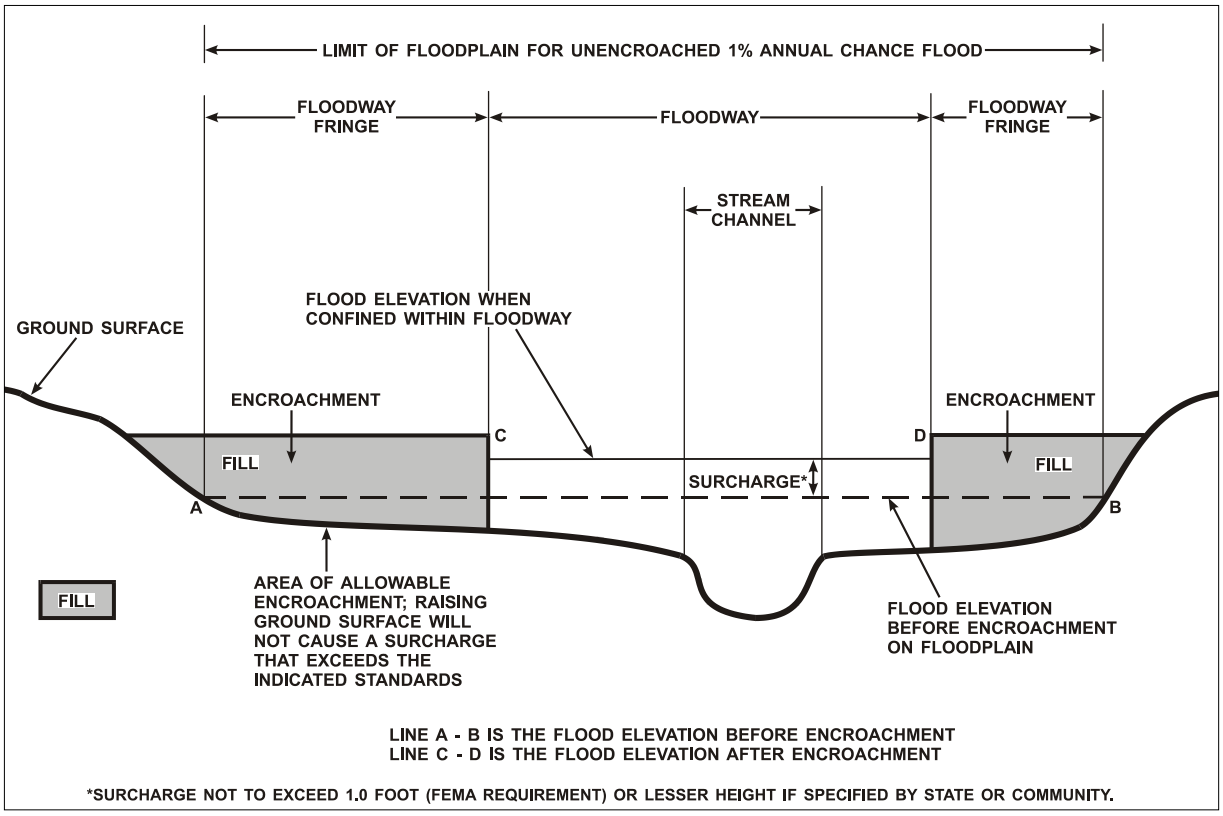

Figure 4 - Floodway Schematic

4.3 Base Flood Elevations

Areas within the community studied by detailed engineering methods have BFEs established in AE and VE Zones. These are the elevations of the 1-percent-annual-chance (base flood) relative to NAVD. In coastal areas affected by wave action, BFEs are generally maximum at the normal open shoreline. These elevations generally decrease in a landward direction at a rate dependent on the presence of obstructions capable of dissipating the wave energy. Where possible, changes in BFEs have been shown in 1-foot increments on the FIRM. However, where the scale did not permit, 2- or 3-foot increments were sometimes used. BFEs shown in the wave action areas represent the average elevation within the zone. Current program regulations generally require that all new construction be elevated such that the first floor, including basement, is elevated to or above the BFE in AE and VE Zones.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance risk zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Clackamas County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps, where applicable. Historical data relating to the maps prepared for each community are presented in Table 9.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE	FIRM EFFECTIVE DATE	FIRM REVISION DATE
Barlow, City of	January 10, 1975		May 5, 1981	
Canby, City of	November 16, 1973	November 28, 1975	June 15, 1984	
*Damascus, City of	March 1, 1978		March 1, 1978	
[1,2]Estacada, City of	N/A		N/A	
Gladstone, City of	April 5, 1974	June 25, 1976	March 15, 1977	
Happy Valley, City of	December 20,1974		December 4, 1979	
[1,2]Johnson City, City of	N/A		N/A	
Lake Oswego, City of	June 14, 1974	May 25, 1982	August 4, 1987	
Milwaukie, City of	April 5, 1974	June 25, 1976	June 18, 1980	
[1,2]Molalla, City of	N/A		N/A	
Oregon City, City of	December 28, 1973	June 4, 1976	February 15, 1980	
Rivergrove, City of	December 6, 1974	April 22, 1977	August 4, 1987	
Sandy, City of	April 12, 1974	December 19, 1975	December 11, 1979	July 1, 2000
West Linn, City	December 17, 1973	August 20, 1976	March 15, 1977	
Wilsonville, City	March 29, 1974	August 6, 1976	January 6, 1982	
