

## **Chapter 432**      **Floodplains**

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### **432.01 Summary of Floodplain Requirements**

This chapter addresses the potential impact of WSDOT projects on floodplains. The chapter focuses mainly on road projects. We briefly address ferries, airports, rail, and nonmotorized transport projects in [Section 432.11](#).

The WSDOT [Floodplain Discipline Report Checklist](#) includes floodplain issues to be addressed in project development, and sources of information. Other references, documents, MOUs, Interagency Agreements, and permits included in this chapter add relevant details.

The 1998 FHWA Environmental Flowchart on Floodplains (Exhibit 432-1) gives a general overview of procedures required for floodplain analysis. The flowchart, which supplements the Floodplain Discipline Report, provides information and guidelines for discussing floodplain impacts with regulators.

Always contact maintenance supervisors during the project development phase to obtain input on existing flood hazards.

## 432.02 Applicable Statutes and Regulations

This section lists the primary statutes and regulations applicable to floodplain issues. Required permits and approvals are listed in [Section 432.10](#).

### 432.02(1) ***National Environmental Policy Act/State Environmental Policy Act***

The National Environmental Policy Act (NEPA), [42 USC 4321](#), requires that all actions sponsored, funded, permitted, or approved by federal agencies undergo planning to ensure that environmental considerations are given due weight in project decision making. For work in floodplains that requires permit approval, environmental documentation must explain the impacts the project will have on these areas, and on the resources within those areas. The State Environmental Policy Act (SEPA), mandates a similar procedure for state and local actions. Federal implementing regulations are at [23 CFR 771](#) (FHWA) and [40 CFR 1500-1508](#) (CEQ). State implementing regulations are in [WAC 197-11](#) and [WAC 468-12](#) (WSDOT) (see Chapters [400](#) and [412](#) for details).

### 432.02(2) ***Endangered Species Act***

All projects with a federal nexus are subject to Section 7 of the Endangered Species Act (ESA) and an analysis is required to ensure compliance with the ESA. The National Marine Fisheries Service (NMFS) issued a Biological Opinion (BO) that noted that continued implementation of the National Flood Insurance Program (NFIP) in the Puget Sound adversely affects the habitat of certain threatened and endangered species. The BO required changes to the implementation of the NFIP in order to meet the requirements of the ESA in the Puget Sound watershed. The Federal Emergency Management Administration (FEMA) Region X has put together an implementation plan that allows communities to apply the performance standards contained in the NFIP BO for Puget Sound by implementing a Model Ordinance, a Programmatic Checklist, or on a permit by permit basis as part of their floodplain development processes as long as it can be demonstrated that there is no adverse effect to listed species (see [Chapter 436](#) for details on ESA compliance).

### 432.02(3) ***Floodplain Management***

Presidential Executive Order (E.O.) [11988 Floodplain Management](#) (May 24, 1977) directs federal agencies to avoid to the extent possible adverse impacts associated with floodplains and to avoid direct or indirect support of development in the floodplain.

### 432.02(4) ***Flood Control Management Act***

The Flood Control Management Act of 1935, [RCW 86.16](#), is the primary statutory authority regulating state flood control jurisdictions, which include flood control districts, counties, and zone districts. The act also regulates flood control management, flood control contributions, cooperation with federal agencies on flood control, and state participation in flood control maintenance. The 1937 [RCW 86.09](#), Flood Control Districts, is the section of the act most relevant to WSDOT projects.

### **432.02(5) Local Ordinances**

Local ordinances are often the key regulatory instrument governing floodplain management. See the WSDOT [Local Environmental Permits and Approvals](#) webpage for details on obtaining local approvals for work in floodplains. Local ordinances must comply with minimum federal standards; however, local jurisdictions may adopt more stringent regulations.

Many local jurisdictions have adopted so called “zero rise” stipulations in their floodplain ordinances. These stipulations disallow any increase in base flood elevation in excess of 0.05 foot. This is the limit of the precision of the models used for flood level calculations, and thus is effectively “zero rise.”

