

Overview of White River Floodplain Mapping Study Zone 4 – River Mile 22.0 to 28.6



Analyses performed by:
Northwest Hydraulic Consultants

for:
King County River and Floodplain Management

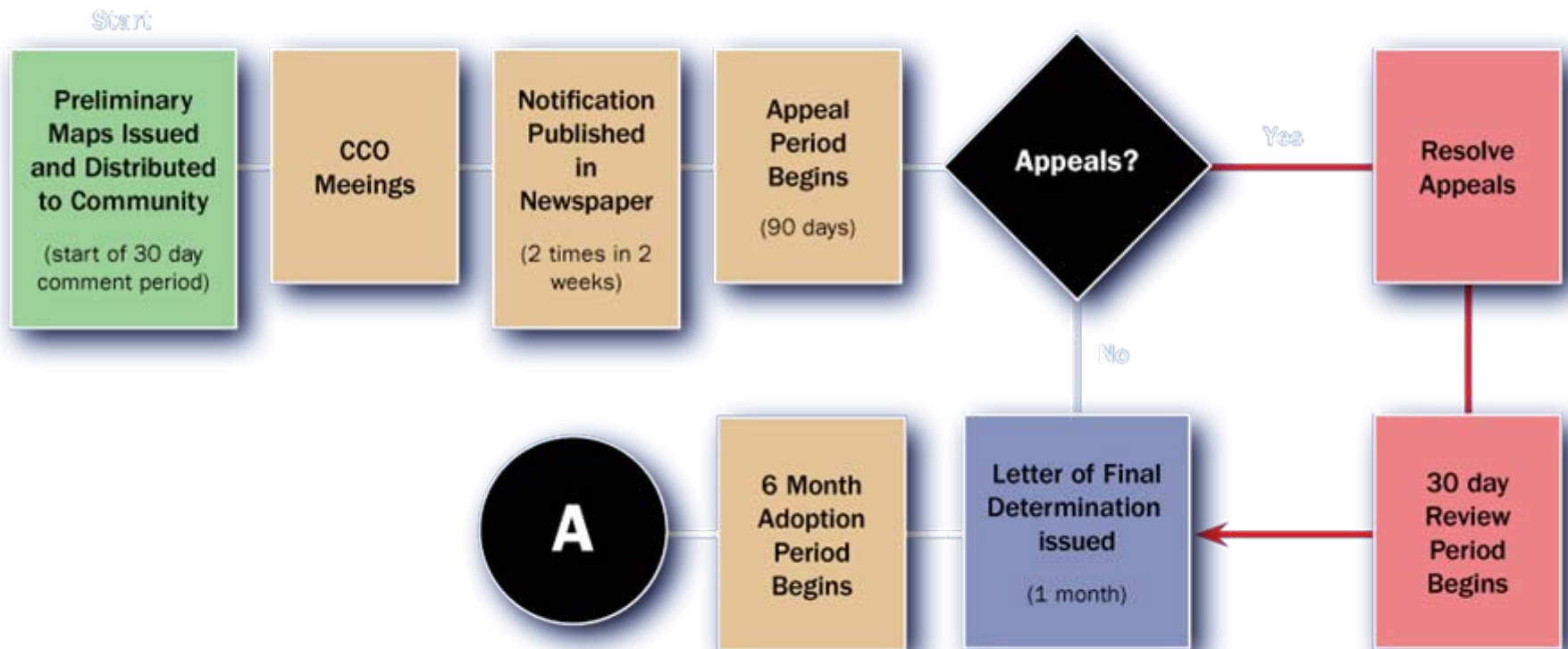
October 22, 2008

RE STUDY PROCESS

Timeline of events

- Preliminary maps issued
- Hold Final CCO meeting
- 90 day appeal period begins after 2nd public notice in local newspaper
- 90-day appeal period ends
- FEMA reviews submitted technical appeals and modifies or maintains maps as appropriate
- FEMA issues “Letter of Final Determination (LFD)” to communities and publishes the BFEs in the Federal Register
 - Communities have 6 months to adopt the study before the data becomes “effective”. *Failure to adopt results in suspension from NFIP*
- Effective date

ADOPTION PROCESS



90 DAY APPEAL PERIOD

Appeals

- *“requests for changes to proposed BFEs”*
- *Must be based on scientific evidence demonstrating error*
- *FEMA will not accept anecdotal information as the basis of a BFE change on a single lot*

“anything else”

- *“requests that do not involve BFEs”*
- *floodplain boundaries*
- *corporate limits*
- *road locations*
- *road names*
- *etc.*

LETTERS OF MAP CHANGE (LOMC) (WAYS TO APPEAL AT ANY TIME)

- **LOMA** - for property owners who believe a property was incorrectly included in a SFHA. An elevation certificate supports a LOMA, but by itself, does not remove the insurance requirement.
- **LOMR** – removes land that has been graded or filled (physical changes) since the date of the map. A LOMR can waive flood insurance requirements.
- **(LOMA) Hotline - 1-877-FEMA-MAP**

FLOOD INSURANCE RAMIFICATIONS



WHEN WILL IT FLOOD?

Flood Frequency Years	Chance in any Year	% chance over 30 yr mortgage
<i>10</i>	<i>10 out of 100</i>	<i>96%</i>
<i>50</i>	<i>2 out of 100</i>	<i>46%</i>
<i>100</i>	<i>1 out of 100</i>	<i>26%</i>
<i>500</i>	<i>.2 out of 100</i>	<i>6%</i>