Clackamas County (Unincorporated Areas)	March 1, 1978		March 1, 1978	August 4, 1987 September 30, 1988 July 19, 2000

[1]No special flood hazard areas identified
[2]This community does not have map history prior to first countywide mapping
*Dates for this community taken from the Unincorporated Areas of Clackamas County

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLACKAMAS COUNTY, OR
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

Table 10 - Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
City of Barlow	410013	17090009	41005C0263D, 41005C0264D, 41005C0505D	
City of Canby	410014	17090007 17090009	41005C0264D, 41005C0266D, 41005C0268D, 41005C0505D, 41005C0510D	
City of Damascus	410006	17090011 17090012	41005C0042D, 41005C0045D, 41005C0053D, 41005C0054D, 41005C0060D[2], 41005C0061D, 41005C0062D, 41005C0063D, 41005C0064D, 41005C0070D	
City of Estacada[1]	410016	17090011	41005C0330D, 41005C0340D	
City of Gladstone	410017	17090007 17090011 17090012	41005C0038D, 41005C0039D, 41005C0276D	
City of Happy Valley	410026	17090011 17090012	41005C0029D, 41005C0033D, 41005C0034D, 41005C0037D, 41005C0041D, 41005C0042D, 41005C0053D, 41005C0061D	
City of Johnson[1]	410267	17090011	41005C0037D, 41005C0039D	
City of Lake Oswego	410018	17090010 17090012	41005C0011D[2], 41005C0012D, 41005C0013D, 41005C0014D, 41005C0016D, 41005C0017D, 41005C0018D, 41005C0019D, 41005C0025D[2]	
City of Milwaukie	410019	17090012	41005C0009D, 41005C0017D, 41005C0028D, 41005C0029D, 41005C0036D, 41005C0037D	

[1]No Special Flood Hazard Areas Identified

[2]Panel Not Printed

Table 10 - Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
City of Molalla[1]	410020	17090009	41005C0540D, 41005C0545D	
City of Oregon City	410021	17090007 17090011 17090012	41005C0038D, 41005C0039D, 41005C0257D, 41005C0259D, 41005C0276D, 41005C0277D, 41005C0278D[2], 41005C0279D[2], 41005C0285D, 41005C0290D[2]	
City of Sandy	410023	17080001 17090011	41005C0091D[2], 41005C0092E, 41005C0093D, 41005C0094E, 41005C0113E	
City of Rivergrove	410022	17090010	41005C0013D	
City West Linn	410024	17090007 17090010 17090012	41005C0018D, 41005C0019D, 41005C0038D, 41005C0257D, 41005C0259D, 41005C0260D, 41005C0276D	
City Wilsonville	410025	17090007	41005C0234D, 41005C0241D, 41005C0242D, 41005C0250D, 41005C0253D[2], 41005C0261D	