Some local jurisdictions are also adding “compensatory storage” requirements to their floodplain ordinances. These statutes require the excavation of floodplain storage areas to compensate for fill placed in floodplains. They may also stipulate elevation requirements for the location of the compensatory storage area. Currently King and Lewis counties have compensatory storage requirements; however, other jurisdictions are considering developing them as well.

### **432.03 Governor’s Directive on Acquisitions of Agricultural Resource Land**

Governor Gregoire directed WSDOT to notify the Governor’s Chief of Staff when WSDOT is seriously considering the use of agricultural properties. The directive, as conveyed in a letter dated August 17, 2007, is available in [Appendix A](#).

For information on how this directive is being implemented, especially on actions to condemn or purchase designated agricultural resource lands for environmental mitigation purposes.

### **432.04 WDFW Memorandum of Agreement (MOA) for Transportation Activities**

The purpose of this MOA is to establish and promote mutual agreement on the needs and mandates of the respective agencies, to facilitate the consistent and efficient administration of Hydraulic Project Approvals (HPAs) for transportation projects under [RCW 77.55](#) (Construction Projects in State Waters), and [WAC 220-660](#) (Hydraulic Code Rules); to ensure that fish passage at transportation projects is facilitated through [RCW 77.57](#) (Fishways, Flow, and Screening); and facilitate the implementation of the Chronic Environmental Deficiency Program. This agreement replaces the MOA Concerning Construction of Projects in State Waters, June 2002 (see [Chapter 436](#) for details).

## 432.05 Floodplain Discipline Report

A Floodplain Discipline Report must be completed whenever a proposed project intersects with, or is located in, a jurisdictional floodplain, particularly when the placement of new fill, structures, in-water structures (such as barbs or weirs), bridges, channel modifications or re-locations are involved.