DIGITAL FLOOD INSURANCE RATE MAPS

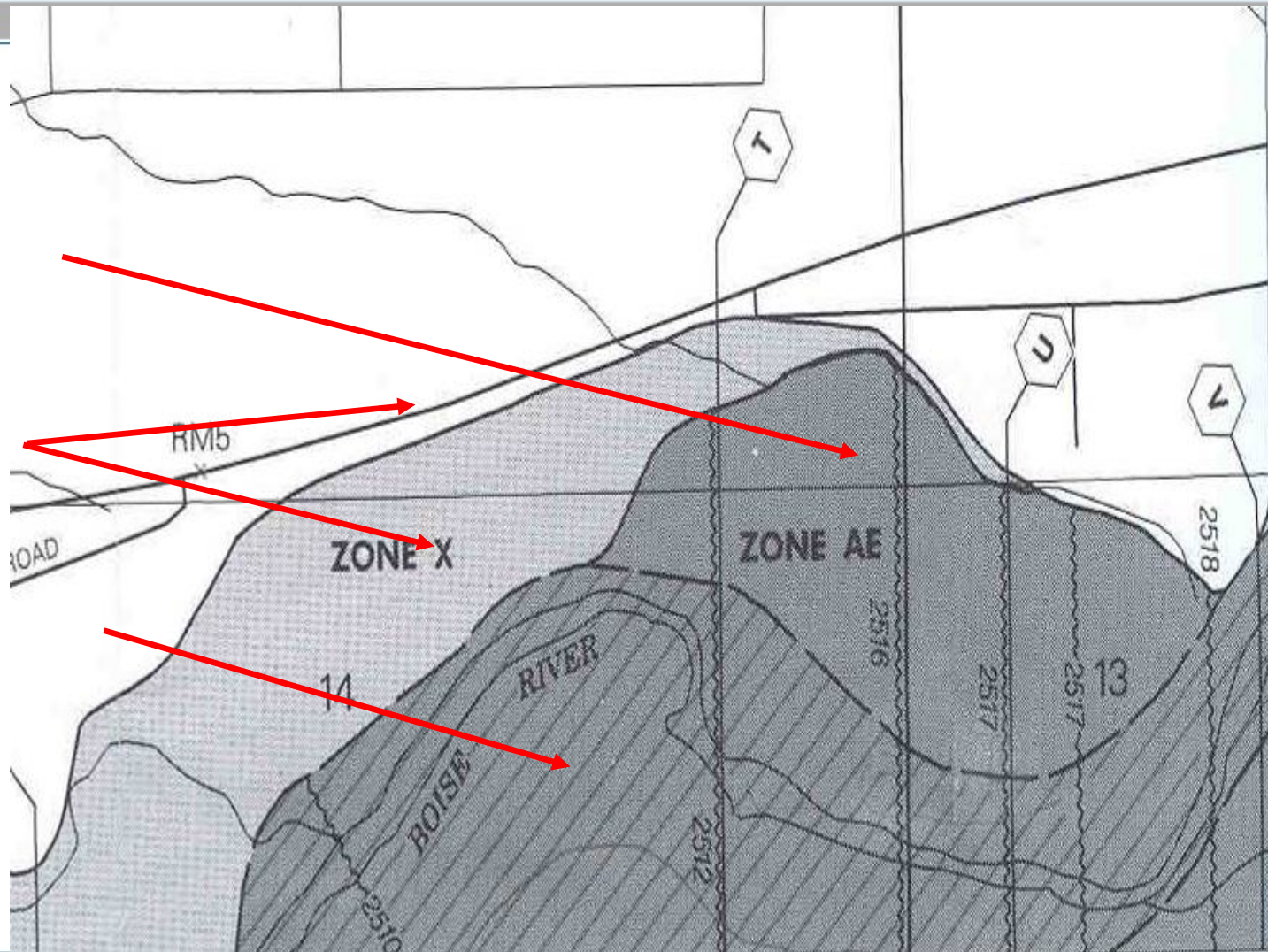
Zone Designation Changes

Old FIRMs	New FIRMs	Definition
A	A	Approximate Floodplain (SFHA)
A1- A30	AE	Detail River Floodplain (SFHA)
A99	A99	Protected by Levee
AH	AH	Shallow Floodplain with BFE
AO	AO	Shallow FP without BFE
B	X (shaded)	500 Year Floodplain
C	X (un-shaded)	Outside 500 Year Floodplain
D	D	Undetermined Floodplain
V	V	Approx Coastal Floodplain
V1-30	VE	Detailed Coastal Floodplain

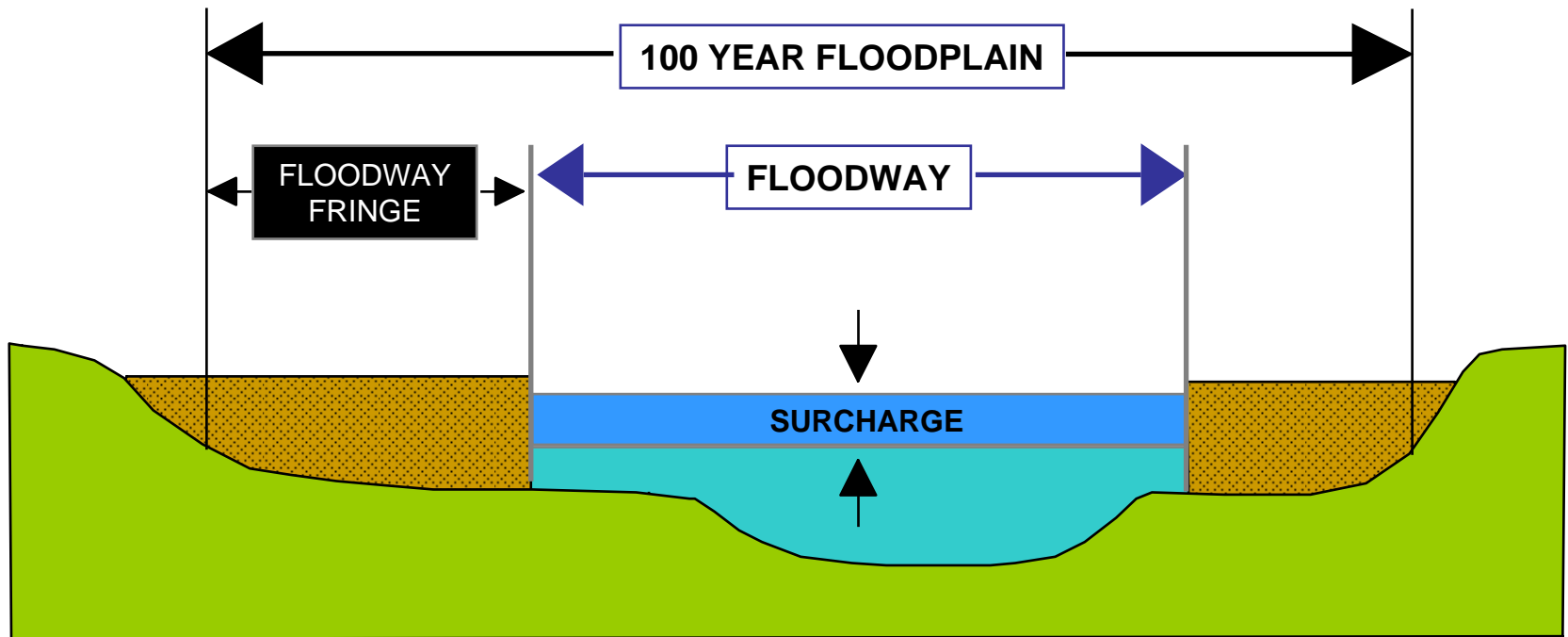
DIGITAL FLOOD INSURANCE RATE MAPS

FIRM Labels

- **AE Zone**
- **X Zone (shaded)**
- **Floodway**



FLOODWAY SCHEMATIC



FLOODWAY + FLOODWAY FRINGE = 100 YEAR FLOODPLAIN
SURCHARGE NOT TO EXCEED 1.0 FEET

DEVELOPMENT

Means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, *filling*, grading, paving, excavation or drilling operations or storage of equipment or materials.

** Permits are required for all “development” in the floodplain.*

SUBSTANTIAL DAMAGE

Means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

* Insured buildings that are SD may be eligible for an additional \$30k in coverage to elevate, relocate, demolish, or floodproof (or any combination thereof)

SUBSTANTIAL IMPROVEMENT

Means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the *market value* of the structure before the 'start of construction' of the improvement"

- *Substantial Improvement = "new construction"*
- *RCW 86.16 prohibits SI in floodway*
- *Full definition, see 44CFR59.1 or WA Model Ord Section 2.0*

BANK & LENDER RESPONSIBILITY

Flood insurance is required for all mortgage properties which fall under one of the following three criteria:

- 1. Federally-backed loan**
- 2. Federally-regulated lending institution (FDIC)**
- 3. Sold on secondary market through GSE**

*** Rates and mandatory purchase requirements are linked only to the “effective” maps, not the preliminary maps**

FLOOD INSURANCE AND PRELIMINARY MAPS

- New structures in Approximate A Zones can be permitted and built to the preliminary BFE (if available). Insurance rates for such buildings is considerably less than policies that are rated without a BFE.
- *Conversely...* New structures built to a proposed BFE that is lower than the effective BFE may result in a significantly higher flood insurance rate and should not be permitted.

FLOOD INSURANCE AND PRELIMINARY MAPS

- Policies are rated based on the maps in effect at the start of construction
- If a community uses preliminary BFEs, the flood insurance rate is still based on the FIRM in effect on the date of construction.
 - However...If the new maps indicate a more favorable rate, the policy holder will benefit from the lesser rate when the maps become effective.

FLOOD INSURANCE RATES

2007 Post FIRM Residential Rates (\$100k)

3 ft above BFE = \$196

2 ft above BFE = \$261

1 ft above BFE = \$411

0 ft at BFE = \$741

-1 ft below BFE = \$2,296

-2 ft below BFE = \$2,535

-3 ft below BFE = \$2,825

-5 ft below BFE = \$5,500

FLOOD INSURANCE

Grandfathering Rate Require Documentation

- FEMA will allow the policy holder to continue to benefit from the original rating of that building.
- Policies are transferable from one owner to another (e.g. due sale of property)
- Owner has the option of using the updated maps as the rating criteria for that property or continuing to use the rate established based on the original (old) maps.

Or...

FLOOD INSURANCE

Grandfathering Rate Require Documentation

A policy holder can provide sufficient documentation

- The date of the FIRM in effect when building was constructed
- The flood zone from that FIRM in which the property is located
- The Base Flood Elevation (BFE) for that zone (if applicable)
- A copy of the map panel showing the location of the building
- The rating element that is to be grandfathered (rate or zone).
 - Evidence supporting the rating element includes documents such as Elevation Certificates.
 - A letter from the community official verifying this information also is acceptable, as long as the above information is provided.