[1]No Special Flood Hazard Areas Identified

[2]Panel Not Printed

Table 10 - Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Clackamas County (Unincorporated Areas)	415588	17080001 17090011 17090012	41005C0008D, 41005C0009D, 41005C0011D[2], 41005C0012D, 41005C0013D, 41005C0014D, 41005C0016D, 41005C0017D, 41005C0018D, 41005C0019D, 41005C0025D[2], 41005C0028D, 41005C0029D, 41005C0033D, 41005C0034D, 41005C0036D, 41005C0037D, 41005C0038D, 41005C0039D, 41005C0041D, 41005C0042D, 41005C0045D, 41005C0050D[2], 41005C0053D, 41005C0054D, 41005C0055D[2], 41005C0060D[2], 41005C0061D, 41005C0062D, 41005C0063D, 41005C0064D, 41005C0070D, 41005C0080D, 41005C0085E, 41005C0090D[2], 41005C0091D[2], 41005C0092E, 41005C0093D, 41005C0094E, 41005C0105E, 41005C0110D[2], 41005C0113E, 41005C0115E, 41005C0120E, 41005C0140E, 41005C0145E, 41005C0165D[2], 41005C0170E, 41005C0175D[2], 41005C0200D[2], 41005C0225D[2], 41005C0234D, 41005C0240D, 41005C0241D, 41005C0242D, 41005C0243D, 41005C0244D, 41005C0250D, 41005C0253D[2], 41005C0255D, 41005C0257D, 41005C0259D, 41005C0260D, 41005C0261D, 41005C0262D, 41005C0263D, 41005C0264D, 41005C0266D, 41005C0268D, 41005C0270D,	

[1]No Special Flood Hazard Areas Identified

[2]Panel Not Printed

Table 10 - Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Clackamas County (Unincorporated Areas)	415588	17080001 17090011 17090012	41005C0276D, 41005C0277D, 41005C0278D[2], 41005C0279D[2], 41005C0285D, 41005C0290D[2], 41005C0295D, 41005C0305D[2], 41005C0310D, 41005C0315D[2], 41005C0320D, 41005C0330D, 41005C0335D, 41005C0340D, 41005C0345D, 41005C0375D[2], 41005C0381D[2], 41005C0382E, 41005C0400D[2], 41005C0401E, 41005C0402E, 41005C0403E, 41005C0404E, 41005C0406E, 41005C0407E, 41005C0408E, 41005C0409E, 41005C0415E, 41005C0420E, 41005C0429E, 41005C0436E, 41005C0437E, 41005C0450E[2], 41005C0475D[2], 41005C0480D[2], 41005C0485D, 41005C0500D, 41005C0505D, 41005C0510D, 41005C0525D, 41005C0530D, 41005C0535D, 41005C0540D, 41005C0545D, 41005C0575D[2], 41005C0600D[2], 41005C0625D[2], 41005C0650D[2], 41005C0675D[2], 41005C0700D[2], 41005C0725D[2], 41005C0750D, 41005C0775D, 41005C0780D[2], 41005C0785D, 41005C0800D[2], 41005C0805D, 41005C0810D[2], 41005C0825D[2], 41005C0850D[2], 41005C0875D[2], 41005C0900D[2], 41005C0925D[2], 41005C0950D[2], 41005C0975D[2], 41005C1000D[2], 41005C1025D[2], 41005C1050D[2], 41005C1075D[2], 41005C1100D[2], 41005C1125D[2], 41005C1150D[2], 41005C1175D[2]	

[1]No Special Flood Hazard Areas Identified

[2]Panel Not Printed

7.0 OTHER STUDIES

This report either supersedes or is compatible with all previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the FEMA, Mitigation Division, Federal Regional Center, 130 228th Street, SW, Bothell, Washington 98021-9796.

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