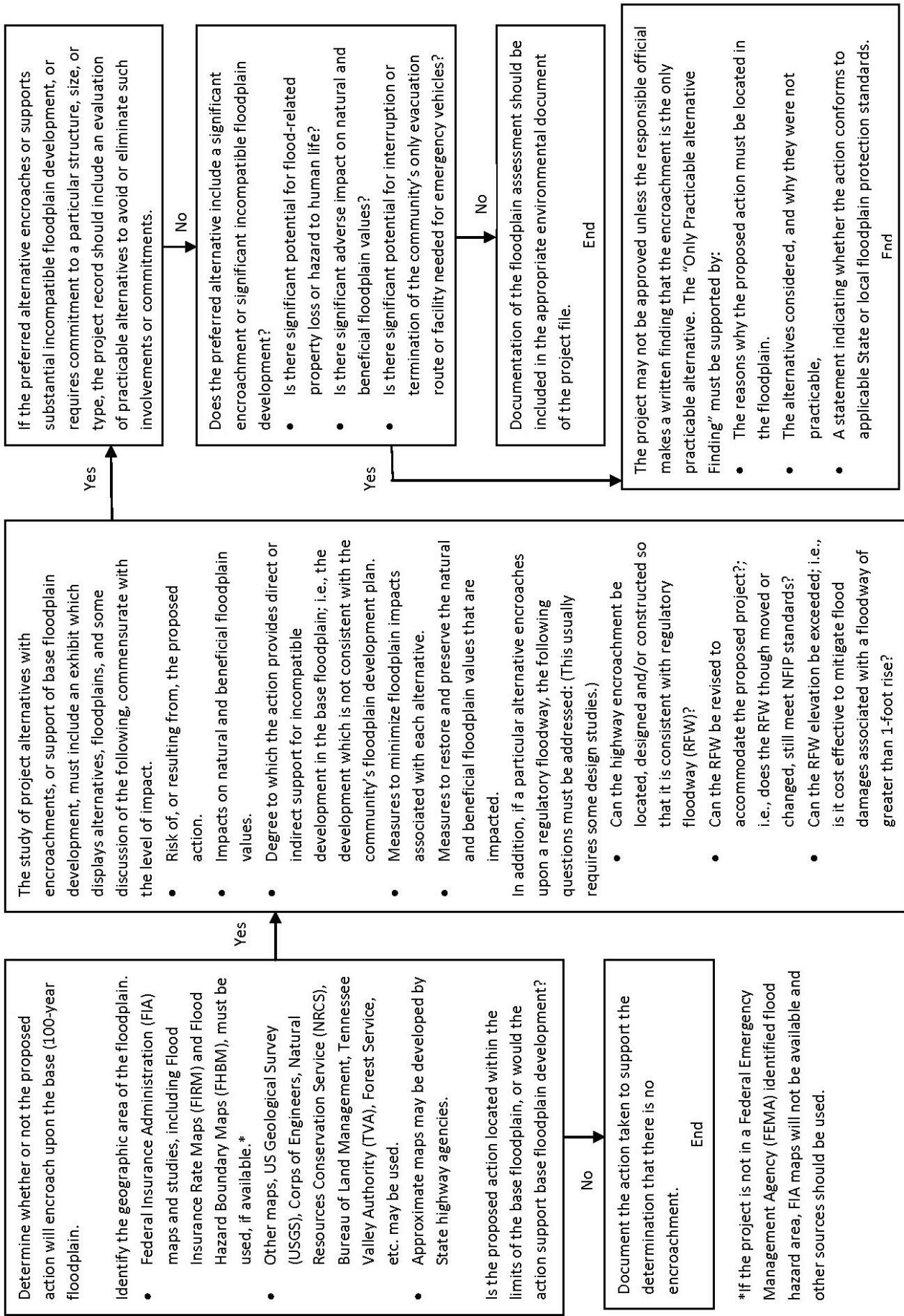
The WSDOT [Floodplain Discipline Report Checklist](#) ensures that floodplain issues are considered in the design of projects. The discipline report should provide the information required for an EIS, EA, or CE, and for floodplain development permits. The extent of analysis should be proportionate to the level of impact without over analyzing or providing unnecessary information.

The checklist includes these sections:

1. Introduction and preliminary drainage survey.
2. Affected environment, shown mainly by mapping.
3. Studies and coordination including flood history, climate impacts vulnerability assessment and identification of permits required.
4. Summary. The summary should include enough detail so it can be included in an EIS with only minor modification. Further instructions pertaining to the Checklist can be found on the *Environmental Manual* website for this chapter.

The 1998 FHWA Environmental Flowchart on Floodplains ([Exhibit 432-1](#)) provides an overview of floodplain issues.

**Exhibit 432-1 1998 FHWA Environmental Flowchart on Floodplains**



## 432.06 FHWA Floodplain Technical Advisory

FHWA [Technical Advisory T 6640.8A](#) (October 1987) gives guidelines for preparing environmental documents, including specifically the section on floodplains. For example, an EIS should identify whether proposed alternatives would encroach on 100 year floodplains, preferably demarcated by NFIP maps. Coordination with the FEMA and appropriate State and local government agencies should be undertaken for each floodway encroachment. If a floodway revision is necessary, an EIS should include evidence from FEMA and State or local agencies indicating that such a revision would be acceptable.

The NFIP Flood Insurance Rate Maps (FIRMs) are designed for insurance purposes. As such, most are not accurate enough to rely upon for engineering design or land use decision making. The NFIP maps tend to underestimate both the extent and depth of inundation, and this tendency should be taken into account. Some of the drawbacks of the FIRM maps are:

- Many do not have calculated Base Flood Elevations (BFEs) at all (i.e., they show only unnumbered A Zones which have limited utility).
- Many are based on outdated hydrographic and channel cross section data.
- Many are based on inadequate topographic data.
- The delineation of channel migration zones (CMZs) and the relationship between the CMZs and the 100-year floodplain are not well established on the FIRM maps, yet these are extremely important considerations with regard to planning transportation projects in the vicinity of floodplains, particularly those located near the larger, more dynamic rivers.