FLOOD INSURANCE

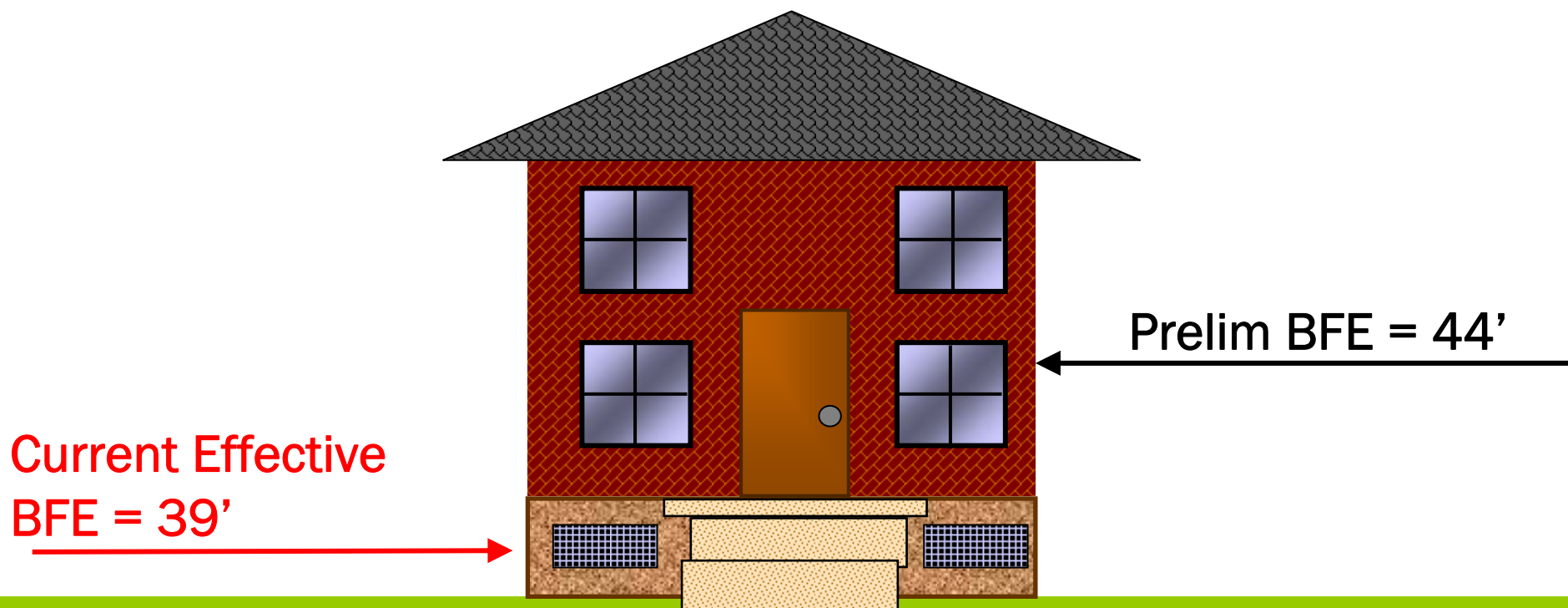
Grandfathering Rates

Why use the draft maps for permitting?

- If a building is voluntarily elevated today using the draft BFEs, when the maps become effective, that owner will still be able to pay rates reflecting the additional freeboard!
- **The key to rating buildings built in compliance with old maps is to retain copies of the old maps!**

GRANDFATHERING

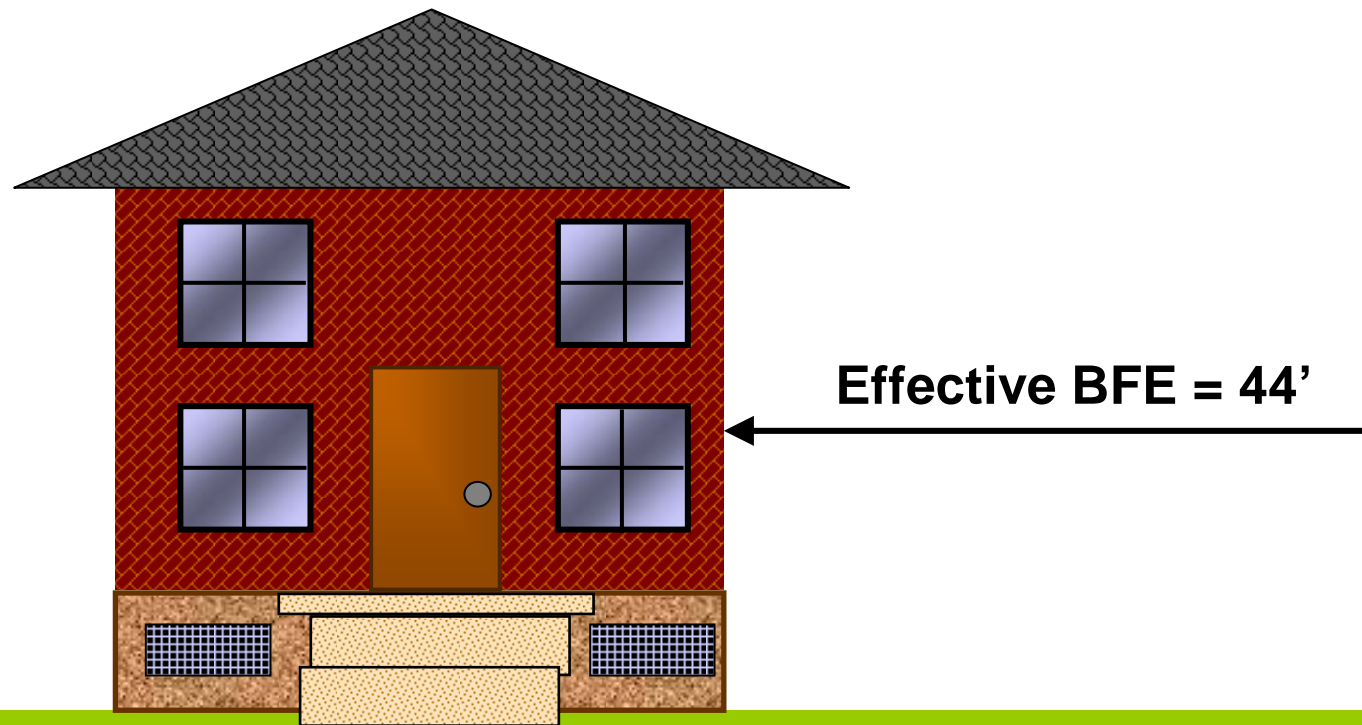
2007 – Existing, Compliant, Post-FIRM Structure



Annual premium: ~\$411 (BFE +1' rate)
for \$100,000 insurance

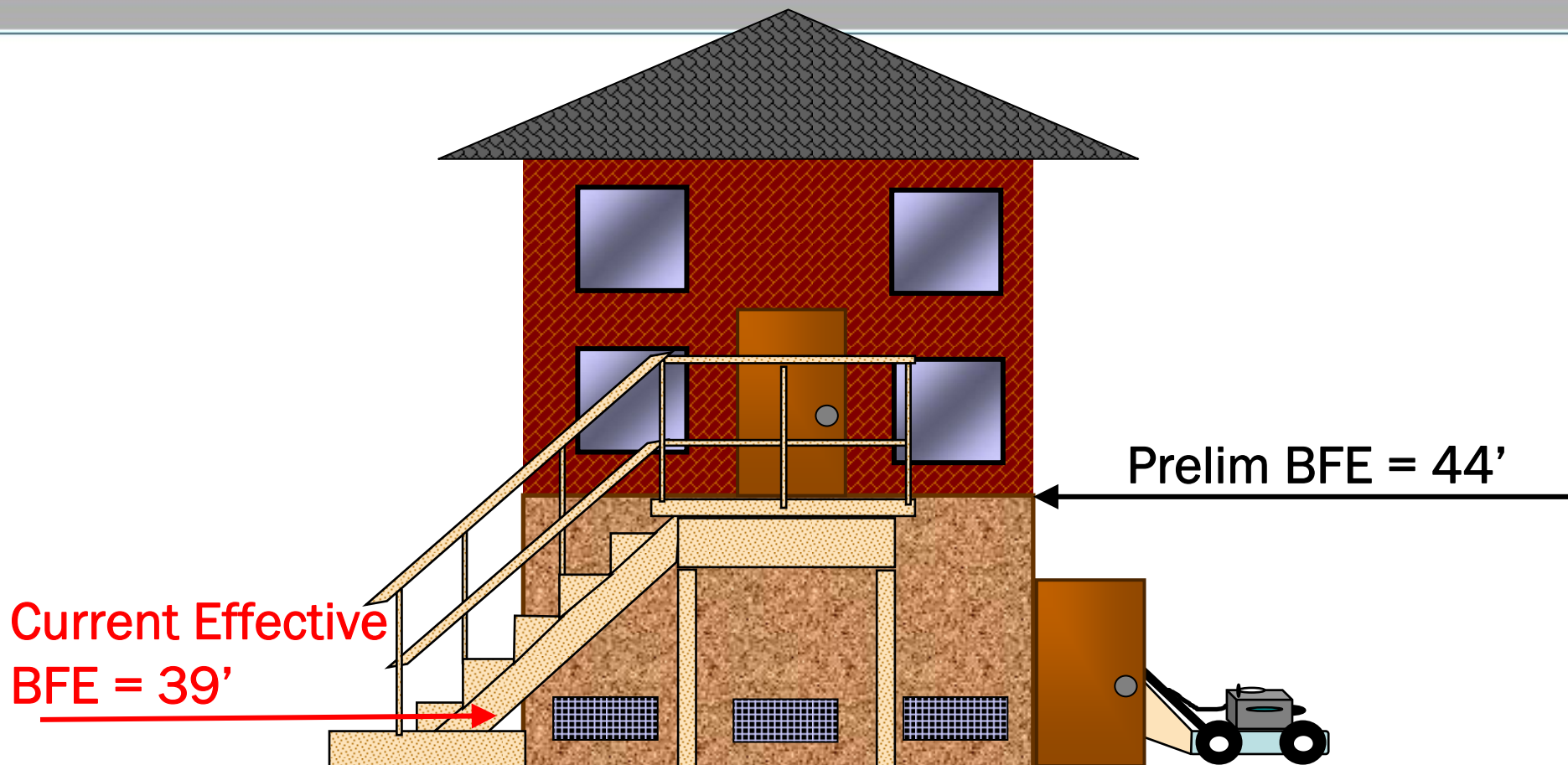
GRANDFATHERING

2007 – Existing, Compliant, Post-FIRM Structure: no changes



GRANDFATHERING

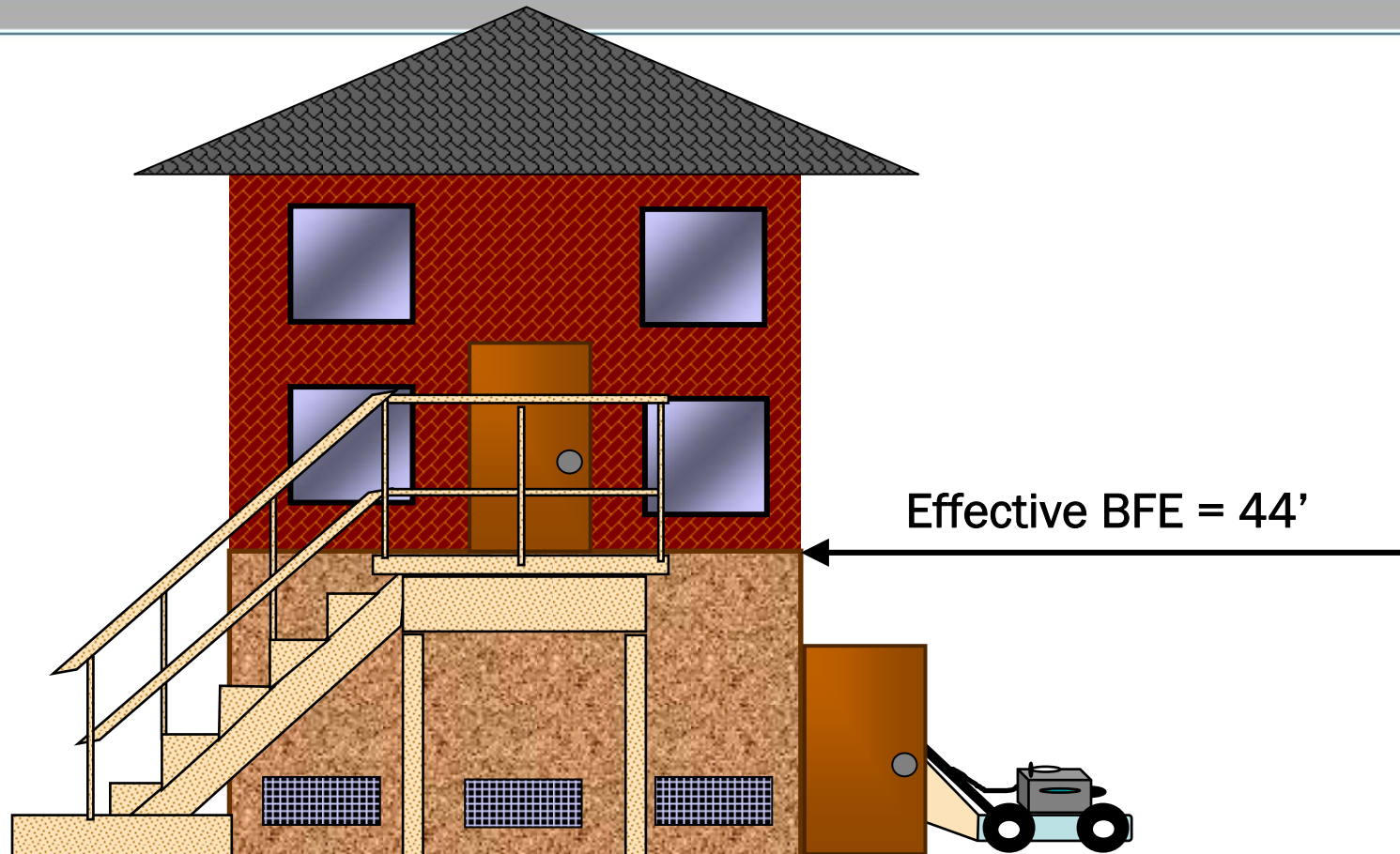
2007 – New construction or substantial improvement



Annual premium: \$196 (BFE + 5' rate)
for \$100,000 insurance

GRANDFATHERING

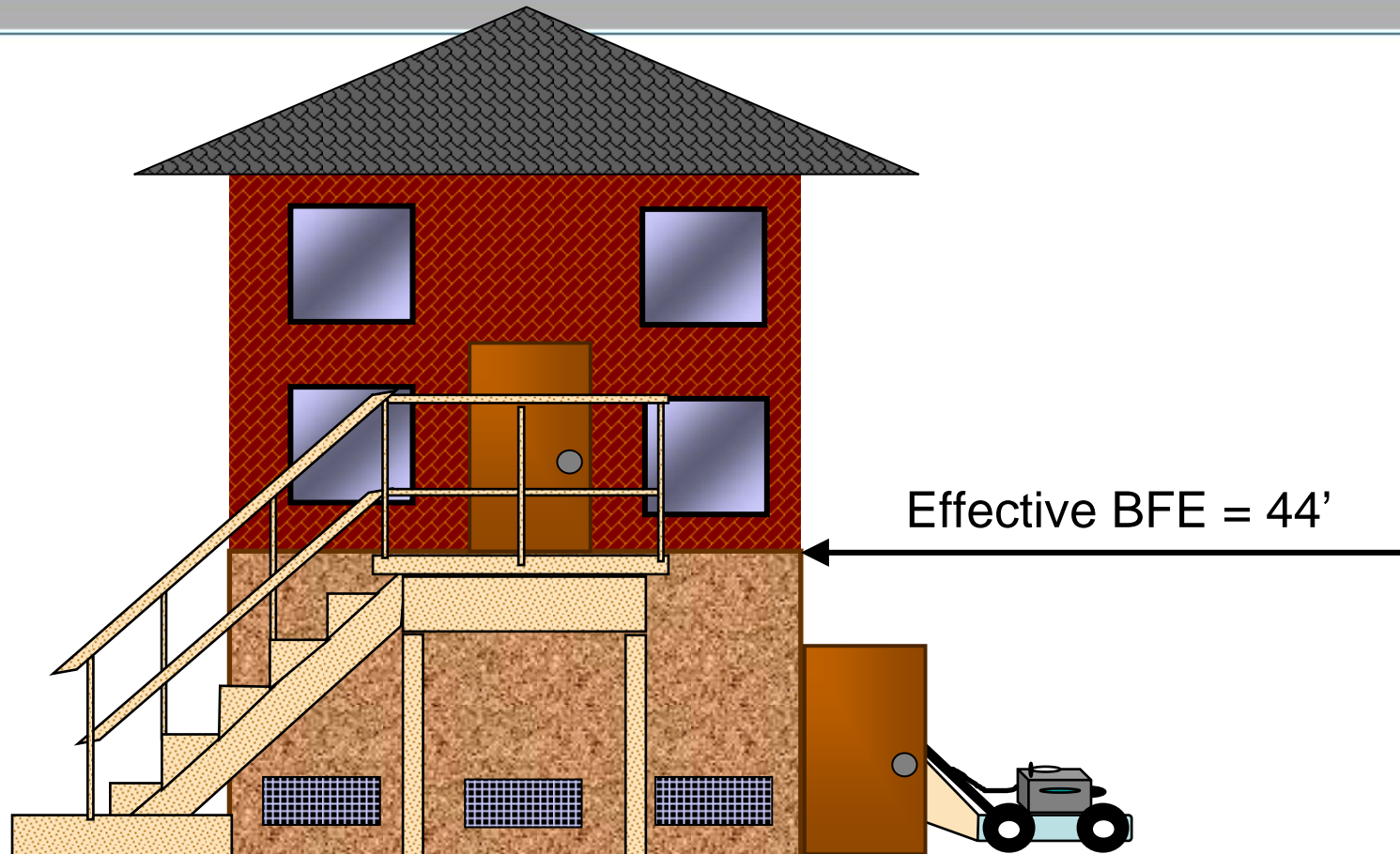
Future new construction or substantial improvement