At a minimum, floodplain maps should contain topographic information accurate to two-foot contours or better.

Floodplains should be modeled using current and accurate hydrographic data using current cross sectional data and properly calibrated modeling tools.

In addition to floodplain delineation and base flood elevation calculation, the CMZs should be mapped and overlaid in order to assess the possibility of channel migration or avulsion affecting project longevity.

The floodplain discipline report is structured to meet the requirements of the FHWA technical advisory. However, WSDOT should ensure that all requirements of the FHWA are met by carefully reading the technical advisory, which can be located under floodplain impacts on the FHWA website.

FHWA's online Environmental Review Toolkit contains several floodplain related documents including guidance for the evaluation of encroachments on floodplains.

## 432.07 FHWA Federal-Aid Highway Program Policy & Guidance Center

The Federal-Aid Highway Program Policy & Guidance Center (PGC), contains the FHWA's current policies, regulations, and non-regulatory procedural guidance information related to the federal aid highway program.

The PGC includes regulations and guidance for the location and hydraulic design of highway encroachments on floodplains. Regulatory authority for this guidance is found in [23 CFR 650 Subpart A](#); [42 USC 4001](#) et seq.; Public Law 92 234, 87 Stat. 975.

## 432.08 Flood Emergency Procedures

ESO is coordinating with the WSDOT Maintenance Division to develop guidance for response to flooding and other emergencies. The definition of "emergency" and the appropriate expedited contracting and environmental procedures for responding to emergency are clarified in a memorandum from the Attorney General's Office dated April 19, 2002.

Further development of regional emergency project implementation guidance is needed, similar to the strategic plan for emergency flood repair on the Methow, Okanogan, Similkameen, Entiat, and Nooksack Rivers, prepared in May 1999 by Herrera and Associates, Inc. Reach Analyses prepared by WSDOT ESO for projects in problem areas along the Hoh, Nooksack, Naches, Sauk, Snohomish, Yakima, White, and other rivers provide good templates for developing area specific guidance.

Sites with repetitive damage histories (three events in 10 years) should be considered for nomination to the Chronic Environmental Deficiencies (CED) Program, which addresses sites with repetitive damages associated with watercourses. Under the auspices of the [CED program](#), ESO hydrologists and geomorphologists provide technical assistance to regions in preparing Reach Analyses to develop solutions to complex riverine problems, which become the foundation of a CED project.

## 432.09 Flood Control Assistance Account Program (FCAAP)

The [Flood Control Assistance Account Program \(FCAAP\)](#) is a statewide financial assistance program, established by the legislature in 1984 to help local jurisdictions reduce flood hazards and flood damages ([RCW 86.26](#) and [WAC 173-145](#)). Matching grants are available to counties, cities, towns, special districts, and eligible tribes for comprehensive flood hazard management plans, specific projects or studies, and emergency flood related activities. The program is administered by the Washington State Department of Ecology (Ecology). Applicants must participate in the NFIP. The Ecology website includes a general introduction to FCAAP grants, guidelines on how to apply for grants, an application form to download, sample grant agreements, invoice forms for grant recipients, progress report forms, and contacts at Ecology for more information and help in preparing or implementing grant agreements.

## 432.10 Floodplain Permits and Approvals

Projects affecting floodplains may be subject to one or more of the permits listed in [Chapter 430](#), Surface Water Quality and in [Chapter 436](#) Fish, Wildlife, and Vegetation. The only permit or approvals relating specifically to floodplains are county or city floodplain development permits, however these permits must comply with the NMFS BO for the Puget Sound Watershed, if applicable. For details, see the WSDOT [Local Environmental Permits and Approvals](#) webpage.