Annual premium: \$196 (retain BFE + 5' rate)
for \$100,000 insurance

GRANDFATHERING

Future New construction or substantial improvement



No grandfathering annual premium: ~\$741 (at BFE)
for \$100,000 insurance

QUESTIONS & COMMENTS

FEMA Region X - **John Graves, CFM (425) 487-4737**

Ecology, NWRO - **Chuck Steele (425) 649-7139**

NFIP Insurance - **Jeff Woodward (425) 487-4664**

Flood Insurance Information:

www.floodsmart.gov

FAQs for Preliminary FIS usage:

www.fema.gov/plan/prevent/floodplain/fis_data.shtm#4

FAQs for residents living behind levees:

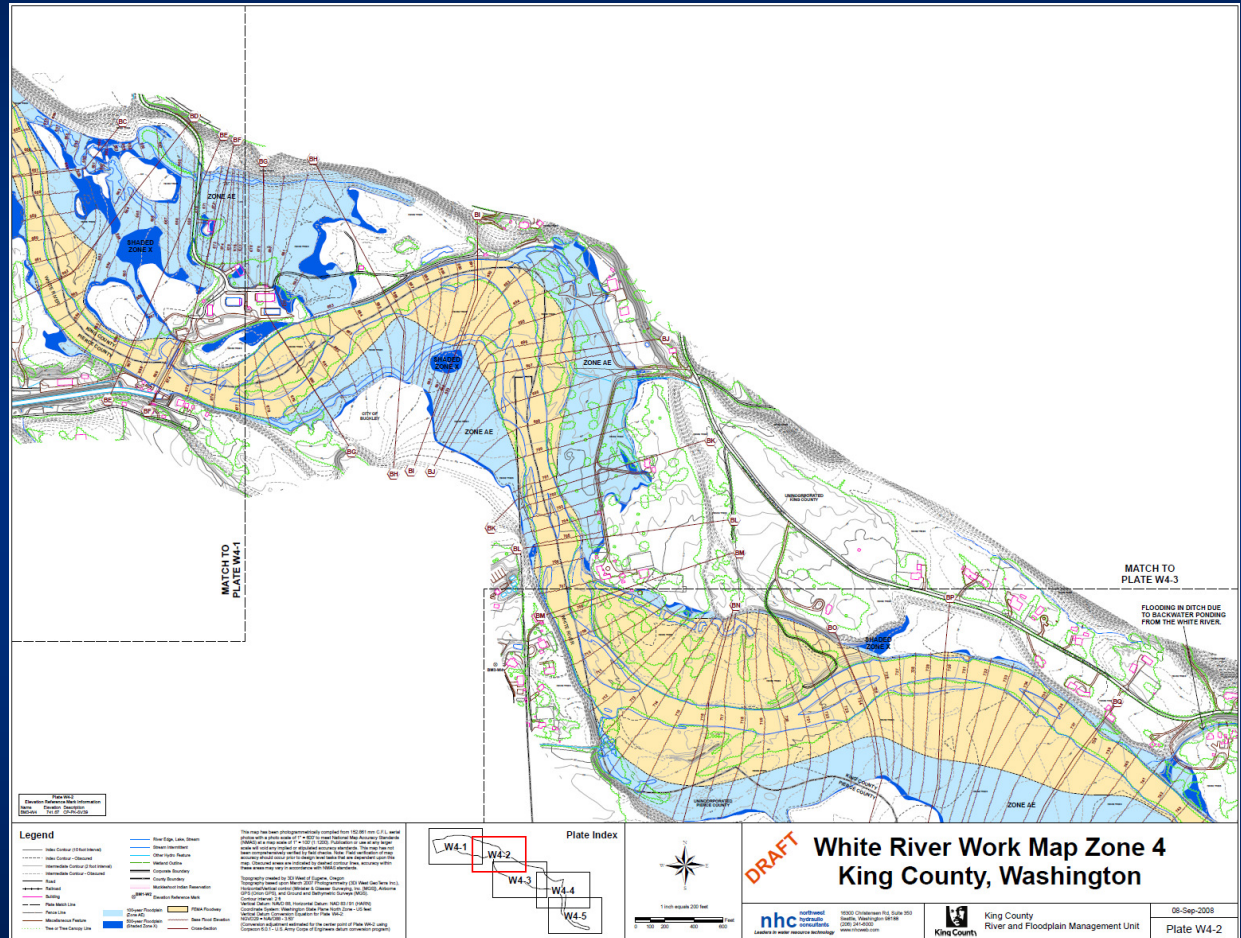
www.fema.gov/plan/prevent/fhm

Study Objective

- The White River flood study was initiated by King County to develop up-to-date and accurate floodplain analyses. The analyses provide the technical information necessary to evaluate and update FEMA's County-wide Preliminary Digital Flood Insurance Rate Map (DFIRM).
 - Effective (printed) White River floodplain maps in King County were based on an approximate study.
 - FEMA's Preliminary DFIRM for King County uses data from the effective maps together with data developed for the Pierce County Preliminary DFIRM
 - These include the City of Buckley FIS which was completed in the mid 1970s and is the only detailed study in Zone 4

Key Technical Tasks – New Data & Analyses

- Channel Surveys
- Aerial Photography
- Topographic Mapping
- Hydrologic Analysis
- Hydraulic Modeling
- Floodway Analysis
- Flood Inundation Mapping
- Study Reporting