## 432.11 Non-Road Project Requirements

Federal agencies maintain their own unique NEPA procedures. As such each agency may have different documentation and procedural requirements for complying with NEPA. If your project has a federal nexus with more than one federal agency, it is critically important to meet with the federal lead agencies and determine how to proceed. In some cases, the federal agencies may agree to co-lead the NEPA process. In others, one agency may serve as lead and the other as a cooperating agency. This decision needs to be made very early in the process to ensure timely approval of your environmental document. The exact requirement will vary depending on the nature of the project, federal permits and approvals required, and individual circumstances. Common examples of projects that require coordination with more than one federal agency are:

- An FHWA funded project that crosses National Forest Lands.
- A project that receives FHWA and FTA funding.
- Any highway project involving FRA or FAA.
- An FHWA funded project that requires an Army Corps of Engineers Individual permit.

## 432.12 Floodplain Resources

### 432.12(1) *Comprehensive Flood Hazard Management Plans*

Ecology's *Comprehensive Planning for Flood Hazard Management* (Ecology Publication #91-44) describes comprehensive flood hazard management plans. Approved plans must meet federal and state requirements for local hazard mitigation plans. Other floodplain resources can be found on the [Ecology website](#).

### 432.12(2) *Local Floodplain Management*

Information on floodplain management with respect to local governments is available online at the [Municipal Research and Services Center](#).

The website includes links to floodplain ordinances for a number of Washington cities and counties.

### 432.12(3) *Emergency Relief Procedures Manual M 3014*

WSDOT provides this manual to assist in obtaining federal resources for the repair of local federal aid highway facilities damaged and/or destroyed by natural disasters or major catastrophes. It provides the legal and procedural guidelines for WSDOT employees to



prepare all necessary documentation to respond to, and recover from, emergencies/disasters that affect the operations of the department.

#### **432.12(4) Climate Change**

During the 20th century, Earth's globally averaged surface temperature rose by approximately 1°F. Additional warming of more than 0.25°F has been measured since 2000. Over the 21st century, climate scientists expect Earth's temperature to continue increasing. Two anticipated results are rising global sea level and increasing frequency and intensity of floods.

Recognizing the vulnerability of our transportation system and the value of the system to the community it serves, the USDOT, FHWA, and WSDOT have adopted policies and developed guidance to improve the resiliency of the transportation system in light of anticipated changes. NEPA provides an avenue to better informed decisions and public involvement when considering actions to improve resiliency of projects to accommodate future conditions that are likely to occur within the service life of the facility.

In 2011 DOT Secretary LaHood issued a [policy statement on climate change adaptation](#). DOT published a [Climate Adaptation Plan](#) in 2013 that identified the climate adaptation strategies of its transportation missions, programs, and operations. As stated in the policy statement, every modal administration has the responsibility to consider climate change impacts on current systems and future investments.

In 2014 FHWA issued [FHWA Order 5520](#) to address climate change resiliency. Consequently, FHWA has developed technical manuals to assist state DOTs in assessing risks to highways in the coastal environment and floodplains, as well as tools to assess vulnerabilities and develop adaptations.

- FHWA, 2014. [Highways in the Coastal Environment: Assessing Extreme Events. Hydraulic Engineering Circular No. 25 - Volume 2.](#)
- FHWA, 2016. [Highways in the River Environment - Floodplains, Extreme Events, Risk, and Resilience. Hydraulic Engineering Circular No. 17, 2nd Edition](#)
- FHWA, 2017. [Vulnerability Assessment and Adaptation Framework, 3rd Edition. FHWA-HEP-18-020](#)

WSDOT completed a [Climate Impacts Vulnerability Assessment in 2011](#). Segments of the state highway system that were identified as having a high vulnerability were typically segments of the highway that were in the floodplain and or adjacent to tidal waters. See our [Addressing climate change in planning and project documents](#) web page for more information.