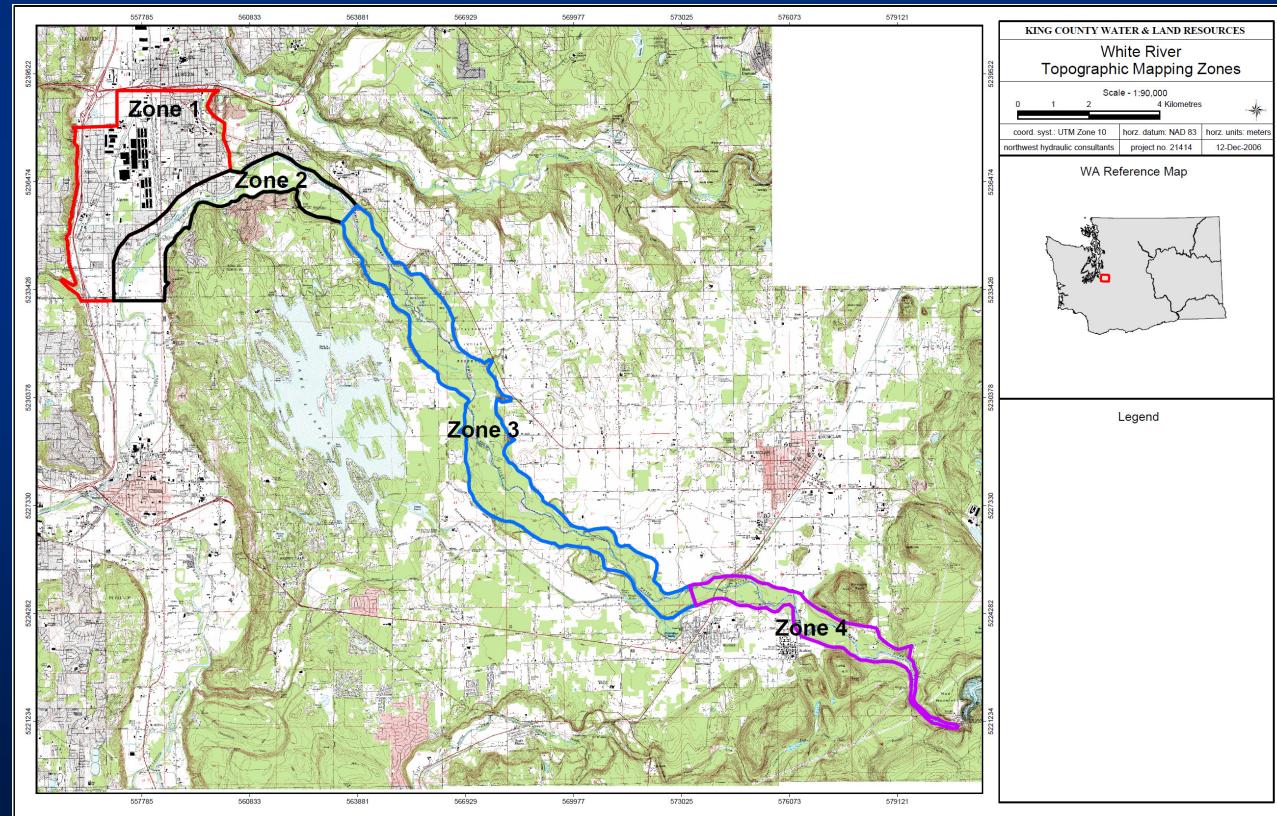
New Bathymetric Surveys

- Surveyed 6.6 Miles of White River from downstream of SR410 (RM 22) to downstream of Mud Mountain Dam (RM 28.6)
- Surveyed by wading or from pontoon boat using GPS equipment and total station
- 38 cross sections surveyed including resurvey of those from previous FIS
- Additional detail collected to define SR-410 bridge and other hydraulic controls



New Topographic Mapping

- New Aerial Photography for four zones along the White River flown on March 29, 2007
- Feature data collection and mapping for Zones 2 and 4 completed in 2007
- Developed new 2-foot contour topographic mapping produced for White River Zone 4, upstream of SR410
- Base maps produced in ArcGIS at 1" = 200 foot scale



Hydrologic Analysis

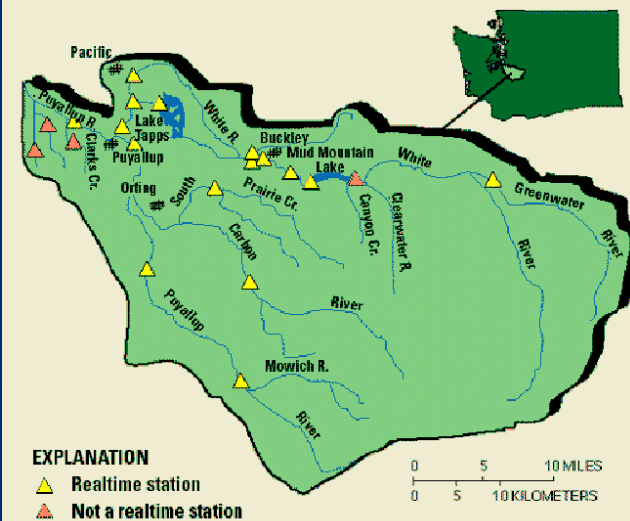
- Used available USGS gage data including White River near Sumner, White River near Auburn
- Used data for 1946 – 2007 period
- Data adjusted to account for current USACE operations and for local inflow at other locations
- Hydrology approach and results submitted to FEMA for review
- Final Discharge Quantiles:

Puyallup River Basin

Real-time Data at [[Current](#) | [Latest](#) | [Graphs](#) | [NWISWeb](#)]

Maps for adjacent basins [[North](#) | [South](#) | [East](#) | [West](#) | [State](#)]

Click on the station to retrieve a graph of the current data. Or select an individual station from the list below.



Puyallup River Basin Real-Time Stations:

Table 4: Final Proposed White River Peak Discharge Quantiles

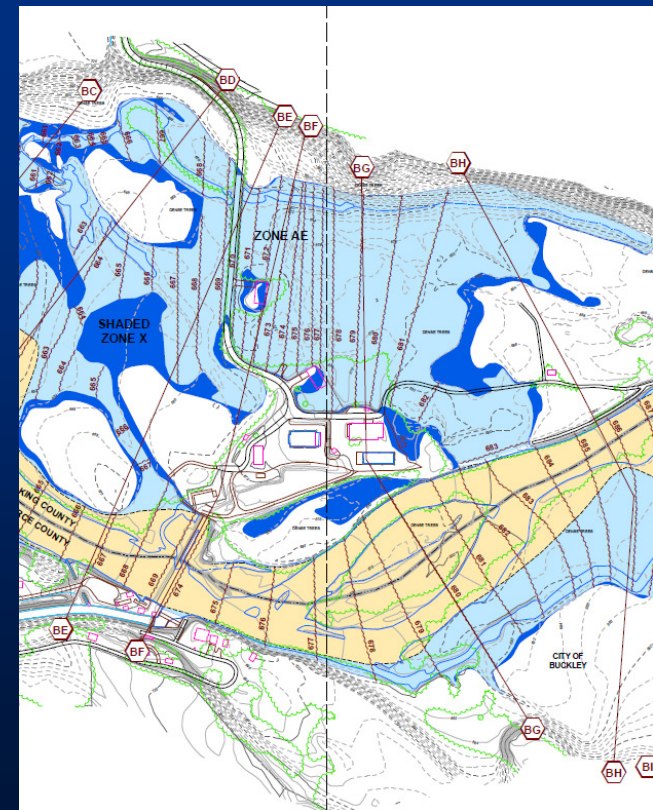
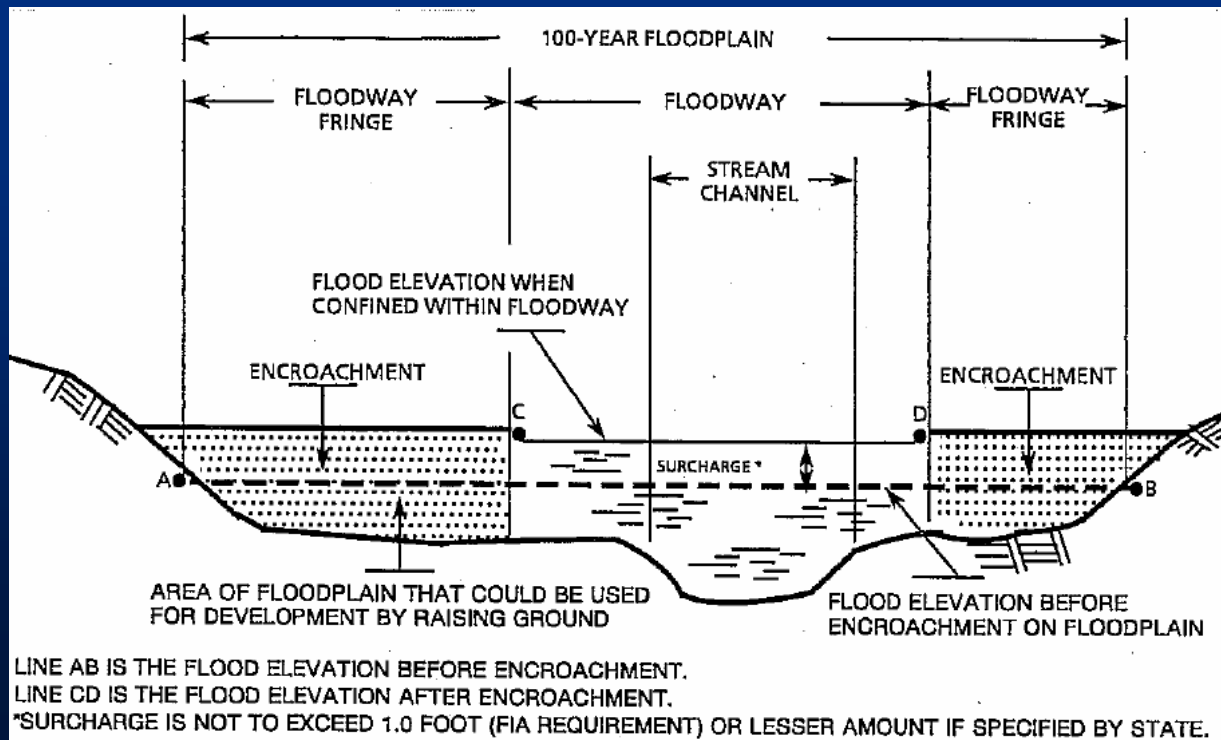
Description of Analysis	Basin Area (mi ²)	Peak Discharge Quantile (cfs)			
		10-year	50-year	100-year	500-year
At Mud Mountain Dam	400	11,900	12,300	12,350	14,500
Upstream of Boise Creek	410	12,300	12,900	13,000	15,400
Downstream of Boise Creek	427	13,000	13,900	14,000	16,800
At Auburn	454	14,000	15,300	15,500	19,000