The guidance documents describe how to document how climate change and extreme weather vulnerability are to be considered in plan and project development as well as propose ways to improve resilience. In addition, the [FHWA Climate Change Adaptation Case Studies website](#) explores examples of how different projects have used their NEPA or other environmental reviews to plan for climate change impacts.

### 432.12(5) **WSDOT GIS Workbench**

The WSDOT GIS Workbench contains much useful information. This tool is a GIS interface for internal WSDOT users only. It has numerous layers of environmental and natural resource management data. WSDOT works with federal, state, and local agencies to maintain a collection of the best available data for statewide environmental analysis. Available data sets include FEMA data, climate impacts vulnerability assessment data and other information necessary to write the floodplain reports. Local jurisdictions can be contacted to find out whether additional local floodplain mapping is available, on GIS or hard copy. WSDOT's GIS staff process requests for access to the workbench and a list of current data sets.

### 432.13 **Abbreviations and Acronyms**

BFE	Base Flood Elevation
CMZ	Channel Migration Zone
FAPG	Federal Aid Policy Guide
FCAAP	Flood Control Assistance Account Program
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
NFIP	National Flood Insurance Program

### 432.14 **Glossary**

**Avulsion**—A sudden, dramatic shift of the river into a new course or channel

**Base Flood Elevation (BFE)** – The calculated or estimated 100 year flood water surface elevation.

**Compensatory Storage** – A provision of some local floodplain ordinances requiring the excavation of floodplain storage area as compensatory mitigation for fill placed in floodplains. The ordinances may also stipulate elevation requirements for the location of the compensatory storage area.

**Flood** – A general and temporary condition of partial or complete inundation of normally dry land areas from one of the following four sources:

- Overflow of inland or tidal waters.
- Unusual and rapid accumulation or runoff of surface waters from any source.
- Mudslides or mudflows that are like a river of liquid mud on the surface of normally dry land area, as when earth is carried by a current of water and deposited along the path of the current.
- Collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water.

**Floodplain** – Any land area susceptible to being inundated by flood waters from any source; usually the flat or nearly flat land on the bottom of a stream valley or tidal area that is covered by water during floods.

**Floodplain Boundaries** – Lines on flood hazard maps that show the limits of the 100 and 500 year floodplains.

**Floodway** – The channel of a river or watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively raising the water surface elevation more than a designated height. Normally, the base flood is defined as the 1 percent chance flood and the designated height is one foot above the pre floodway condition.

**Special Flood Hazard Area** – An area with a one percent chance of being flooded in any given year. You may also hear this called 100 year floodplain. FEMA further defines a variety of zones within special flood hazard areas which describe whether the determination is based on approximate or detailed flood studies, and whether formal BFEs have been established.

**Zone A** indicates an unnumbered A zone without formal BFEs established. Zone is established through approximation.

**Zones AE and A1 A30** indicate that the zone has established BFEs derived from a detailed hydraulic analysis.

**Zone AH** usually corresponds to areas of ponding with relatively constant surface elevations. Average depths are between one and three ft.

**Zone AO** corresponds to areas of shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three ft.

**Zone AR** depicts areas in the floodplain that are protected by flood control structures such as levees that are being restored.

**Zone A99** corresponds to areas that will be protected by a Federal flood protection structure or system where construction has reached statutory milestones. No BFEs are depicted in these zones.

**Zone D** indicates the possible but undetermined presence of flood hazards.

**Zone V** indicates additional coastal flooding hazards such as storm waves. Study is approximate and no BFEs are shown.

**Zone VE** indicates additional coastal flooding hazards such as storm waves. Study is detailed and BFEs are shown.

**Zones B, C, and X** correspond to areas outside of the 1 percent recurrence floodplain with a one percent chance of shallow sheet flow or minor stream flooding with water depths of less than one ft. Studies are approximate and no BFEs are shown for these areas.

**Zero Rise (floodplain)** – A provision of many local floodplain ordinances that disallows any increase in base flood elevation in excess of 0.05 ft.

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