Hydraulic Modeling and Analysis

- Used other Study Products as input (e.g. cross sections, topography, hydrology)
- Steady Flow Modeling of river hydraulics using U.S. Army Corps of Engineers HEC-RAS Model
- Calibration to recent historic flood events (January 2006, November 2006, March 2007, February 1996)
- Simulation of 10-, 50-, 100-, and 500-year steady state flows
- The only levees in the study reach are overtopped at 100-year event so no need to consider levee failures

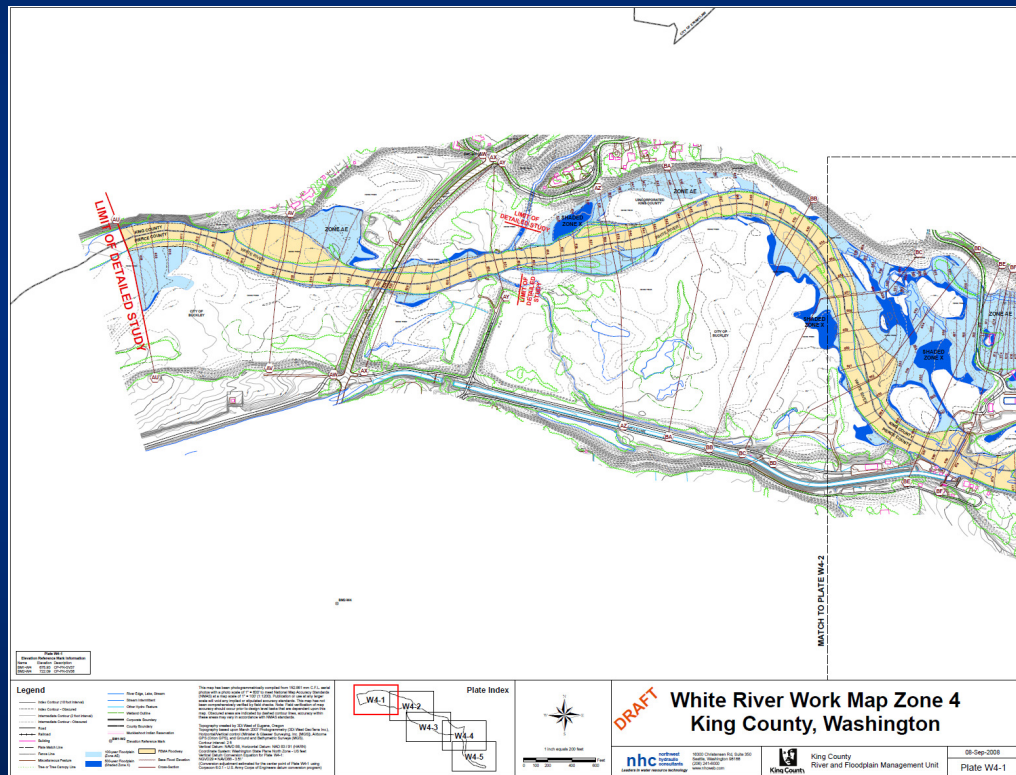
Floodway Analysis

- 100-year flood event simulation becomes “base flood scenario”
- Floodway area must pass 100-year flood without exceeding 1 foot rise in water surface elevation at any point (when compared to base flood)
- Floodway defines area with significantly greater development restrictions



Floodplain Mapping

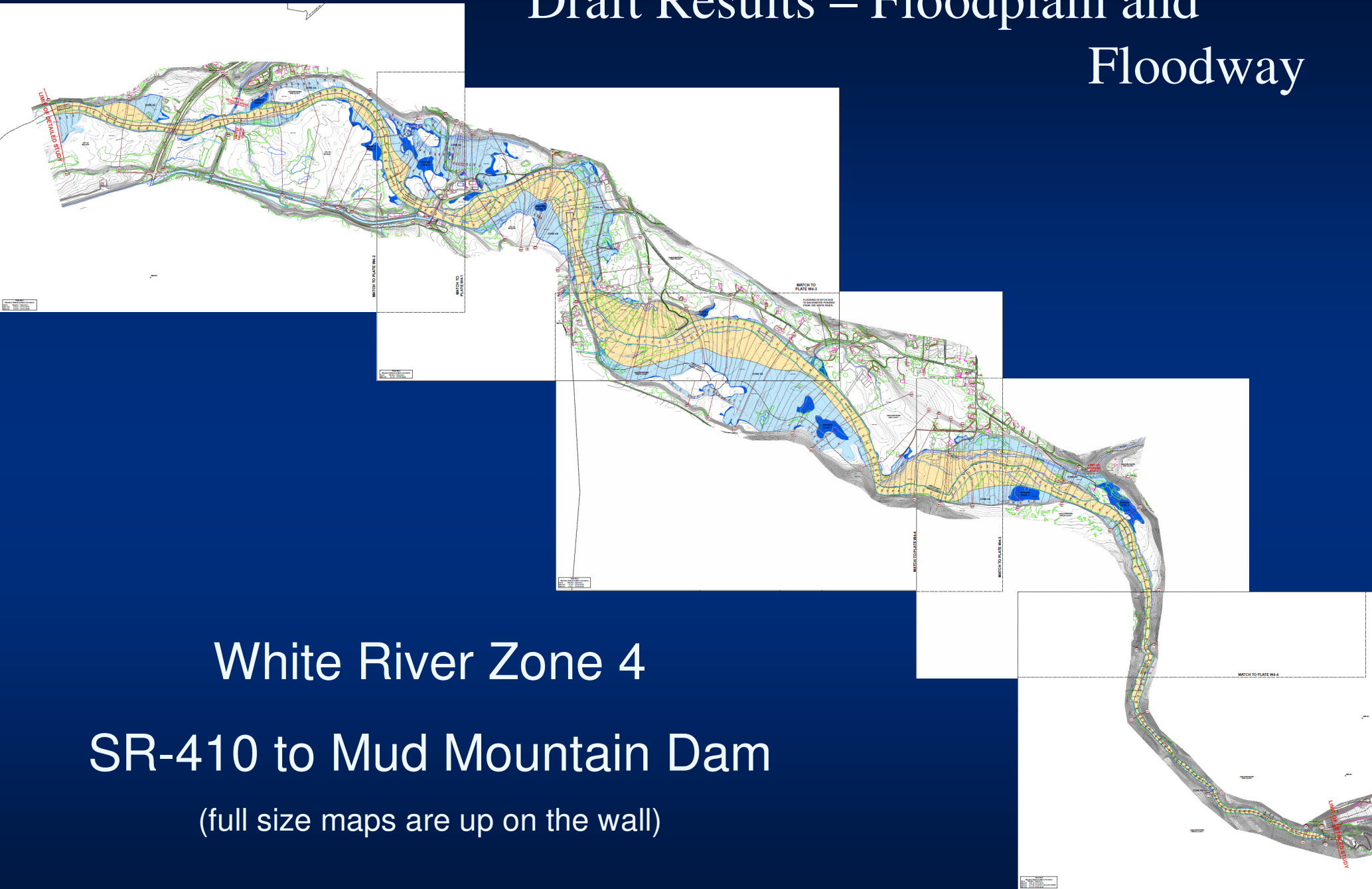
- Transferred data from hydraulic model to topographic map
- Developed Base Flood Elevations (BFEs)
- Mapped 100-year and 500-year inundation limits
- Plotted main channel flood profiles for 10-, 50-, 100-, and 500-year events
- Transferred floodway widths to maps and finalized floodway mapping



Study Documentation

- Data to be submitted and reviewed by FEMA includes:
 - Topographic Mapping
 - Hydrologic Modeling Approach and Results
 - Hydraulic Model (HEC-RAS)
 - Inundation Mapping
 - Floodway Data
 - Study Report
- Revised DFIRM data layers will also be provided to FEMA
- All study data and analyses have been developed in accordance with FEMA Guidelines and Specifications
- Draft floodplain maps will be technically reviewed by FEMA and are subject to revision

Draft Results – Floodplain and Floodway

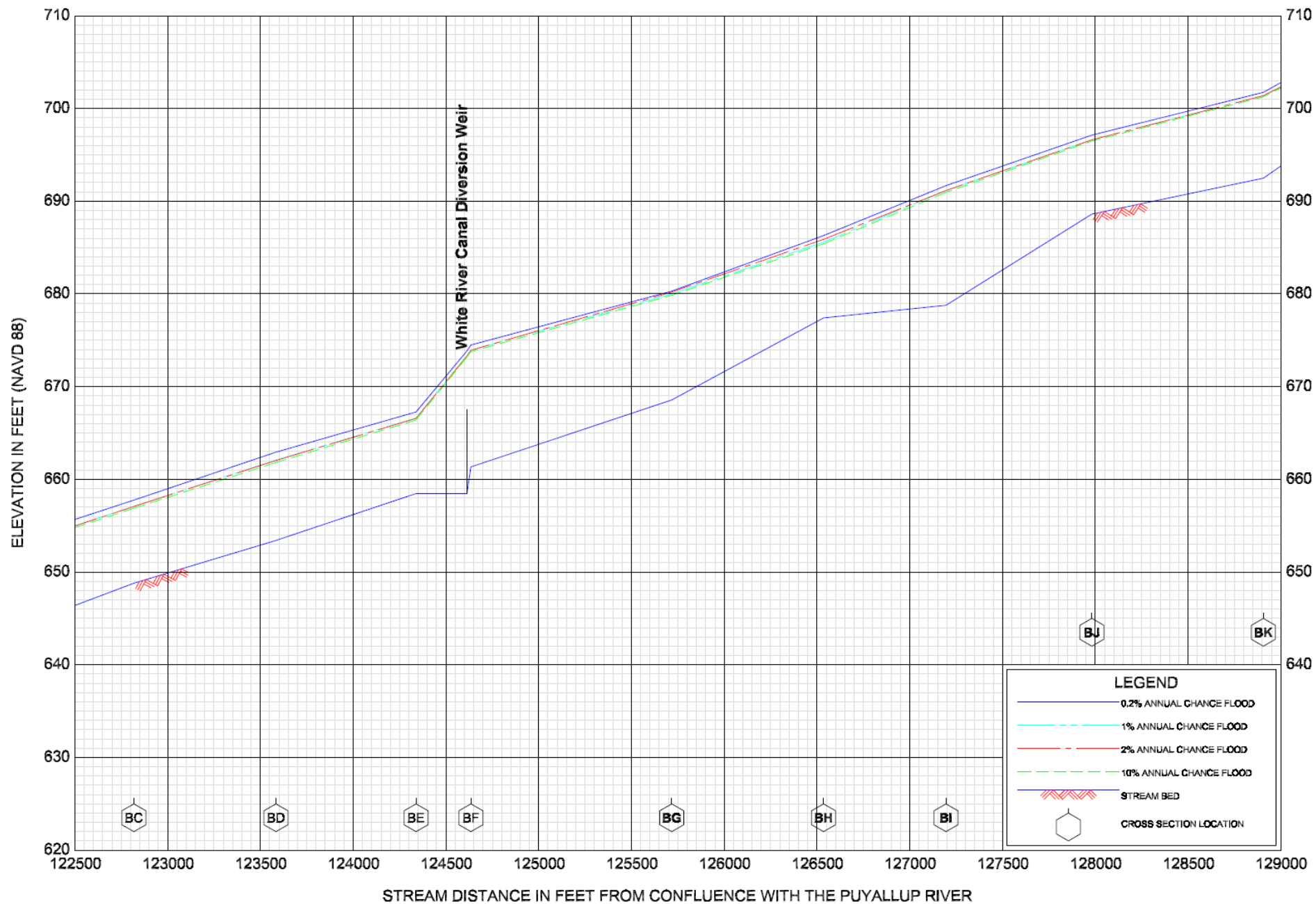


White River Zone 4

SR-410 to Mud Mountain Dam

(full size maps are up on the wall)

Draft Results – Water Surface Profile



FLOOD PROFILES

WHITE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
KING COUNTY, WA
& INCORPORATED AREAS

Z4-2

October 22, 2008

Expected Schedule for Next Steps

Submittal to FEMA

- After public comment period **nhc** will finalize and compile study materials and provide to King County
- Letter of request for study revision and technical materials to be transmitted to FEMA

FEMA Review and Publication

- FEMA has been consulted and is anticipating the submission of new flood study for the White River
- FEMA will review technical materials to ensure the study meets Federal requirements
- After FEMA technically approves the new flood study, FEMA will print a Preliminary Flood Insurance Rate Map

Questions

- Study Coordination
 - Jeanne Stypula – King County River and Floodplain Management
- Technical Analyses
 - Larry Karpach – Northwest Hydraulic Consultants, Inc.
- FEMA Mapping Process and Flood Insurance
 - John Graves - Federal Emergency Management Agency, Region X
- Washington State Flood Hazard Regulations
 - Chuck Steele – Washington State Department of Ecology

Contact Information

King County

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Washington State DOE

Chuck Steele, Floodplain Management Specialist

Department of Ecology SEA Program

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(425) 649-7139

Flooding in Washington State

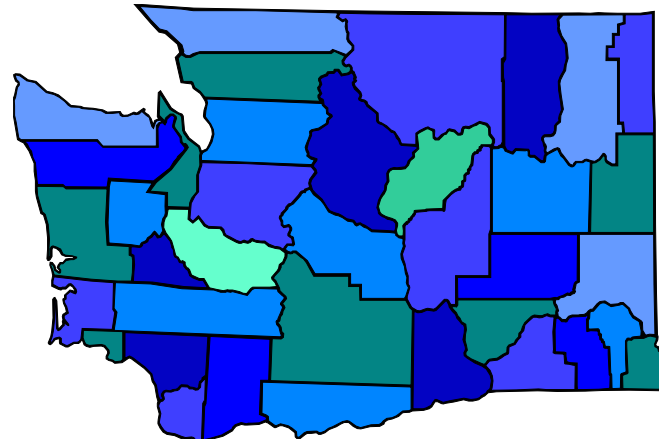
- WA is one of the most flood-prone states in the US
- 29 Presidential flood disasters in last 38 years
- One of first state floodplain laws in the US in 1935
- Amendments in 1969, 1989 and 1999
- Flood disasters in 1990s led to greater state involvement
- Floodway prohibition exceeds Federal regs and programs
- 291 participating communities in the NFIP
- WA has highest number of flood policies west of the Mississippi (except for Tx, La, Cal)
- FCAAP since 1984



Chapter 86.16 RCW

WA Floodplain Management Law

- **1935** – Original law: “Flood Control Zones by State”
- **1969** – Prohibition of residences in floodway: flood control zones only
- **1977** – Maple Leaf Investors v. DOE upheld floodway law
- **1989** – Elimination of 18 flood control zones; expansion of residential floodway prohibition to ALL state floodways
- **1999** – Farmhouse exception to residential floodway prohibition; allowance of certain substantially-damaged residences in the floodway



Residences Prohibited in Floodway per RCW 86.16.041

Construction of residential structures is prohibited

Improvement of residential structures prohibited, unless:

- Improvements (or repairs) do not increase the ground floor area, and:
- Cost of improvements (or repairs) do not exceed 50% of market value of the structure
- Applies to substantial damage also

King Co, Auburn & Pacific have adopted these measures



Farmhouse Exception

Existing farmhouses in floodways can be repaired, reconstructed, replaced or improved per RCW 86.16.041, WAC 173-158-075, subject to:

- Must be located on lands designated as agricultural lands of long-term significance for the commercial production of food or other agricultural products, under RCW 36.70A.170
- No new farmhouses; any new farmhouse must be a replacement for an existing farmhouse on the same site and cannot exceed existing total square footage of the encroachment
- Repairs or improvements cannot increase the total square footage of the encroachment of the existing farmhouse
- Replacement or improved farmhouses must be 1' above BFE



Non-Farm Residential Exception

- Applies only to substantially damaged residences
- WAC 173-158-076 authorizes Ecology to perform floodway assessment of a residence at the request of local government
- Floodway assessment is based on:
 - Depths: cannot exceed more than 3 feet
 - Velocities: cannot exceed more than 3 feet per second
 - Erosion: erosion hazard determined in relation to channel migration zone or existence of bank erosion
- Ecology provides assessment to local government – local government decides whether or not to allow rebuilding
- If construction is allowed:
 - must be no potential site outside floodway
 - replacement structure must be of equivalent use and size; cannot increase square footage
 - lowest floor must be 1' above BFE

